925 Grand Boulevard, Kansas City, MO

THE GRAND RESERVE

September 9, 2020
Construction Documents

OWNER
Delta Quad Holdings, LLC
70932 Cambridge Court
Niles, MI 49120

ARCHITECT
Browning Day Mullins Dierdorf
626 North Illinois Street
Indianapolis, IN 46204
P 317.635.5030
www.bdmd.com

CONSTRUCTION MANAGER
Rau Construction Co.
9101 West 110th Street, Suite 150
Overland Park, KS 66210
P 913.642.6000
www.rauconstruction.com

CIVIL ENGINEER
SK Design Group, Inc.
4600 College Boulevard, Suite 100
Overland Park, KS 66211
P 913.451.1818
www.skdesigngroup.net

STRUCTURAL ENGINEER
Lawson Elser, Inc.
650 East Carmel Drive, Suite 150
Carmel, IN 46032
P 317.574.9431
www.lawsonelser.com

MEP ENGINEER
Hoss & Brown Engineers, Inc.
11205 West 79th Street, Suite 102
Lenexa, KS 66214
P 913.362.9090
www.h-be.com

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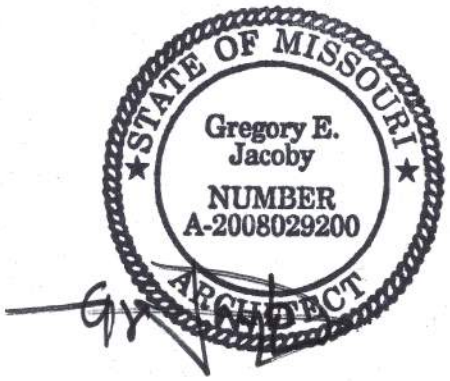
CERTIFICATIONS

PROJECT MANUAL FOR:

The Grand Reserve

BROWNING DAY MULLINS DIERDORF
Architecture and Landscape Architecture



Greg Jacoby

CERTIFICATIONS

PROJECT MANUAL FOR:

The Grand Reserve
LAWSON ELSER INC.

Michael J Lawson
PE-20020116439

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CERTIFICATIONS

PROJECT MANUAL FOR:

The Grand Reserve

SK DESIGN GROUP, INC.
Civil Engineers

Gary M. Urkevich, PE, PLS

CERTIFICATIONS

PROJECT MANUAL FOR:

The Grand Reserve

Hoss & Brown Engineers
Mechanical, Plumbing, and Electrical
Systems Design

Casey Steiner

DOCUMENT 00 31 19 - EXISTING CONDITION INFORMATION

1.1 EXISTING CONDITION INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. Existing drawings that include information on existing conditions are available for viewing through the office of Architect.

END OF DOCUMENT

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DOCUMENT 00 31 26 - EXISTING HAZARDOUS MATERIAL INFORMATION

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. An Environmental Assessment report and information is available through RAU Construction.

C. Related Requirements:

1. Document 003119 "Existing Condition Information" for information about existing conditions that is made available to bidders.

END OF DOCUMENT

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SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Future work.
5. Access to site.
6. Work restrictions.
7. Specification and Drawing conventions.
8. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification and Team Members: Refer to Directory immediately following the end of this Section.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Construction of site work and renovation of the building for new use as a hotel…

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. Preceding Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations are scheduled to be substantially complete before Work under this Contract begins.

1. Asbestos and lead based paint remediation.
2. Demolition.

1.6 ACCESS TO SITE

A. General Contractor shall have full use of Project site for demolition operations during demolition period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

THE GRAND RESERVE

925 Grand Boulevard
Kansas City, Missouri

Owner	**DELTA QUAD HOLDINGS, LLC** 70932 Cambridge Court Niles, MI 49120	 P 000.000.0000 F 000.000.0000
Architect	**BROWNING DAY MULLINS DIERDORF** 626 North Illinois Street Indianapolis, IN 46204	P 317.635.5030 F 317.634.5409 www.bdmd.com

Responsible for overall design direction and coordination with all – ownership, Hilton, design disciplines. Prepare documentation for bidding and construction.

Landscape Architect	**BROWNING DAY MULLINS DIERDORF** 626 North Illinois Street Indianapolis, IN 46204	P 317.635.5030 F 317.634.5409 www.bdmd.com

Responsible for design and coordination of exterior softscape (planters) and collaboration of interior water feature and plantings. Prepare documentation for bidding and construction.

Structural Engineer	**Lawson Elser, Inc.** 650 East Carmel Drive, Suite 150 Carmel, IN 46032	P 317.574.9409 F 317.574.9431 www.lawsonelser.com

Responsible for design and coordination of garage repair, tower elevation repair, structural renovation work on interior of building. Prepare documentation for bidding and construction.

Civil Engineer	**SK Design Group, Inc.** 4600 College Boulevard, Suite 100 Overland Park, KS 66211	P 913.451.1818 F 913.451.7599 www.skdesigngroup.net

Responsible for design and development of all streetscape/street/utility work on exterior of property. Lead design team through review and approval process with government agencies overseeing these areas – Parks and Rec (Grand Ave), KCMO (balance of streetscape). Prepare documentation for bidding and construction.

MEP Engineer	**Hoss & Brown Engineers, Inc.** 11205 West 79th Street, Suite 102 Lenexa, KS 66214	P 913.362.9090 www.h-be.com

Responsible for design and coordination MEP systems. Develop and oversee investigation into viability of existing utilities within existing building. Develop scope documentation for maintenance work for parking garage. Prepare documentation for bidding and construction.

Interior Designer	**MatchLine Design Group** 10300 North Central Expressway, Suite 335 Dallas, TX 75231	P 972.707.0568 www.matchlinedesign.com

Responsible for design and coordination of interior finishes and furnishings. Coordinate and develop design elements to meet brand standards with architect and brand. Assist, as need, with procurement of furnishings. Prepare documentation for bidding and construction.

Food Service Consultant

Reitano Design Group
302 North East Street, Studio One
Indianapolis, IN 46202
P 317.637.3204
www.reitanodesigngroup.com

Responsible for design and coordination food service function and equipment. Develop design of food service to meet brand requirements. Prepare documentation for bidding and construction.

Elevator Consultant

Van Deusen & Associates, Inc.
3636 South Geyer Road, Suite 100
St. Louis, MO 63127
P 314.858.1100
www.vdassoc.com

Responsible for evaluation of existing elevators and equipment. Report on ability of system to perform in meeting brand operations requirements. Assist in preparing documentation for bidding and construction.

Food Service Consultant

Network Technologies, Inc.
320 South Perry Street
Lawrenceville, GA 30046
P 678.460.3928
www.nitconsultants.com

Responsible for design and coordination of low voltage and A/V systems. Develop design of low voltage and A/V to meet brand requirements. Prepare documentation for bidding and construction.

Code Consultant

FSC, Inc.
9225 Indian Creek Parkway, Suite 300
Overland Park, KS 66210
P 913.722.3473
www.fsc-inc.com

Responsible for development and implementation of code strategy for project. Assist ownership and design team in preparing any documentation required for Code Modification Requests (CMR) for project. Assist in preparing documentation for bidding and construction.

Historic Preservation Consultant

MacRostie Historic Advisors, LLC.
263 Summer Street, 6th Floor
Boston, MA 02210
P 617.531.7160
F 617.499.4019
wwwmacrostihistoric.com

Responsible for development and implementation of historic preservation strategy and documentation for project. Assist ownership and design team in preparing any documentation required tax credits and NPS review and approvals for project. Assist in preparing documentation for bidding and construction.

Construction Manager

Rau Construction Co.
9101 West 110th Street, Suite 150
Overland Park, KS 66210
P 913.642.6000
F 913.642.6031
www.rauconstruction.com

Responsible to oversee overall construction schedule and budget for project. Work with ownership to develop and maintain all requirements of local jurisdictions regarding zoning, permits, and any other project specific requirements (MBE, WBE guidelines).

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. RFIs.
4. Digital project management procedures.
5. Project meetings.

B. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.3 DEFINITIONS

A. BIM: Building Information Modeling.

B. RFI: Request for Information. Request from Owner, Construction Manager/General Contractor, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.

2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, in web-based Project software directory (if used), and in prominent location in facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

1.6 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall carefully study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation prepare. If, upon completion of previous steps, Contractor has not found required information they shall submit an RFI in the form specified.

1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Excessive/Frivolous RFIs: Design Team reserves the right to seek additional services if numerous RFIs are found to be result of lack of careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation per Article 4.2.2 of AIA Document B101. Addition services expense to be issued as deduct Change Order to project.

C. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect and Construction Manager/General Contractor.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI. Goal should be to have solution be no cost to the Project.
12. Documentation showing all available sources for answer to issue have been exhausted. Example of checklist attached at end of the specifiaction section.
13. Contractor's signature.
14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

D. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in PDF format.
2. Form must include documentation review checklist (example at end of section) showing review prior to submission of RFI.

E. Architect's and GC/Construction Manager's Action: Architect and GC/Construction Manager will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect or GC/Construction Manager after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for approval of Contractor's means and methods.
   d. Requests for coordination information already indicated in the Contract Documents.
   e. Requests for adjustments in the Contract Time or the Contract Sum.
   f. Requests for interpretation of Architect's actions on submittals.
   g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect or GC/Construction Manager of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.

   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and GC/Construction Manager in writing within 10 days of receipt of the RFI response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log on week prior to regularly scheduled Project Progress meetings. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect and GC/Construction Manager].
4. RFI number including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's and GC/Construction Manager's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

G. On receipt of Architect's and GC/Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and GC/Construction Manager within seven days if Contractor disagrees with response.

1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model will be provided by Architect for Contractor's use during construction.

1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in Autodesk REVIT 17.
4. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.

    a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Architect.

B. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. File name format: Architect’s project number date descriptor.

    a. Example: 18A023 180415 RFI 13.

4. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times a minimum of 10 working days prior to meeting.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, GC/Construction Manager, and Architect, within three days of the meeting.

B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, GC/Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Responsibilities and personnel assignments.
    b. Tentative construction schedule.
    c. Phasing.
    d. Critical work sequencing and long lead items.
    e. Designation of key personnel and their duties.
    f. Lines of communications.
    g. Use of web-based Project software.
    h. Procedures for processing field decisions and Change Orders.
    i. Procedures for RFIs.
    j. Procedures for testing and inspecting.
    k. Procedures for processing Applications for Payment.
    l. Distribution of the Contract Documents.
    m. Submittal procedures.
    n. Use of the premises and existing building.
    o. Work restrictions.
    p. Working hours.
    q. Responsibility for temporary facilities and controls.
    r. Procedures for moisture and mold control.
    s. Procedures for disruptions and shutdowns.
    t. Construction waste management and recycling.
    u. Parking availability.
    v. Office, work, and storage areas.
    w. Equipment deliveries and priorities.
    x. First aid.
    y. Security.
    z. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Progress Meetings: Conduct progress meetings at regular intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, GC/Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All

participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

      1) Review schedule for next period.

   b. Review present and future needs of each entity present, including the following:

      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Off-site fabrication.
      6) Access.
      7) Site use.
      8) Temporary facilities and controls.
      9) Progress cleaning.
      10) Quality and work standards.
      11) Status of correction of deficient items.
      12) Field observations.
      13) Status of RFIs.
      14) Status of Proposal Requests.
      15) Pending changes.
      16) Status of Change Orders.
      17) Pending claims and disputes.
      18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's Construction Schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Unusual event reports.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

C. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF file.

B. Startup construction schedule.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

D. Construction Schedule Updating Reports: Submit with Applications for Payment.

E. Daily Construction Reports: Submit at monthly intervals.

F. Site Condition Reports: Submit at time of discovery of differing conditions.

G. Unusual Event Reports: Submit at time of unusual event.

H. Qualification Data: For scheduling consultant.

1.5 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

B. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
3. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and GC/Construction Manager's administrative procedures necessary for certification of Substantial Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Work Restrictions: Show the effect of the following items on the schedule:

a. Protection of historic materials and items as documented in Drawings.

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.

F. Contractor's Construction Schedule Updating: At intervals corresponding with regularly scheduled progress meetings, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

H. Distribution: Distribute copies of approved schedule to Architect, GC/Construction Manager, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.7 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 30 days of date established for the Notice of Award.

1. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.8 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.
9. Meetings and significant decisions.
10. Unusual events.
11. Stoppages, delays, shortages, and losses.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

C. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final completion construction photographs.

1.3 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within five days of taking photographs.

1. Submit photos on CD-ROM or thumb-drive or by uploading to web-based project software site. Include copy of key plan indicating each photograph's location and direction.
2. Identification: Provide the following information with each image description [:

a. Name of Project.
b. Name and contact information for photographer.
c. Name of Architect.
d. Name of Contractor.
e. Date photograph was taken.
f. Description of location, vantage point, and direction.
g. Unique sequential identifier keyed to accompanying key plan.

1.4 FORMATS AND MEDIA

A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.

B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

C. File Names: Name media files with date and sequential numbering suffix.

1.5 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs with maximum depth of field and in focus.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Preconstruction Photographs: Before commencement of demolition, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect or GC/Construction Manager.

1. Take 10 photographs to show existing conditions adjacent to property before starting the Work.
2. Take 10 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

C. Periodic Construction Photographs: Take a minimum of20 photographs coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and final completion construction photographs.
4. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required

for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

3. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of GC/Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals – 000000.#.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package, and transmit to Architect by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Architect.

a. Architect will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 days for review of each resubmittal.

4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. Submit Product Data before Shop Drawings, and before or concurrent with Samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

2. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 24 by 36 inches.

C. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

D. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
3. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
4. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

E. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
3. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

4. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
5. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.8 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with indication in web-based Project software. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

    1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval.

1.9 ARCHITECT'S REVIEW

A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.

    1. PDF Submittals: Architect will indicate, via markup on each submittal, the appropriate action

        a. 'A' Action: Fabricate, manufacture and/or construction may proceed providing work is in compliance with Contract Documents.
        b. 'B' Action: Fabricate, manufacture and/or construction may proceed providing work is in compliance with the Architect's notations and the Contract Documents.
        c. 'C' Action: No work shall be fabricated, manufactured and/or constructed under this submittal. The Contractor shall make a new submittal to the

Architect. No work for submissions marked 'C' Action will be permitted on the site.

d. 'Reviewed': No action required.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 35 91 - HISTORIC TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general protection and treatment procedures for designated historic spaces, areas, rooms, and surfaces in Project.

1.3 DEFINITIONS

A. Consolidate: To strengthen loose or deteriorated materials in place.

B. Design Reference Sample: A sample that represents Architect's prebid selection of work to be matched; it may be existing work or work specially produced for Project.

C. Dismantle: To disassemble or detach a historic item from a surface, or a nonhistoric item from a historic surface, using gentle methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

D. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance that are important to the successful preservation as determined by Architect. Designated historic spaces are indicated on Drawings.

1. Restoration areas of greatest architectural importance, integrity, and visibility; to be preserved and restored to the original, circa 1925, design and finish as indicated on Drawings.

E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.

F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.

G. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.

H. Remove: To take down or detach a nonhistoric item located within a historic space, area, or room, using methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

I. Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.

J. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.

K. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.

L. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.

M. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.

N. Retain: To keep existing items that are not to be removed or dismantled.

O. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials unless otherwise indicated.

P. Salvage: To protect removed or dismantled items and deliver them to Owner.

Q. Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.

R. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 COORDINATION

A. Historic Treatment Subschedule: A construction schedule coordinating the sequencing and scheduling of historic treatment work for entire Project, including each activity to be performed in historic spaces, areas, and rooms, and on historic surfaces; and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for historic treatment work.

1. Schedule construction operations in sequence required to obtain best historic treatment results.
2. Coordinate sequence of historic treatment work activities to accommodate the following:

    a. Owner's continuing occupancy of portions of existing building.
    b. Owner's partial occupancy of completed Work.
    c. Other known work in progress.

d. Tests and inspections.

3. Detail sequence of historic treatment work, with start and end dates.
4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
5. Use of elevator and stairs.
6. Equipment Data: List gross loaded weight, axle-load distribution, and wheel-base dimension data for mobile and heavy equipment proposed for use. Do not use such equipment without certification from Contractor's professional engineer that the structure can support the imposed loadings without damage.

1.5 PROJECT MEETINGS FOR HISTORIC TREATMENT

A. Preliminary Historic Treatment Conference: Before starting historic treatment work, conduct conference at Project site.

1. Attendees: In addition to representatives of Owner, Construction Manager, Architect, and Contractor, testing service representative, historic treatment specialists, chemical-cleaner manufacturer(s), and installers whose work interfaces with or affects historic treatment shall be represented at the meeting.
2. Agenda: Discuss items of significance that could affect progress of historic treatment work, including review of the following:

a. Historic Treatment Subschedule: Discuss and finalize; verify availability of materials, historic treatment specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
b. Fire-prevention plan.
c. Governing regulations.
d. Areas where existing construction is to remain and the required protection.
e. Hauling routes.
f. Sequence of historic treatment work operations.
g. Storage, protection, and accounting for salvaged and specially fabricated items.
h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
i. Qualifications of personnel assigned to historic treatment work and assigned duties.
j. Requirements for extent and quality of work, tolerances, and required clearances.
k. Methods and procedures related to historic treatments, including product manufacturers' written instructions and precautions regarding historic treatment procedures and their effects on materials, components, and vegetation.
l. Embedded work such as flashings and lintels, special details, collection of wastes, protection of occupants and the public, and condition of other construction that affect the Work or will affect the work.

3. Reporting: Construction Manager will record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.

B. Coordination Meetings: Conduct specifically for historic treatment work at monthly intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.

1. Attendees: In addition to representatives of Owner, Construction Manager, Architect, and Contractor, each historic treatment specialist, supplier, installer, and other entity concerned with progress or involved in planning, coordination, or performance of historic treatment work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to historic treatment work.
2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of historic treatment work. Include topics for discussion as appropriate to status of Project.

a. Historic Treatment Subschedule: Review progress since last coordination meeting. Determine whether each schedule item is on time, ahead of schedule, or behind schedule. Determine how construction behind schedule will be expedited with retention of quality; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities are completed within the Contract Time.
b. Schedule Updating: Revise Contractor's Historic Treatment Subschedule after each coordination meeting where revisions to schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
c. Review present and future needs of each entity present, including review items listed in the "Preliminary Historic Treatment Conference" Paragraph in this article and the following:

1) Interface requirements of historic treatment work with other Project Work.
2) Status of submittals for historic treatment work.
3) Access to historic treatment work.
4) Effectiveness of fire-prevention plan.
5) Quality and work standards of historic treatment work.
6) Change Orders for historic treatment work.

3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may

be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.

1. Dismantle and salvage each item or object and protect it from damage, then promptly deliver it to Owner where directed at Project site.
2. Coordinate with Owner's historical adviser who will establish special procedures for dismantling and salvaging.

1.7 INFORMATIONAL SUBMITTALS

A. Historic Treatment Subschedule:

1. Submit historic treatment subschedule within 30 days of date established for commencement of historic treatment work.

B. Preconstruction Documentation: Show preexisting conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by Contractor's historic treatment operations.

C. Historic Treatment Program: Submit 30 days before work begins.

D. Fire-Prevention Plan: Submit 30 days before work begins.

1.8 QUALITY ASSURANCE

A. Historic Treatment Specialist Qualifications: An experienced firm regularly engaged in historic treatments similar in nature, materials, design, and extent to the work as specified in each Section and that has completed a minimum of five recent projects with a record of successful in-service performance that demonstrates the firm's qualifications to perform this work.

1. Field Supervisor Qualifications: Full-time supervisors experienced in historic treatment work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on site when historic treatment work begins and during its progress. Supervisors shall not be changed during Project except for causes beyond control of the specialist firm.

a. Construct new mockups of required work whenever a supervisor is replaced.

B. Title X Requirement: Each firm conducting activities that disturb painted surfaces shall be a "Lead-Safe Certified Firm" according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe work practices.

C. Historic Treatment Program: Prepare a written plan for historic treatment for whole Project, including each phase or process and protection of surrounding materials during operations. Describe in detail the materials, methods, and equipment to be used for each phase of work. Show compliance with indicated methods and procedures

specified in this and other Sections. Coordinate this whole-Project historic treatment program with specific requirements of programs required in other historic treatment Sections.

1. Dust and Noise Control: Include locations of proposed temporary dust- and noise-control partitions and means of egress from occupied areas coordinated with continuing on-site operations and other known work in progress.
2. Debris Hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

D. Fire-Prevention Plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire-control devices during each phase or process. Coordinate plan with Owner's fire-protection equipment and requirements. Include fire-watch personnel's training, duties, and authority to enforce fire safety.

E. Safety and Health Standard: ANSI/ASSE A10.6.

1.9 STORAGE AND HANDLING OF HISTORIC MATERIALS

A. Salvaged Historic Materials:

1. Clean loose dirt and debris from salvaged historic items unless more extensive cleaning is indicated.
2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area on-site.
5. Protect items from damage during transport and storage.

B. Historic Materials for Reinstallation:

1. Repair and clean historic items for reuse as indicated.
2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.

C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.

D. Storage: Catalog and store historic items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.

1. Identify each item with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
2. Secure stored materials to protect from theft.
3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F or more above the dew point.

E. Storage Space:

1. Owner will arrange for limited on-site location(s) for free storage of historic material. This storage space includes security for stored material.
2. Arrange for off-site locations for storage and protection of historic material that cannot be stored and protected on-site.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures.

1. Use only proven protection methods, appropriate to each area and surface being protected.
2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where historic treatment work is being performed.
3. Erect temporary barriers to form and maintain fire-egress routes.
4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during historic treatment work.
5. Contain dust and debris generated by historic treatment work, and prevent it from reaching the public or adjacent surfaces.
6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
8. Provide supplemental sound-control treatment to isolate removal and dismantling work from other areas of the building.

B. Temporary Protection of Historic Materials:

1. Protect existing historic materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Architect.

C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

D. Utility and Communications Services:

1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by historic treatment work before commencing operations.
2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for historic treatment work.
3. Maintain existing services unless otherwise indicated; keep in service, and protect against damage during operations. Provide temporary services during interruptions to existing utilities.

E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin work in an area until the drainage system is functioning properly.

1. Prevent solids such as stone or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.2 PROTECTION FROM FIRE

A. Follow fire-prevention plan and the following:

1. Comply with NFPA 241 requirements unless otherwise indicated.
2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.

   a. If combustible material cannot be removed, provide fire blankets to cover such materials.

3. Prohibit smoking by all persons within Project work and staging areas except where specifically designated for smoking.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:

1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.

2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
6. Fire Watch: Before working with heat-generating equipment or combustible materials, station personnel to serve as a fire watch at each location where such work is performed. Fire-watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:

    a. Train each fire watch in proper operation of fire-control equipment and alarms.
    b. Prohibit fire-watch personnel from other work that would distract from fire-watch duties.
    c. Cease work with heat-generating equipment whenever fire-watch personnel are not present.
    d. Have fire-watch personnel perform final fire-safety inspection each day beginning no sooner than 30 minutes after conclusion of work in each area to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
    e. Maintain fire-watch personnel at each area of Project site until two hours after conclusion of daily work.

C. Fire-Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for type of fire risk in each work area. Ensure that nearby personnel and fire-watch personnel are trained in fire-extinguisher and blanket use.

D. Sprinklers: Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards.

    1. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.

B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in historic treatment program. Use covering materials and masking agents that are waterproof and UV resistant and that will not stain or leave residue on surfaces

to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.

D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.

E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL HISTORIC TREATMENT

A. Have historic treatment work performed only by qualified historic treatment specialists.

B. Ensure that supervisory personnel are present when historic treatment work begins and during its progress.

C. Record existing work before each procedure (preconstruction), and record progress during the work. Use digital preconstruction documentation photographs or video recordings. Comply with requirements in Section 013233 "Photographic Documentation."

D. Perform regular inspections of Project site as the Work progresses to detect hazards resulting from historic treatment procedures.

E. Follow the procedures in subparagraphs below and procedures approved in historic treatment program unless otherwise indicated:

1. Retain as much existing material as possible; repair and consolidate rather than replace.
2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
3. Use reversible processes wherever possible.
4. Use historically accurate repair and replacement materials and techniques unless otherwise indicated.
5. Record existing work before each procedure (preconstruction) and progress during the work with digital preconstruction documentation photographs or video recordings. Comply with requirements in Section 013233 "Photographic Documentation."

F. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.

1. Do not proceed with the work in question until directed by Architect.

G. Where missing features are indicated to be repaired or replaced, provide work with appearance based on accurate duplications rather than on conjecture, subject to approval of Architect.

H. Where work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.

I. Identify new and replacement materials and features with permanent marks hidden in the completed Work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on record Drawings.

END OF SECTION

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SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner, GC/Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect or GC/Construction Manager.

1.4 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

F. Reports: Prepare and submit certified written reports and documents as specified.

G. Permits, Licenses, and Certificates: For Owner's record, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.

4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As

applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Engage a qualified testing agency to perform quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

D. Testing Agency Responsibilities: Cooperate with Architect, GC/Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, GC/Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and GC/Construction Manager's reference during normal working hours.

1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Not available.

C. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.

D. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.

C. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.

D. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

E. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.

F. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. Waste-handling procedures.
3. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-inch-OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch-thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch-OD line posts and 2-7/8-inch-OD corner and pull posts, with 1-5/8-

inch-OD top and bottom rails. Provide concrete or galvanized-steel bases for supporting posts.

C. Fencing Windscreen Privacy Screen: Polyester fabric scrim with grommets for attachment to chain link fence, sized to height of fence, in color selected by Architect from manufacturer's standard colors.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, CGC/Construction Manager, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
3. Drinking water and private toilet.
4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead unless otherwise indicated.

F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

G. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.

1. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Contractor's emergency after-hours telephone number.
e. Architect's office.
f. Engineers' offices.
g. Owner's office.
h. Principal subcontractors' field and home offices.

3.4 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 50 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until conditions acceptable to Owner.

B. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

C. Parking: Provide temporary parking areas for construction personnel.

D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.

E. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

F. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

D. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.

E. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

G. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.

1. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
2. Paint and maintain appearance of walkway for duration of the Work.

H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

END OF SECTION

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SECTION 01 57 13 - TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Silt fence erosion protection.
   2. Hay bale silt fence erosion protection.

B. Related Sections:
   1. Section 311000 – Site Clearing.
   2. Section 312000 – Earth Moving.
   3. Section 329119 – Landscape Grading.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements;
   1. Comply with all requirements, exemptions, regulations and outflow sampling requirements set forth by local and state agencies.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Straw Bale Fence: As indicated on Drawings.

B. Silt Fence Fabric: Synthetic filter fabric or a pervious sheet of polypropylene, nylon, polyester, or polyethylene yard, containing ultraviolet ray inhibitors and stabilizers providing a minimum of six months usable construction life at a temperature range from 0 to 120 degrees F., and meeting the following requirements:
   1. Sediment retention efficiency: Not less than 85 percent.
   2. Grab strength at 20 percent maximum elongation:
      a. Standard strength fabric: 30 pounds per lineal inch.
      b. Extra strength fabric: 50 pounds per lineal inch.
   3. Flow rate: Not less than 0.30 gallons per square foot per minute.

C. Silt Fence Posts: Contractor has option of the following:
   1. 4 inch diameter pine.
   2. 2 inch diameter pine.
   3. 1.33 pound per lineal foot steel posts a minimum of 4 feet in length.
      a. Steel posts shall have projections for fastening the fabric.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper and timely completion:
   1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection:
   1. Protect trees, shrubs, lawns, other vegetation and other features indicated on Drawings to remain, or not indicated to be removed.
      a. Provide temporary guards to protect trees and vegetation which is to remain.
      b. Protect roots over 1-1/2 inch diameter which are cut during construction operations.
         1) Coat cut faces with emulsified asphalt or other acceptable coating formulated for use on damaged plan tissues.
         2) Temporarily cover exposed roots with wet burlap to prevent roots from drying out. Cover with earth as soon as possible.
   2. Protect bench marks, monuments, existing structures, existing fences, existing roads, existing sidewalks, existing paving, existing curbs and other features indicated on Drawings to remain, or not indicated to be removed, from damage and displacement.
      a. If damaged or displaced, notify Engineer and correct defects as directed by Engineer.
   3. Protect above and below grade utilities which are to remain.

B. Preparation:
   1. Use all means necessary to control dust on and near the Work, and on and near off-site storage, and spoil areas, if such dust is caused by performance of the Work of this Section, or if resulting from the condition in which Project Site is left by Contractor..
   2. Moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other Work on Project Site.

3.3 INSTALLATION

A. Install erosion control devices at locations indicated on Drawings, and where required to protect adjacent and downstream properties from damage and pollution resulting from erosion caused by the Work of this Contract.
   1. Implement erosion control measures indicated on Drawings and additional erosion control measures necessary to prevent damage to adjacent and downstream properties.

B. Install silt fence located along perimeter of Site or grading limits immediately following site clearing operations specified under Section 311000.
   1. Install silt fence fabric from a continuous roll for the length of the silt fence whenever possible to minimize the number of joints.

a. Create joints in fabric by securely fastening fabric at the support post with overlap extending to the next post.

2. Drive support post into ground not less than 18 inches.
3. Excavate a 4 inch wide by 8 inch deep trench on up-slope side of silt fence.
   a. Line trench with silt fence fabric materials.
   b. Backfill trench with soil or gravel.

C. Install straw bale fence at completion of grading operations in affected area.
   1. Install erosion control devices at storm sewer inlets immediately after completion of the storm sewer.
   2. Place straw bales in a single row, lengthwise on the contour, and embedded 4 inches into soil.
   3. Secure each individual bale in place by stakes or reinforcement bars driven through bales into the ground to a depth not less than 18 inches.

3.4 MAINTENANCE

A. Check silt fences and straw bale fences after each rainfall event to ensure that they are in proper working order:
   1. Check embankments and spillways for erosion, settlement or other damage.
   2. Immediately make all necessary repairs.

B. Inspect silt and straw bale fences at least once a week.
   1. Immediately replace damaged portions of the silt fences, including portions which have collapsed, contain tears, have decomposed, or have become ineffective.

C. Remove sediment deposits as necessary to provide adequate sediment storage and to maintain the integrity of fences.

D. Maintain erosion control devices in places as specified until Site is stabilized by pavement, vegetation, or other means.

E. After site is stabilized, remove erosion control devices, sediment, and debris from Site prior to final grading specified under Section 312000 and Section 329119.

END OF SECTION

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SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within fifteen <15> days of receipt of request, or

seven days of receipt of additional information or documentation, whichever is later.

a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Products:

a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

2. Manufacturers:

a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

3. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Field engineering and surveying.
2. Cutting and patching.
3. Progress cleaning.
4. Starting and adjusting.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting surveys.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site.

1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

a. Contractor's superintendent.
b. Trade supervisor responsible for cutting operations.
c. Trade supervisor(s) responsible for patching of each type of substrate.

d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.

2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.6 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning , investigate and verify the existence and location of utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before demolition, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CUTTING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
5. Proceed with patching after construction operations requiring cutting are complete.

3.4 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

E. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

END OF SECTION

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of [10] days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Construction Manager. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Construction Manager's signature for receipt of submittals.

5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of [10] days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.

4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of [10] days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for

Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first] [and] [proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:

a. MS Excel electronic file. Architect, through Construction Manager, will return annotated copy.
b. PDF electronic file. Architect, through Construction Manager, will return annotated copy.
c. Three paper copies unless otherwise indicated. Architect, through Construction Manager, will return two copies.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
p. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

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SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

   a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   b. Enable inserted reviewer comments on draft submittals.

2. Two paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

C. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

   a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor is delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.

9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

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SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Requirements:

1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up record prints.

a. Final Submittal:

1) Submit record digital data files and three set(s) of record digital data file plots.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record

data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Record data as soon as possible after obtaining it.
c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Annotated PDF electronic file with comment function enabled or DWG format.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect for resolution.
4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.

C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect.
e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Product Data as scanned PDF electronic file(s) of marked-up paper copy of Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.2 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.3 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals and in PDF electronic file format on compact disc.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project record documents.
    e. Identification systems.

f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

    a. Diagnosis instructions.
    b. Repair instructions.
    c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    d. Instructions for identifying parts and components.
    e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

    1. Owner will furnish an instructor to describe Owner's operational philosophy.
    2. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

    1. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage an owner acceptable videographer to record demonstration and training video recordings. Record each training module separately. Include classroom

instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video Recording Format: Provide high-quality color video recordings with menu navigation.

C. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION

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SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 INFORMATIONAL SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work.
2. Use of elevator and stairs.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 FIELD CONDITIONS

A. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

B. Hazardous Materials: It is not known if hazardous materials will be encountered in the Work.
1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

C. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.

D. Storage or sale of removed items or materials on-site is not permitted.

E. Utility Service: Maintain existing utilities to remain in service and protect them against damage during selective demolition operations.

1.8 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

B. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mix design, placement procedures, and finishes.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with fly ash.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Information to be submitted for each type and strength shall include the following items:

1. Sources of concrete mix design components including coarse aggregate, fine aggregate, cement, water, admixtures, and pozzolans where included.
2. Concrete mix design – Concrete proportions shall be established based on the requirements of ACI 301, latest edition.
3. Laboratory sieve analysis and mechanical properties for coarse and aggregate.
4. Admixture types and chemical compositions. (Include certification of compliance with ASTM reference standards and confirmation of any supplementary requirements included in these Specifications).
5. Where pozzolans are used in combination with Type I cement, provide laboratory test results to certify compliance with ASTM reference standards and supplementary requirements included in these Specifications.
6. Field strength data to show proposed concrete mix designs will produce the required f'c.

C. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement."

Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures. Reinforcing shall be fabricated and placed only from drawings bearing the final stamp of approval of the Engineer.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork. Design and engineering of formwork are Contractor's responsibility. Submit shop drawings when requested by the Engineer.

E. Welding Certificates: Copies of certificates for welding procedures and personnel.

F. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Cementitious materials and aggregates.
2. Form materials and form-release agents.
3. Steel reinforcement and reinforcement accessories.
4. Fiber reinforcement.
5. Admixtures.
6. Waterstops.
7. Curing materials.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Epoxy joint filler.
13. Joint-filler strips.
14. Repair materials.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project in material, design, and extent.

C. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.

D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

F. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

G. ACI Publications: Comply with the following, unless more stringent provisions are indicated:

1. ACI 301, "Specification for Structural Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
   a. B-B (Concrete Form), Class 1, or better, mill oiled and edge sealed unless concrete will be exposed to view.
   b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed for concrete exposed to view.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface.
2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets. Welded wire fabric in rolls is not permitted.

2.3 REINFORCEMENT ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

B. Joint Dowel Bars: Plain-steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

2.4 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I.

B. Portland Cement: ASTM C 150, Type III.

C. Fly Ash: ASTM C 618, Class C.

D. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:

1. Nominal Maximum Aggregate Size: not to exceed maximum size permitted by ACI 301.
2. Combined Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 sieve, and less than 8 percent may be retained on sieves finer than No. 50.

E. Water: Potable and complying with ASTM C 94.

F. Limestone Aggregate: Limestone aggregate shall be used in exterior flatwork that will be exposed to freezing and thawing.

2.5 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A, 15 mil, and with a maximum of 0.01 perms (grains/hr/sq.ft.) in accordance with ACI 302.2R, when tested according to ASTM E96 Procedure B (water method). Include manufacturer's recommended adhesive or pressure-sensitive tape.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:
   a. Fortifiber Building Systems Group; Moistop Ultra 15.
   b. Insulation Solutions, Inc.; Viper VaporCheck II 15-mil.
   c. Raven Industries, Inc; Vapor Block VBLP15.
   d. Stego Industries, LLC; Stego Wrap 15 mil Class A.
   e. W.R. Meadows, Inc; Perminator 15 mil.

B. Do not use a blotter layer between concrete slab on grade and vapor retarder.

C. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

D. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch (9.5-mm) sieve, 10 to 30 percent passing a No. 100 (0.15-mm) sieve, and at least 5 percent passing No. 200 (0.075-mm) sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

E. Termination Bar: Provide non-corrosive metal termination bar for below-slab vapor retarder.

2.7 FLOOR AND SLAB TREATMENTS

A. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

2.8 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Chemical curing compounds: Verify compatibility of curing compound with other coatings, sealers, paints or adhesives to be applied to the concrete.

1. Clear, Solvent-Borne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
2. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
3. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
4. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.9 RELATED MATERIALS

A. Joint-Filler Strips for Unsealed, Exterior Joints: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Joint-Filler Strips for Sealed, Interior Joints: closed cell polyethylene, 25% compression deflection @ 10-15 psi pressure.

C. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements, and as follows:

1. Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
2. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
3. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

D. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.053 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 CONCRETE MIXES

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases, as follows:

1. Proportion normal-weight concrete according to ACI 211.1 and ACI 301.
2. Proportion lightweight structural concrete according to ACI 211.2 and ACI 301.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.

C. Footings: Proportion normal-weight concrete mix as follows:
1. Compressive Strength (28 Days): 3000 psi.
2. Maximum Slump: 4 inches.
3. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8 inches after admixture is added to concrete with 2- to 4-inch slump.

D. Slab-on-Grade: Proportion normal-weight concrete mix as follows:

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Slump: 4 inches.
3. Fly ash mix shall be used.
4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
5. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. Synthetic micro-fiber shall be used for exterior sidewalks only.

E. Foundation Walls and Piers: Proportion normal-weight concrete mix as follows:

1. Compressive Strength (28 Days): 5000 psi.

2. Maximum Slump: 4 inches.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.

G. Submit field data showing that the proposed mix designs will produce the minimum required concrete strength. In the absence of such field data, water/cement ratios shall not exceed the following:

Minimum 28 Day Compressive Strength (psi)	Maximum Water/Cement Ratio (by weight)
4,000 psi AE	0.35
4,000 psi	0.44
3,000 psi AE	0.46
3,000 psi	0.58

H. Maximum Water-Cementitious Materials Ratio: 0.40 for concrete exposed to deicers or subject to freezing and thawing while moist.

I. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:

1. Air Content: 5.5 percent for 1-1/2-inch- nominal maximum aggregate size.
2. Air Content: 6 percent for 1-inch- nominal maximum aggregate size.
3. Air Content: 6 percent for 3/4-inch- nominal maximum aggregate size.

J. Do not air entrain concrete to trowel-finished interior floors and suspended slabs. Do not allow entrapped air content to exceed 3 percent.

K. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

L. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

M. Aggregates: The proportion of fine aggregate to total aggregate shall fall within the limits of 35% and 45% unless otherwise expressly permitted by the Engineer.

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 WATERSTOPS

A. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. BoMetals, Inc.
   b. Greenstreak.
   c. Paul Murphy Plastics Company.
   d. Vinylex Corp.

2. Profile: Ribbed with center bulb.
3. Dimensions: 6 inches by 3/8 inch thick; nontapered.

2.13 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

1. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
1.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required.

2. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

B. It shall be the responsibility of the Contractor to provide for and cooperate with other contractors in the installation of conduit boxes, sleeves, inserts, hangers, etc., required for their work; forms shall be cut out and framed as necessary for the installation of the work of other trades. At the same time, it shall be the responsibility of this Contractor to prevent groupings of sleeves or pipes through structural members, or cut outs not shown on the Drawings, which may affect the safety of the structure. When such problems arise, he shall immediately notify the Engineer for resolution. The same course shall be followed for pipes or sleeves, of whatever size, through beams and through slabs. Gauge metal sleeves may be used in slabs only where the Engineer's approval is given.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:

1. At least 70 percent of 28-day design compressive strength.
2. Determine compressive strength of in-place concrete by testing representative field- or laboratory-cured test specimens according to ACI 301.
3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

A. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.

B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

C. Shores and other supports shall not be removed until concrete has attained sufficient strength to support without objectionable deflection its own weight plus all anticipated construction loads. The Contractor shall bear the full responsibility of this operation. Concrete damaged from too early removal of shores shall be repaired to the satisfaction of the Engineer or replaced.

3.5 BELOW-SLAB VAPOR RETARDER INSTALLATION

A. Granular Course: Place vapor retarder under slab on grade on top of 4 inches minimum of granular fill, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.
   1. Place and compact a 1/2-inch thick layer of fine-graded granular material over granular fill.

B. Sheet Vapor Retarders: Place, protect, and repair vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
   1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
   2. Seal penetrations with manufacturer’s recommended penetration boot or seam tape.

C. Vapor Retarder Termination: At all perimeter terminations, and elsewhere as shown, install per manufacturer instructions and requirements below.
   1. Lay vapor retarder loosely, to prevent concrete from pulling on termination.
   2. Secure vapor retarder in place by anchoring bar to vertical surface, with butyl tape between vapor retarder and substrate.

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

C. Accurately position, support, and secure reinforcement against displacement. Every bar shall be wired securely into position. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Reinforcing shall be set accurately in position according to the Drawings and placing plans. Every bar shall be wired securely in design position. Before concrete is placed, reinforcing shall be carefully checked and all bars displaced or bent during the course of the work shall be fully restored to their intended shape and position. There shall be

no heating of bars for bending on the job. Beam, joist or slab bars hooked for anchorage in beams, walls or columns shall be positioned so that there is the minimum specified clearance between the hook and the far face of the beam, wall or column.

E. Concrete cover for reinforcing bars shall conform to the minimum requirements of the ACI-318. latest edition.

F. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

G. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one and one-half mesh spacing or 12" minimum. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire. Welded wire fabric in slabs on grade shall be placed such that it's final position is at the mid-depth of the slab thickness. During the course of the concrete slab placement, welded wire fabric shall be pulled up from the bottom of the slab to the mid-depth with a hooked hand tool, specifically designed for this purpose. Welded wire fabric shall be provided in flat sheets and not continuous rolls whenever possible.

H. Place an equivalent area of steel to that interrupted by an opening, pipe penetration, electrical conduit group or duct penetration around the opening or penetration. The bars shall have sufficient length to develop bond at each end beyond the opening or penetration.

I. No reinforcing bars shall be welded either during fabrication or erection unless specifically called for on the Drawings, specified herein, or with prior written approval of the Engineer. All bars that have been welded, including tack welds, without such approval shall be immediately removed from the work. When welding of reinforcement is approved or called for it shall conform to the AWS Structural Welding Code-Reinforcing Steel, AWS D1.4.

J. Tension lap splices shall be Class B lap splices, as defined in latest issue of ACI 318 unless indicated otherwise on the Drawings. Mechanical connectors shall not be used for reinforcing bar splices unless prior written approval is obtained from the Engineer. Mechanical connectors shall develop at least 125% of the specified yield strength of the bar.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved in writing by Engineer.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Joints shall be approximately 10' on center. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
3. Contraction joints in exterior concrete and interior tiered ("Stadium Savers") slabs shall be grooved. Contraction joints in other interior slabs-on-grade and elevated slabs shall be sawed.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Slabs on grade, walls or pavement shall be constructed on compacted fill.

C. Do not add water to concrete during delivery, at Project site, or during placement, unless approved in writing by the Engineer.

D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified.

E. Concrete shall be deposited as nearly as possible in its final position to avoid segregation from rehandling and flowing; vibrators shall not be used to move concrete. Placing and vibrating shall be regulated so that concrete is plastic at all times, flowing readily around the reinforcement and into the form's corners. No concrete partially hardended or contaminated by foreign material shall be used.

F. Deposit concrete in forms in horizontal layers no deeper than 18 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

G. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

H. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

I. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.

1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
2. Do not apply rubbed finish to smooth-formed finish.

C. Rubbed Finish: Apply the following to smooth-formed finished concrete:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.

1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system
2. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface:

   a. Carpeted floors: Specified overall values of flatness, F(F) 25; and levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and levelness, F(L) 15.
   b. Exposed slabs-on-grade with ground & polished surfaces: Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17.
   c. Thin-set flooring or resilient floor covering for slabs-on-grade: Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17.
   d. Thin-set flooring or resilient floor covering for suspended slabs: Specified overall values of flatness, F(F) 30; with minimum local values of flatness, F(F) 24.
   e. Hardwood floor covering for suspended slabs: Specified overall values of flatness, F(F) 50; and levelness, F(L) 35; with minimum local values of flatness, F(F) 35; and levelness, F(L) 25.

3. In addition to tolerances above, finish all slab work and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.
4. Corrective Measures: Following flatness and levelness tolerance testing, if work is found to be noncompliant, provide from the following remedial measures:

a. Grinding, planing, surface repair, or retopping.

E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

G. Slip-Resistive Aggregate Finish: Before final floating, apply slip-resistive aggregate finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:

1. Uniformly spread 25 lb/100 sq. ft. of dampened slip-resistive aggregate over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose slip-resistive aggregate.

3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.12 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period,

moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of methods listed for “Unformed Surfaces”.

C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match

adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

8. Repair all slab joints, intersections and transitions having a vertical offset in excess of 1/8”.

E. Perform structural repairs of concrete, subject to Engineer’s approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.16 CONCRETE WALKS AND PLATFORMS

A. Slope in the transverse direction 1/8” per foot.

B. Cut reinforcement at all control or expansion joints.

C. Jointing:

1. Transverse contraction joints (control joints) shall be installed at regular intervals no greater than five feet to a depth of not less than one inch with a maximum width of one-quarter (1/4) inch.
2. Expansion joint material shall be placed in the concrete walks and curb at the same section where indicated on the Drawings. Expansion joint material, extending through the entire thickness of the slab and secured against movement during concrete placement, shall be placed between the concrete and all fixed objects abutting or wholly within the sidewalk area. Included are walks meeting the building or prior placed walks not of the same straight run, and at all crosswalks.
3. Wherever concrete delivery is interrupted for thirty (30) minutes or more or at the end of a day’s run, a construction joint shall be placed, but at no distance lass than regular scoring. The joint, at right angles to the sidewalk surface and sides, shall be made with a keyed header-board properly placed and secured against

displacement of additional run of concrete. Keyed joints shall be oiled before placement of additional run of concrete.

D. Walks and platforms shall be constructed to drain all water and not allow water to puddle on them.

E. Reinforce all sidewalks with synthetic fiber reinforcing unless noted otherwise on the Drawings.

F. Walks and platforms shall be given a broom finish. Tool joints and edges.

3.17 EXTERIOR CONCRETE STEPS

A. To be constructed and reinforced as shown on the Drawings. The risers shall be brought to the required elevations and steps finished with a brush finish running parallel to the length of the steps and all exposed edges rounded to one-half (1/2) inch radius.

B. Brush finish as final finish operation.

C. Forms for steps shall be removed not less than twelve (12) nor more than twenty-four (24) hours after the concrete is placed, unless prevailing weather conditions require a longer period. In removing forms, special care shall be exercised not to crack or injure exposed surfaces, corners and projections. Should damage occur, the Contractor shall remove and replace, at his own expense, as much of the concrete as the Engineer may direct.

D. If the final curing has been applied to treads before the forms are removed, curing shall be placed on risers, ends and all exposed concrete as soon as possible after these parts are finished. All concrete shall be protected by an approved treatment during the curing periods.

3.18 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each class of concrete, plus one set for each additional 50 cu. yd. or fraction thereof.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
6. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.

    a. Cast and field cure one standard cylinder for each composite sample.

C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.

D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

E. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer will not be used as sole basis for approval or rejection of concrete.

G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Engineer.

END OF SECTION 03 3000

SECTION 03 54 13 – GYPSUM CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes gypsum-cement-based, self-leveling underlayment for application below interior floor coverings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.

PART 2 - PRODUCTS

2.1 GYPSUM-CEMENT-BASED UNDERLAYMENTS

A. Underlayment: Gypsum-cement-based, self-leveling product that can be applied in minimum uniform thickness of 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: Gypsum or blended gypsum cement as defined by ASTM C 219.
2. Compressive Strength: Not less than 2000 psi (13.8 MPa) at 28 days when tested according to ASTM C 109/C 109M.
3. Underlayment Additive (if recommended by manufacturer for installation): Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.

B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.

1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.

C. Water: Potable and at a temperature of not more than 70 deg F.

D. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions.

1. Treat nonmoving substrate cracks to prevent cracks from telegraphing (reflecting) through underlayment.
2. Fill substrate voids to prevent underlayment from leaking.

B. Concrete Substrates: Mechanically remove laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.

1. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

C. Nonporous Substrates: For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond, and prepare surfaces.

D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment.

3.2 APPLICATION

A. General: Mix and apply underlayment components according to manufacturer's written instructions.

1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

C. Apply underlayment to produce uniform, level surface.

1. Apply a final layer without aggregate to product surface.
2. Feather edges to match adjacent floor elevations.

D. Cure underlayment. Prevent contamination during application and curing processes.

E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.

F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

END OF SECTION

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SECTION 05 1200 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes structural steel and architecturally exposed structural steel.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Engineer structural-steel connections required by the Contract Documents to be selected or completed by fabricator to withstand design loadings indicated.

1.3 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Show fabrication of structural-steel components, including connections, splices, holes, welds, and bolts.

1. Shop drawing review will cover the size and arrangement of the principal and auxiliary members, and the strength of connections. An effort will be made to discover any errors in size of materials, general dimensions, and detail dimensions, but the responsibility for these remains with the Contractor. Shop drawings judged to be incomplete or materially incorrect will be returned without review for completion.
2. Shop drawings shall show all field dimensions related to the existing construction.
3. The Contractor shall allow a minimum of 2 weeks for review of shop drawings.

C. Mill certificates.

D. Welding certificates.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator who participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category I, conventional steel structures.

B. Comply with applicable provisions in AISC's “Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" and RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

D. Reference Standards referred to above are hereby amended as follows:

1. Items of structural steel appearing on the Drawings are hereby included in this work, whether shown, scheduled or noted. Items of steel required by this Specification, whether included or not in the “Definition of Structural Steel”, Section 2 of “Code of Standard Practice”, are also a part of this work.
2. This Contractor shall verify the setting of all anchor bolts and make such field measurements as related to this work at an advance date.
3. Lintels, frames and appurtenances built into the masonry walls shall be furnished under this section and installed under Unit Masonry section.
4. This work shall include such cutting, drilling, punching and fabrication of the structural steel to accommodate other trades as may be required.
5. Field painting of field bolt heads and nuts, field welds, abrasions in the shop coat and repainting of surfaces inaccessible after field assembly is complete, are included in the work. Touch up paint shall be the same as paint specified for shop coat.

1.5 STORAGE AND PROTECTION

A. Store steel members off ground and protect steel members and packaged materials from erosion and deterioration.

B. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural-Steel Wide Flange Shapes, Beams and Columns: ASTM A 992, Fy = 50 ksi.

B. Misc. Structural-Steel Shapes, Channels Plates, and Bars: ASTM A 36, carbon steel.

C. Cold-Formed Structural-Steel Tubing: ASTM A 500, Grade B, Fy = 46 ksi.

D. Structural Steel Pipe: ASTM A 500, Grade B, Fy = 42 ksi.

E. Anchor Rods, Bolts, Nuts: ASTM F 1554, Grade 36, unheaded rods.

F. Nonhigh-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A; carbon-steel, hex-head bolts; carbon-steel nuts; and flat, unhardened steel washers, uncoated.

G. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers, uncoated.

H. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

I. Nonmetallic, Shrinkage-Resistant Grout: Premixed, ASTM C 1107, of consistency suitable for application.

2.2 FABRICATION

A. Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC specifications referenced in this Section and in Shop Drawings.

1. Comply with fabrication tolerance limits in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel and architectural exposed structural steel.
2. Shop install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.
3. Shop install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

   a. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

4. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

B. Shop Priming: Shop prime steel, except surfaces embedded in concrete or mortar, surfaces to be field welded, surfaces to be high-strength bolted with slip-critical connections, and surfaces to receive sprayed-on fireproofing.

1. Surface Preparation: SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning."
2. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

C. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.

1. Fill vent holes and grind smooth after galvanizing.
2. Galvanize all steel exposed to weather including lintels and shelf angles in exterior walls.

2.3 SOURCE QUALITY CONTROL

A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.1 ERECTION

A. Examination: Verify elevations of concrete and masonry bearing surfaces and locations of anchorages for compliance with requirements.

B. Erect structural steel accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.

C. Base and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen surfaces before setting base and bearing plates. Clean bottom surface of base and bearing plates and set on wedges, shims, or setting nuts as required.

1. Tighten anchor bolts, cut off wedges or shims flush with edge of base or bearing plate, and pack grout solidly between bearing surfaces and plates.

D. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

E. Install and tighten nonhigh-strength bolts, except where high-strength bolts are indicated.

F. Install and tighten high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1. Connection Type: Snug tightened, unless indicated as slip-critical, direct-tension, or tensioned shear/bearing connections.

G. Weld Connections: Comply with AWS D1.1 for procedures, appearance and quality of welds, and methods used in correcting welding work.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
c. Ultrasonic Inspection: ASTM E 164.
d. Radiographic Inspection: ASTM E 94.

END OF SECTION 05 1200

SECTION 05 3100 - STEEL DECK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Roof Deck.
2. Composite Floor Deck.

1.2 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings: Include layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.

C. Product certificates.

D. Welding certificates.

E. Research/evaluation reports.

1.3 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

B. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those steel deck units tested for fire resistance per ASTM E 119 by a testing and inspection agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

C. AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. BHP Steel Building Products USA Inc.
2. Consolidated Systems, Inc.
3. Epic Metals Corp.
4. Marilyn Steel Products, Inc.
5. Nucor Corp.; Vulcraft Div.
6. Roof Deck, Inc.
7. United Steel Deck, Inc.
8. Verco Manufacturing Co.
9. Wheeling Corrugating Co.; Div. of Wheeling-Pittsburgh Steel Corp.

2.2 ROOF DECK

A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
1. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 40, G60 zinc coating.
2. Deck Profile: Type B - WR, wide rib.
3. Profile Depth: See drawings.
4. Design Uncoated-Steel Thickness: See drawings.

2.3 COMPOSITE FLOOR DECK

A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
2. Profile Depth: As indicated.
3. Design Uncoated-Steel Thickness: As indicated.

2.4 ACCESSORIES

A. Accessories: Steel deck manufacturer's standard accessory materials, including mechanical fasteners, closure strips, pour stops, and closures for deck.

B. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

C. Repair Paint: Lead- and chromate-free rust-inhibitive primer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 29, manufacturer's written instructions, and requirements in this Section.

B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to decking.

E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.

F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

1. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

G. Roof Deck Accessories: Install sump pans and sump plates, ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck

manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

H. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.

I. Floor Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of decking. Weld cover plates at changes in direction of floor deck panels, unless otherwise indicated.

J. Repairs and Protection:

1. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
2. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

3.2 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.

B. Field welds will be subject to inspection.

C. Remove and replace work that does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

END OF SECTION 05 3100

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.

1.2 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details.

PART 2 - PRODUCTS

2.1 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

2.2 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/ D1187M.

2.3 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

2.4 MISCELLANEOUS FRAMING AND SUPPORTS

A. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

2.5 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Galvanize and prime loose steel lintels.

2.6 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

2.7 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items unless otherwise indicated.

1. Shop prime with universal shop primer, compatible with coating.

C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."

D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 REPAIRS

A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel pipe railings.

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Railing brackets.
3. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters, including finish.
2. Fittings and brackets.
3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.

    a. Show method of connecting and finishing members at intersections.

D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer, registered in the state of Mississippi, responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

E. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

F. Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.2, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, registered in the state of Mississippi, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

3. Exterior railings: In addition to the loads above, the railing assemblies and connections shall be designed to withstand ultimate design wind speed of 160 mph.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.3 STEEL AND IRON

A. Pipe: ASTM A 53, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

B. Plates, Shapes, and Bars: ASTM A 36.

2.4 FASTENERS

A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153 or ASTM F 2329 for zinc coating.
3. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations: Alloy Group 2 (type 316) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

E. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

H. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that are exposed to weather in a manner that excludes water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Form Changes in Direction as Follows:

1. As detailed.
2. By bending or by inserting prefabricated elbow fittings.

J. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

K. Close exposed ends of railing members with prefabricated end fittings.

L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

O. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.7 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
2. Comply with ASTM A 123 for hot-dip galvanized railings.
3. Comply with ASTM A 153 for hot-dip galvanized hardware.
4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.

E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning.

F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with universal shop primer.
2. Do not apply primer to galvanized surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Leave anchorage joint exposed with 1/4-inch buildup, evenly sloped away from post.

C. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ATTACHING RAILINGS

A. Attach railings to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

B. Secure wall brackets to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.

3. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood blocking between studs. Coordinate with stud installation to locate backing members.

3.6 ADJUSTING AND CLEANING

A. Touchup: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop primer, and prime exposed areas with the same material and thickness as used for shop priming to comply with SSPC requirements for touching up shop-primed surfaces. Sand touched up areas to blend into adjacent areas. Remove sanding dust from railings and any surrounding surfaces.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A 780.

3.7 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

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SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior standing and running trim.
2. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.
3. Hangers and accessories for installing woodwork.
4. Shop finishing of interior architectural woodwork.

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that interior architectural woodwork can be supported and installed as indicated.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Anchors.
2. Adhesives.
3. Shop finishing materials.

B. Shop Drawings:

1. Include the following:

   a. Dimensioned plans, elevations, and sections.
   b. Attachment details.

2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.

C. Samples: For each exposed product and for each shop-applied color and finish specified.

1. Size:

a. Panel Products: 12 inches by 12 inches.
b. Lumber Products: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of typical interior architectural woodwork as shown on Drawings
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with the Architectural Woodwork Standards, Section 2.

B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.

C. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1. Handle and store fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and

maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

C. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. The Contract Documents contain requirements that are more stringent than the Architectural Woodwork Standards. Comply with Contract Documents and Architectural Woodwork Standards.

2.2 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Architectural Woodwork Standards Grade: Custom.

B. Hardwood Lumber:

1. Species: Ash
2. Cut: Plain sliced/plain sawn.
3. Wood Moisture Content: 5 to 10percent.
4. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.

5. For trim items wider than available lumber, use veneered construction. Do not glue for width.

    a. For veneered base, use hardwood lumber core, glued for width.

6. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.

2.3 METAL FRAMING ANCHORS

A. Subject to compliance with requirements, provide products by one of the following:

1. Cleveland Steel Specialty Company
2. Simpson Strong-Tie Co.
3. USP Structural Connectors.

B. Allowable design loads, as published by manufacturer, shall meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

D. Joist Hangers: U-shaped joist hangers with 2-inch- long seat and concealed flange.

1. Thickness: 0.050 inch.
2. Provide 45 degree skewed hangars, and standard hangars, as indicated.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Nailers: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

1. Fire-Retardant Treatment: Complying with requirements; provide for all concealed members.

B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.

C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.

1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.

2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

D. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.5 FABRICATION

A. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.

1. Ease edges to radius indicated for the following:

a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
b. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.

B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

1. Disassemble components only as necessary for shipment and installation.
2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
3. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.

a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

2.6 SHOP FINISHING

A. Finish interior architectural woodwork with transparent finish at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

B. Preparation for Finishing: Comply with Architectural Woodwork Standards, Section 5 for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of interior architectural woodwork. Apply two coats to end-grain surfaces.

C. Transparent Finish:

1. Architectural Woodwork Standards Grade: Custom.
2. Finish: System - 5, Varnish, Catalyzed Conversion.
3. Staining: As indicated in the Material Finish Legend.
4. Filled Finish for Open-Grain Woods: After staining, apply wash-coat sealer and allow to dry. Apply paste wood filler and wipe off excess. Tint filler to match stained wood.
5. Sheen: Matt Finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.

B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION

A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.

B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.

C. Install interior architectural woodwork level, plumb, true in line, and without distortion.

1. Shim as required with concealed shims.
2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.

1. Secure with countersunk, concealed fasteners and blind nailing.
2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.
3. For shop-finished items, use filler matching finish of items being installed.

F. Standing and Running Trim:

1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.

2. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary.
3. Scarf running joints and stagger in adjacent and related members.
4. Fill gaps, if any, between top of base and wall with latex sealant, painted to match wall.
5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

3.3 REPAIR

A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects.

B. Where not possible to repair, replace defective woodwork.

C. Shop Finish: Touch up finishing work specified in this Section after installation of interior architectural woodwork.

1. Fill nail holes with matching filler where exposed.
2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

D. Field Finish: See Section 09 91 23 "Interior Painting" for final finishing of installed interior architectural woodwork not indicated to be shop finished.

3.4 CLEANING

A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION

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SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board.
2. Glass-fiber blanket.
3. Mineral-wool board.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

A. Extruded Polystyrene Board, Type IV: ASTM C578, Type IV, 25-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E84.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Kingspan Insulation Limited.
d. Owens Corning.

2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 GLASS-FIBER BLANKET

A. Glass-Fiber Blanket, Unfaced: ASTM C665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation.
b. Johns Manville; a Berkshire Hathaway company.
c. Knauf Insulation.
d. Owens Corning.

2.3 MINERAL-WOOL BOARD

A. Mineral-Wool Board, Unfaced: ASTM C612, Type IVB; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics. Nominal density of 4.4 lb/cu. ft..

1. Manufacturers: Subject to compliance with requirements, provide Rockwool International ‘Cavityrock’, or comparable product by one of the following:

a. Johns Manville; a Berkshire Hathaway company.
b. Thermafiber, Inc.; an Owens Corning company.

2.4 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AGM Industries, Inc.
   b. Gemco.

2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AGM Industries, Inc.
   b. Gemco.

2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:

   a. Ceiling plenums.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. AGM Industries, Inc.
   b. Gemco.

2.5 ACCESSORIES

A. Insulation for Miscellaneous Voids:

1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.

2. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application.
2. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.4 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.

1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.

B. Mineral-Wool Board Insulation: Install insulation fasteners 4 inches from each corner of board insulation, at center of board, and as recommended by manufacturer.

1. Fit courses of insulation between obstructions, with edges butted tightly in both directions, and with faces flush.
2. Press units firmly against inside substrates.

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.6 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation

is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 072600 - VAPOR RETARDERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polyethylene vapor retarders.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 POLYETHYLENE VAPOR RETARDERS

A. Polyethylene Vapor Retarders: ASTM D4397, 6-mil- thick sheet, with maximum permeance rating of 0.1 perm.

PART 3 - EXECUTION

3.1 INSTALLATION OF VAPOR RETARDERS ON FRAMING

A. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.

C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.

D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

END OF SECTION

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. 3M Fire Protection Products.
b. A/D Fire Protection Systems Inc.
c. Hilti, Inc.
d. Specified Technologies, Inc.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg .

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg .

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.

3. Collars.
4. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Fire rated cable pathway devices used in fire-rated construction for low-voltage, video, data and voice cabling.

J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing

equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet .

B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner reserves the right to engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration

firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

1. Reference the Drawings for floor and wall rating requirements.

B. Penetration Firestopping Systems with No Penetrating Items:

1. UL-Classified Systems: F-A-; W-J-; W-L-0001-0999.
2. Type of Fill Materials: As required to achieve rating.

C. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing:

1. UL-Classified Systems: F-A-; W-J-; ; W-L-1001-1999.
2. Type of Fill Materials: As required to achieve rating.

D. Penetration Firestopping Systems for Nonmetallic Pipe, Conduit, or Tubing:

1. UL-Classified Systems: F-A-; W-J-; W-L-2001-2999.
2. Type of Fill Materials: As required to achieve rating.

E. Penetration Firestopping Systems for Electrical Cables:

1. UL-Classified Systems: F-A-3015; W-J-; W-L-3218, or comparable STI Firestop EZ-Path UL System, based on the number of cable to be installed. .
2. F-Rating: As indicated. .

F. Penetration Firestopping Systems for Cable Trays with Electric Cables:

1. UL-Classified Systems: F-A-; W-K-; W-L-4001-4999.
2. Type of Fill Materials: As required to achieve rating.

G. Penetration Firestopping Systems for Insulated Pipes:

1. UL-Classified Systems: F-A-;W-J-; W-L-5001-5999.
2. Type of Fill Materials: As required to achieve rating.

H. Penetration Firestopping Systems for Miscellaneous Electrical Penetrants:

1. UL-Classified Systems: F-A-; W-L-;W-J6001-6999.
2. Type of Fill Materials: As required to achieve rating.

I. Penetration Firestopping Systems for Miscellaneous Mechanical Penetrants:

1. UL-Classified Systems: F-A-; W-J-; W-L- 7001-7999.
2. Type of Fill Materials: As required to achieve rating.

J. Penetration Firestopping Systems for Groupings of Penetrants:

1. UL-Classified Systems: F-A-; W-J-; W-L-8001-8999.
2. Type of Fill Materials: As required to achieve rating.

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Butyl joint sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Consumer Solutions.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Pecora Corporation.
d. Tremco Incorporated.

2.3 URETHANE JOINT SEALANTS

A. Urethane, M, NS, 50, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Pecora Corporation.
b. Sika Corporation; Joint Sealants

B. Urethane, M, NS, 50, T, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Tremco Incorporated.
b. Sika Corporation; Joint Sealants

C. Urethane, M, NS, 25, T, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 25, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BASF Corporation; Construction Systems.
b. Bostik, Inc.
c. Pecora Corporation.
d. Sika Corporation; Joint Sealants.

2.4 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Dow Corning Corporation.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. Pecora Corporation.

2.5 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Bostik, Inc.

2.6 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Alcot Plastics Ltd.
    b. BASF Corporation; Construction Systems.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective

coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.

2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Construction joints in cast-in-place concrete.
b. Joints between plant-precast architectural concrete units.
c. Joints between different materials listed above.

d. Perimeter joints between materials listed above and frames of doors, windows, and louvers.
e. Control and expansion joints in ceilings and other overhead surfaces.
f. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT .
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.

1. Joint Locations:

a. Isolation joints in cast-in-place concrete slabs.
b. Control and expansion joints in tile flooring.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, M, P, 50, T, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors

C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Control and expansion joints on exposed interior surfaces of exterior walls.
b. Tile control and expansion joints.
c. Vertical joints on exposed surfaces of walls, and partitions.
d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
e. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, M, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors

D. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
b. Tile control and expansion joints where indicated.
c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint-Sealant Application: Concealed mastics.

1. Joint Locations:

   a. Aluminum thresholds.
   b. Sill plates.
   c. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

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SECTION 07 92 19 - ACOUSTICAL JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes acoustical joint sealants.

B. Related Requirements:

1. Section 07 92 00 "Joint Sealants" for elastomeric and butyl-rubber-based joint sealants for nonacoustical applications.

1.3 ACTION SUBMITTALS

A. Product Data: For each acoustical joint sealant.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

D. Samples for Verification: For each kind and color of acoustical joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

E. Acoustical-Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each kind of acoustical joint sealant, for tests performed by a qualified testing agency.

B. Sample Warranties: For special warranties.

1.5 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: <Insert number> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.

1. Sealant shall have a VOC content of 250 g/L or less.
2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Everkem Diversified Products, Inc.
b. Franklin International.
c. GE Construction Sealants; Momentive Performance Materials Inc.
d. Hilti, Inc.

e. Pecora Corporation.
f. Tremco Incorporated.
g. USG Corporation.

2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.

2.3 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.

B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.

C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect acoustical joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

SECTION 08 03 51.33 – MAINTENANCE OF ALUMINUM WINDOWS (ALTERNATE #1)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes maintenance of aluminum windows as follows:

1. Cleaning aluminum surfaces.
2. Repairing aluminum windows and trim.
3. Reglazing.
4. Providing new add-on storm windows.

B. Related Requirements:

1. Section 08 51 13 "Historic Replica Aluminum Windows" for new, replacement aluminum windows.

1.3 DEFINITIONS

A. Glazing: Includes glass, glazing clips, glazing tapes, glazing sealants, and glazing compounds.

B. Window: Includes window frame, sash, hardware, and storm windows unless otherwise indicated by context.

C. Aluminum Window Component Terminology: Aluminum window components for maintenance work are welded, brazed, or mechanically fastened together from aluminum extrusions or shapes and include the following classifications:

1. Subframe: Steel or aluminum anchorage, usually built into wall construction.
2. Window-Frame Members: Head, jambs, and sill.
3. Sash Members: Stiles, rails, and mullions.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Materials, salvage materials, material application, sequencing, tolerances, and required clearances.
2. Fire-protection plan.
3. Aluminum window maintenance program.
4. Coordination with other projects occurring.

1.5 SEQUENCING AND SCHEDULING

A. Perform maintenance of aluminum windows in the following sequence, which includes work specified in this and other Sections:

1. Begin work only after bird excrement removal is completed (by others).
2. Label each window frame with permanent opening-identification number in inconspicuous location.
3. Remove caulking and sealant residue from perimeter masonry and concrete.
4. Dismantle unused window accessory hardware from masonry or concrete and repair holes.
5. Dismantle unused interior window accessory hardware from plaster, gypsum board, or window frames and repair holes.
6. Remove existing hardware on operable windows and fix windows in place except windows leading to adjacent roof surfaces.
7. Remove transom panels with grilles, holes, or otherwise compromised.
8. Replace transom panels with spandrel panel to match adjacent.
9. Clean surfaces.
10. Seal perimeter joints between frames and masonry
11. Install interior storm window after interior finish work is completed.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include recommendations for product application and use.

B. Shop Drawings: Include plans, elevations, and sections showing extent of maintenance and replacement work, with enlarged details of replacement parts indicating materials, profiles, connections, reinforcing, method of splicing into or attaching to existing aluminum window, accessory items, and finishes. Include field-verified dimensions and the following:

1. Schedule of window maintenance.
2. Details of temporary protection and security at window openings.
3. Templates and directions for installing add-on storm windows if any.
4. Provisions for sealant joints as required for location.

C. Samples for Initial Selection: For each type of exposed finish.

1. Include Samples of spandrel involving color selection.

D. Samples for Verification: For the following products in manufacturer's standard sizes unless otherwise indicated, finished as required for use in the Work:

1. Repaired Aluminum Window Members: Prepare Samples using aluminum window members from salvage sources.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For window contractor.

B. Aluminum Window Maintenance Program: Submit before work begins.

1.8 QUALITY ASSURANCE

A. Aluminum-Patching-Compound Manufacturer Qualifications: A firm regularly engaged in producing aluminum-patching compound that has been used for similar historic-metal-repair applications with successful results.

B. Aluminum Window Maintenance Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for maintenance work, including protection of surrounding materials and Project site.

C. Mockups: Prepare mockups of maintenance processes to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation. Prepare mockups so they are as inconspicuous as practicable.

1. Locate mockups on existing windows where directed by Architect.
2. Aluminum Window Maintenance: Prepare one entire window unit to serve as mockup to demonstrate samples of each type of repair of aluminum window members, including frame, sash, glazing, and hardware.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Pack, deliver, and store products in suitable packs, heavy-duty cartons, or wooden crates; surround with sufficient packing material to ensure that products will not be deformed, broken, or otherwise damaged.

B. Store products inside a well-ventilated area and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity, and where environmental conditions comply with manufacturer's requirements.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with maintenance of aluminum windows only when existing and forecasted weather conditions are within environmental limits set by each manufacturer's written instructions and specified requirements.

PART 2 - PRODUCTS

2.1 STORM WINDOWS

A. Description: Custom fabricated, tight fitting to opening.

1. Glazing Material: Uncoated clear float glass.

B. Add-on Storm Windows: Fabricated from extruded aluminum to fit inside the window opening, and thermally separated from contact with primary window frame; finish to match adjacent frame; storm window frames not easily visible from exterior side of primary window.

1. Basis of Design: Allied Window (MOL) Magnetic One Lite (allied window.com) or approved equal from one of the following manufacturers:

a. Edi window systems (ediwindowsystems.net)
b. Mon-Ray Inc. (monray.com)

2. Fabricate add-on storm windows for installation inside of primary existing windows to remain and where indicated on Drawings.
3. Hardware: As required to secure storm window to window opening.

C. Frame Joints: Mitered and staked in place with corner keys.

D. Aluminum Finish: Manufacturer's standard to match the existing anodized surface.

2.2 ALUMINUM-REPAIR MATERIALS

A. Aluminum-Patching Compound: Two-part, metal-filled epoxy resin, aluminum-patching compound; knife-grade formulation as recommended in writing by manufacturer, tooling time required for the detail of work, and site conditions. Compound shall be produced for filling metal that has deteriorated from corrosion or abuse. Filler shall be capable of filling deep holes and spreading to featheredge.

1. Source Limitations: Obtain aluminum-patching compound from single source from single manufacturer.

a. Belzona (www.belzona.com)
b. ITW (itwperformancepolymers.com)

2.3 GLAZING MATERIALS

A. Spandrel Glass: To match existing.

2.4 MISCELLANEOUS MATERIALS

A. Detergent Solution: Prepared by mixing 2 cups (0.5 L) of tetrasodium pyrophosphate (TSPP), 1/2 cup (125 mL) of laundry detergent that contains no ammonia, 5 quarts (5 L) of 5 percent sodium hypochlorite bleach, and 15 quarts (15 L) of warm water for each 5 gal. (20 L) of solution required.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect adjacent materials from damage by maintenance of aluminum windows.

B. Clean aluminum windows of mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with a natural bristle brush or sponge and detergent solution. After cleaning, rinse thoroughly with fresh water. Allow to dry before repairing.

3.2 MAINTENANCE OF ALUMINUM WINDOWS, GENERAL

A. Maintenance Treatment Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from window interior at 20 feet (6 m) away.

B. Repair Aluminum Windows

1. Unless otherwise indicated, repair aluminum windows by patching aluminum members.

3.3 REMOVING CHALKING APPEARANCE ON ANODIZED ALUMINUM

A. Perform preparatory cleaning as required in "Preparation" Article.

B. Perform additional cleaning at places where chalking remains. Perform this work as determined by testing and demonstrated in mockup.

3.4 ALUMINUM WINDOW PATCH-TYPE REPAIR

A. Description: Patch aluminum members that exhibit depressions and nonstructural holes.

1. Verify that surfaces are sufficiently clean and free of paint and other residues according to aluminum-patching-compound manufacturer's written instructions prior to patching.

B. Remove corrosion down to sound material.

C. Apply aluminum-patching compound to fill depressions and non structural holes.

1. Mix only as much patching compound as can be applied according to manufacturer's written instructions.
2. Apply patching compound in layers, as recommended in writing by manufacturer, until the void is completely filled.
3. Finish patch surface smooth and flush with adjacent aluminum, without voids in patch material, and matching contour of aluminum member.
4. Clean spilled compound from adjacent materials immediately.

3.5 GLAZING

A. Comply with combined written instructions of manufacturers of glass, glazing system, and glazing materials unless more stringent requirements are indicated.

B. Remove spandrel glazing that have existing grilles or holes and prepare surfaces for reglazing.

C. Prime aluminum, including glazing rabbets, with finish-paint primer before installing glass.

D. Size glass as required by Project conditions to provide necessary bite on glass and minimum edge and face clearances with reasonable tolerances.

E. Install setting bead, side beads, and back bead against stop in glazing rabbets before setting glass.

F. Install glass with proper orientation so that coatings, if any, face exterior or interior as required.

G. Install glazing system including stops or clips as required for system.

H. Disposal of Removed Glass: Remove from Owner's property and legally dispose of it.

3.6 STORM WINDOW INSTALLATION

A. Install add-on storm windows at each window opening indicated. Install units by mounting to window opening after finish work is completed according to manufacturer's written instructions.

3.7 ADJUSTMENT

A. Adjust add-on storm windows, and accessories for a uniform fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

3.8 CLEANING AND PROTECTION

A. Protect window surfaces from contact with contaminating substances resulting from construction operations. Monitor window surfaces adjacent to and below exterior concrete and masonry during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances contact window surfaces, remove contaminants immediately.

B. Clean exposed surfaces immediately after maintenance of aluminum windows. Avoid damage to coatings and finishes. Remove excess sealants, glazing and repair materials, dirt, and other substances.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION

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SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Standard hollow metal doors and frames.

B. Related Sections:

1. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
2. Division 09 Sections "Interior Painting" for field painting hollow metal doors and frames.
3. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/ SDI A250.8.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.

5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

C. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.

D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

E. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch-high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.

D. Frame Anchors: ASTM A 591, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.

E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.

F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143.

G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.

1. Design: Full flush.
2. Core Construction: Manufacturer's 1” cell kraft structural honeycomb.

   a. Fire Door Core: As required to provide fire-protection ratings indicated.
   b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 12.3 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.

      1) Locations: Exterior doors and interior doors where indicated.

3. Vertical Edges for Single-Acting Doors: Square edge.

4. Top and Bottom Edges: Closed with flush 0.078-inch- thick (14 ga.), end closures or channels of same material as face sheets.
5. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
6. Finish: Manufacturer’s standard primer finish to receive paint in field.

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless).

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 3 Steel Doors: 0.053-inch- thick steel sheet.

C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.7 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016-inch thick.

2.8 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Continuously weld (full-profile weld) all frame joints: grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches high.
        2) Three anchors per jamb from 60 to 90 inches high.
        3) Four anchors per jamb from 90 to 120 inches high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches high.
        2) Four anchors per jamb from 60 to 90 inches high.
        3) Five anchors per jamb from 90 to 96 inches high.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
        5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.

    c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

7. Door Silencers: Except on weather-stripped and sound control doors, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
    c. Silencers and holes are **NOT** to be provided at sound-control door frames

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.

3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/ DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.9 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. At fire-protection-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable glazing stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
3. Metal-Stud Partitions: For non-sound control door, solidly pack mineral-fiber insulation behind frames. For sound-control doors, solidly grout door frames as required by Division 08 Section “Sound Control Door Assemblies”.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with countersunk post-installed expansion anchors (“punched and dimpled”).
7. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

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SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Five-ply flush wood doors for opaque finish.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.
4. Barn doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door trim for openings.
5. Factory-priming specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware and lite cutouts, and glazing thicknesses.
3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
4. Dimensions and locations of blocking for hardware attachment.
5. Dimensions and locations of mortises and holes for hardware.
6. Clearances and undercuts.
7. Doors to be factory primed and application requirements.

1.4 CLOSEOUT SUBMITTALS

A. Special warranties.

B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

C. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

B. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 [percent during remainder of construction period.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of veneer.
b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Wood Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.

B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with WDMA I.S. 1A.

2.4 FIVE-PLY FLUSH WOOD DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. See attached exhibit for Hilton partners.
   b. Basis-of-Design for Barn Doors: Continental Group Wood barn doors.

2. Performance Grade: WDMA I.S. 1A Extra Heavy Duty.
3. Faces: MDO.

   a. Apply MDO to standard-thickness, closed-grain, hardwood face veneers.

4. Exposed Vertical and Top Edges: Any closed-grain hardwood.

   a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
   b. Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
   c. Fire-Rated Pairs of Doors: Provide formed-steel edges and astragals with intumescent seals.

d. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

1) Screw-Holding Capability: 550 lbf in accordance with WDMA T.M. 10.

5. Core for Non-Fire-Rated Doors: ANSI A208.1, Grade LD-2 particleboard.

a. Blocking: Provide wood blocking in particleboard-core doors as follows:

1) 5-inch top-rail blocking, in doors indicated to have closers.
2) 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
3) 5-inch midrail blocking, in doors indicated to have exit devices.

b. Provide doors with glued-wood-stave or WDMA I.S. 10 structural-composite-lumber cores instead of particleboard cores for doors scheduled to receive exit devices in Section 087100 "Door Hardware."

6. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.

a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as needed to eliminate through-bolting hardware. follows:

1) 5-inch top-rail blocking.
2) 5-inch bottom-rail blocking, in doors indicated to have protection plates.
3) 5-inch midrail blocking, in doors indicated to have armor plates.
4) 5-inch midrail blocking, in doors indicated to have exit devices.

7. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.5 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated on Drawings.

Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.6 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
2. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

1. Locate hardware to comply with DHI-WDHS-3.
2. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.

C. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2.7 FACTORY PRIMING

A. Doors for Opaque Finish: Factory prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 099123 " Interior Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

1. Install fire-rated doors and frames in accordance with NFPA 80.
2. Install smoke- and draft-control doors in accordance with NFPA 105.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 08 14 33 - STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior fire-rated, stile and rail MDF and wood doors.
2. Factory prefitting and premachining.
3. Factory finishing of stile and rail wood doors.
4. Machining for hardware.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include details of construction.
2. Include factory-finishing specifications.

B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:

1. Dimensions of doors for factory fitting.
2. Locations and dimensions of mortises and holes for hardware.
3. Undercuts.
4. Doors to be factory finished and finish requirements.
5. Fire-protection ratings for fire-rated doors.

C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification: Corner sections of doors, approximately 8 by 10 inches, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish Sample with same materials proposed for factory-finished doors.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of door, from manufacturer.

B. Sample Warranty: For special warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company specializing in the manufacture of stile and rail doors specified in this section for a minimum of 10 years.

B. Source: All doors specified in this section shall be supplied and manufactured by one company.

C. STC Ratings shall be operable and shall have been tested and not estimated. Manufacturers shall have testing lab documentation of STC ratings of their own doors.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in opaque plastic bags or cardboard cartons.

C. Mark each door as directed by construction manager with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, within specified warranty period.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty shall be in effect during the Life of the Installation for interior and interior fire doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain stile and rail wood doors from single manufacturer.

2.2 MATERIALS

A. General: Use only materials that comply with referenced standards and other requirements specified.

1. Assemble interior doors, including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.

B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

C. Panel Products: Any of the following unless otherwise indicated:

1. Medium-density fiberboard made from wood fiber, with binder containing no urea-formaldehyde, complying with ANSI A208.2, Grade 130.
2. Hardboard complying with ANSI A135.4.
3. Veneer-core plywood, made with adhesive containing no urea-formaldehyde.

D. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

2.3 INTERIOR FIRE-RATED, STILE AND RAIL MDF DOORS

A. Fire-Rated MDF Doors: Two Panel Stile and Rail Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Temperature-Rise Limit: Provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

C. Interior Fire-Rated Stile and Rail Wood Doors: Fire-rated (90-minute rating) doors complying with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards," and with other requirements specified.

1. Basis-of-Design Product: Subject to compliance with requirements, provide TruStile Doors TS2020 2 Panel Door.

2. Panel Designs: 2-Panel Door in Panel Profile C. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
   a. Panels shall be constructed of 48 pound density MDF routed to profile specified.
   b. Panels shall float inside the sticking in true stile and rail construction. Panels shall be held in place by the sticking and flexible bumper shall be installed inside the sticking to keep the panel centered.
3. Grade: Premium.
4. Finish: Opaque powder coating.
5. Interior Fire-Rated Door Construction: 1-3/4-inch-thick, edged and veneered MDF stiles and rails and MDF flat panels.
6. Edge Construction: At hinge stiles, provide continuous laminated-edge construction, extending the entire height of the door, with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

   a. Screw-Holding Capability: 550 lbf per WDMA T.M.-10.

7. STC Rating: 38.

8. Stile and Rail Widths: Manufacturer's standard, but not less than the following:

   a. Stiles, Top and Intermediate Rails: 5 inches.
   b. Bottom Rails: 8 1/4" inches.

9. Molding Profile (Sticking): Custom Bolection Molding to match trim on existing doors.
10. Provide Labels indicating that doors comply with requirements of grades specified.

2.4 STILE AND RAIL WOOD DOOR FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.5 FINISHING

A. Finish MDF stile and rail doors at factory using ResiliColor powder coating finish for MDF. Color as selected by architect from manufacturer’s full range of colors and sheens.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 08 71 00 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

1. Install fire-rated doors according to NFPA 80.
2. Install smoke- and draft-control doors according to NFPA 105.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Access doors and frames for walls and ceilings.

1.3 SUBMITTALS

A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.

C. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

D. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.

B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for vertical access doors and frames.

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.5 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

PART 2 - PRODUCTS

2.1 STEEL MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36.

1. ASTM A 123, for galvanizing steel and iron products.
2. ASTM A 153, for galvanizing steel and iron hardware.
3. First paragraph below specifies minimum yield point of 30 ksi (205 MPa); revise if a higher strength is

B. Steel Sheet: Uncoated or electrolytic zinc-coated, ASTM A 591with cold-rolled steel sheet substrate complying with ASTM A 1008, Commercial Steel (CS), exposed.

C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS) with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924.

D. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
2. Surface Preparation for Metallic-Coated Steel Sheet: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

   a. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

3. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

E. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acudor Products, Inc.
2. Babcock-Davis; A Cierra Products Co.
3. Dur-Red Products.
4. Jensen Industries.
5. J. L. Industries, Inc.
6. Karp Associates, Inc.
7. Larsen's Manufacturing Company.
8. Milcor Inc.
9. Nystrom, Inc.

B. Flush Access Doors and Frames for Gypsum Board Walls and Ceilings:

1. Bauco-plus II, by Bauco Access Panel Solutions, Inc. No substitutions.

C. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel sheet.

1. Locations: Concrete Masonry wall surfaces.
2. Fire-Resistance Rating: Not less than that of adjacent construction
3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch.
5. Frame: Minimum 0.060-inch- thick sheet metal with 1-inch- wide, surface-mounted trim.
6. Hinges: Concealed, continuous piano.
7. Automatic Closer: Spring type.
8. Lock: Self-latching device with manufacturer’s standard keyed lock.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

1. Exposed Flanges: Nominal 3/4 to 1-1/4 inches wide around perimeter of frame.
2. For trimless frames with drywall bead, provide edge trim for gypsum board and gypsum base securely attached to perimeter of frames.
3. Provide mounting holes in frame for attachment of masonry anchors. Furnish adjustable metal masonry anchors.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel or frame as required to prevent buckling.

E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.

1. For cylinder lock, furnish two keys per lock and key all locks alike.
2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Carefully reference mechanical, electrical, plumbing, and fire protection drawings for panels required to access Work of those disciplines.

C. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

D. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

E. Coordinate mounting heights with item being accessed. Confirm final locations with the Architect.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

3.3 SCHEDULE

A. Coordinate final sizes, quantities, and locations with Plumbing, Mechanical, and Electrical Contractors.

B. Typical access in restrooms – 16 inch x 16 inch unit, or as otherwise indicated on Drawings.

C. Other access panels as indicated.

END OF SECTION

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SECTION 08 32 13 - SLIDING ALUMINUM-FRAMED GLASS DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes sliding aluminum-framed glass doors for exterior locations.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sliding aluminum-framed glass doors.

C. Samples: For each exposed product and for each color specified, 12-inch-long (300-mm-long) section with weather stripping, glazing bead, and factory-applied color finish.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification data.

B. Product test reports.

C. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating sliding aluminum-framed glass doors that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.

1.6 WARRANTY

A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of sliding aluminum-framed glass doors that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. Sliding Door: Three years from date of Substantial Completion.
b. Insulating-Glass Units: 10 years from date of Substantial Completion.
c. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. EFCO Corporation.
2. Graham Architectural Products Corporation.
3. Jeld-Wen, Inc.
4. Kawneer North America; an Alcoa company.
5. YKK AP America Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Product Certification: AAMA certified with label attached to each door.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: Class CW>.
2. Minimum Performance Grade: Grade 30.

C. Thermal Transmittance: NFRC 100 maximum total fenestration product U-factor of 0.32 Btu/sq. ft. x h x deg F (1.83 W/sq. m x K).

D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum total fenestration product SHGC of 0.30.

2.3 SLIDING ALUMINUM-FRAMED GLASS DOORS

A. Frames and Door Panels: Fabricated from aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Thermally Improved Construction: Fabricate frames and door panels with an integral, concealed, low-conductance thermal barrier located between exterior and interior surfaces in a manner that eliminates direct metal-to-metal contact.

B. Threshold and Sill Cap/Track: Provide extruded-aluminum threshold and track of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior; with manufacturer's standard finish.

1. Low-Profile Floor Track: ADA-ABA compliant.

2.4 GLAZING

A. Glass and Glazing: Manufacturer's standard glazing system that produces weathertight seal.

2.5 HARDWARE

A. General: Provide manufacturer's standard hardware, fabricated from a corrosion-resistant material compatible with aluminum complying with AAMA 907 and designed to smoothly operate, tightly close, and securely lock sliding aluminum-framed glass doors.

B. Lock: Install manufacturer's keyed cylinder lock and locking device on each movable panel, lockable from the inside only and outside. Adjust locking device to allow unobstructed movement of the panel across adjacent panel in the direction indicated.

2.6 ACCESSORIES

A. Anchors, Clips, and Accessories: Provide anchors, clips, and accessories of aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron for sliding aluminum-framed glass doors, complying with ASTM B 456 or ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.

1. Windborne-Debris Resistance: Provide anchors of same design used in windborne-debris resistance testing.

2.7 FABRICATION

A. Fabricate sliding aluminum-framed glass doors in sizes indicated. Include a complete system for assembling components and anchoring doors.

B. Weather Stripping: Provide full-perimeter weather stripping for each door panel.

C. Weep Holes: Provide weep holes and internal drainage passages to conduct infiltrating water to exterior.

D. Factory-Glazed Fabrication: Glaze sliding aluminum-framed glass doors in the factory where practical and possible for applications indicated. Comply with requirements in Section 088000 "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440.

2.8 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

1. Color: To match existing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing doors, hardware, accessories, and other components.

B. Install sliding aluminum-framed glass doors level, plumb, square, true to line, without distortion, without warp or rack of frames and panels, and without impeding thermal movement; anchored securely in place to structural support; and in proper relation to wall flashing, vapor retarders, air barriers, water/weather barriers, and other adjacent construction.

C. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.

D. Install sliding aluminum-framed glass doors and components to drain condensation, water penetrating joints, and moisture migrating within doors to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

F. Adjust operating panels and screens to provide a tight fit at contact points and weather stripping for smooth operation, without binding, and a weathertight closure. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.

END OF SECTION

SECTION 08 51 13 – HISTORIC REPLICA ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes historic replica aluminum windows for exterior locations.

B. Work included: Provide labor, materials and equipment necessary to complete the work of the window contract and without limiting the generality thereof include:

1. Removal of existing work as required for the proper installation and operation of the units.
2. Removal from site and legal disposal of all removed materials and debris.
3. Provide new factory glazed, thermally broken aluminum windows, types as specified herein, together with necessary operating hardware, installation hardware and all other materials as required for complete installation of the windows.
4. Provide treated wood blocking, fillers and nailers as required to provide a secure installation.

C. Related Requirements:

1. Section 08 03 51.33 "Maintenance of Aluminum Windows".
2. Section 02 41 19 “Selective Demolition” for removal of existing work as required for the installation and operation of units.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.

3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.

B. Shop Drawings: For aluminum windows.

1. Include plans, elevations, sections, hardware, accessories, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, 2 by 4 inches (50 by 100 mm) in size.

D. Samples for Initial Selection: For units with factory-applied finishes.

E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.

B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of window installed in typical exterior window opening as selected by Architect.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period (to the satisfaction of and at no cost to the Owner).

1. Failures include, but are not limited to, the following:

a. Failure to meet performance requirements.
b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
c. Faulty operation of movable sash and hardware.
d. Deterioration of materials and finishes beyond normal weathering.
e. Failure of insulating glass.

2. Warranty Period:

a. Window: Two [2] years from date of Substantial Completion.
b. Glazing Units: Five [5] years from date of Substantial Completion.
c. Aluminum Finish: Five [5] years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AAMA certified with label attached to each window.

B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:

1. Minimum Performance Class: AW.
2. Minimum Performance Grade: 90.

C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.56 Btu/sq. ft. x h x deg F when tested in accordance with AAMA 1503.1 and subjected to a 15 mph positive wind load during testing.

D. Solar Heat-Gain Coefficient (SHGC): As required for local jurisdiction.

E. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1502.7, showing a CRF of at least 54.

F. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F (67 deg C) ambient; 180 deg F (100 deg C) material surfaces.

2.3 ALUMINUM WINDOWS

A. Acceptable Manufacturers

1. The aluminum windows as shown on drawing and specified herein are based on the SH-2000 series AW 90 rated windows manufactured by Win-Vent Architectural Windows, Division of Extrusions, Inc., 2401 South Main Street, PO Box 430, Fort Scott, Kansas 66701, 800-295-3113, fax 620-223-1139.

2. Other acceptable manufactures include:

a. Graham Windows 2500 Series.
b. Quaker Historical Series.
c. Architect approved equal. Full sized sample to be provided to architect 5 days before bid required for approval.

B. Types: Provide the following types in locations indicated on Drawings:

1. Replica single hung [fixed].
2. Replica single hung [operable].
3. Replica Fixed.

C. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/ I.S.2/A440.

1. Aluminum Extrusions: Shall be 4 1/2” in depth of 6063T5 aluminum alloy. Wall thicknesses shall be not less than .100” at any location for frame and sash members and not less than .070 at the glazing bead.
2. All window and sash members shall be nominally 4 1/2” in depth of one part construction (incorporating a thermal barrier). The four corners of the frames shall be neatly cut and joined with 3 screws. Cross rails shall be coped and mechanically fastened to the abutting frame sections. Butyl, narrow joint seam sealer as previously specified in this section shall be applied to all intersections so as to provide a permanent and weather-tight joint. All window sections located beneath sash shall utilize weep holes or slots of adequate size to provide a means of drainage for water, which may accumulate.
3. Thermal Barrier: Fabricate window units with an integrally concealed low conductance thermal barrier. Material shall be poured-in-place, two-part chemically curing structural polyurethane equal to PRC (Product Research and Chemical Corporation) PR-453M. No hardware or other appurtenances shall bridge the thermal barrier in any way.

D. Insulating-Glass Units: ASTM E2190.

1. Glass: ASTM C1036, Type 1, Class 1, q3. (Flat Glass); ASTM C1048 (Heat Strengthened and Fully Tempered Flat Glass)

   a. Tint: Clear.
   b. Kind: Fully tempered where indicated on Drawings

2. Lites: Two.
3. Filling: Fill space between glass lites with argon.
4. Low-E Coating: Manufacturer’s standard on second or third surface.

E. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.

1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.

F. Hung Window Hardware (Where Operable):

1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.

2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
3. Tilt Latch: Releasing latch allows sash to pivot about horizontal axis to facilitate cleaning exterior surfaces from the interior.

G. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

H. Window Assembly Sealant: Unless otherwise indicated, for sealants required within the fabricated window units use the type recommended by the manufacturer for joint size and movement, to remain permanently elastic, non-shrinking and non-migrating.

I. Perimeter Weather Seals: Provide a sealant which matches in color the finish of the window members. Use primers, back up material, bond breakers and cleaning agents as recommended by the sealant manufacturer. Provide product complying with AAMA Specification 803 and 808.

2.4 ACCESSORIES

A. Subsills: Thermally broken, extruded-aluminum subsills in configurations indicated on Drawings.

B. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

C. Fasteners: Aluminum, non-magnetic stainless steel or other material warranted by the window manufacturer to be non-corrosive and compatible with the aluminum window members, trim, hardware, anchors and other components of the window units. Do not use exposed fasteners except where unavoidable for application of operating hardware. Provide only exposed fasteners that match the finish of the hardware being used. Exposed fasteners shall be Phillips, flat, or pan-head machine screws.

D. Anchors, Clips and Window Accessories: Depending on strength and corrosion inhibiting requirements, fabricate accessories of aluminum, non-magnetic stainless steel or hot-dip zinc coated steel or iron complying with ASTM A386.

2.5 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units.

F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. High-Performance Organic Finish (Two-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.

1. Color and Gloss: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.

C. Examine built-in components to ensure weathertight window installation.

D. Carefully remove all applicable items of the existing sash, stops, mullions, screens, storm windows and trim as shown on the drawings and as required for proper installation of the new windows. Avoid damage to the existing work that remains.

E. Existing window items that are removed from the construction shall not be reused in the new installation.

F. Existing windows, window shades, brackets, drapery that is to be disposed of, hardware or other miscellaneous items within the immediate adjacent opening surfaces which affect the installation of the new replacement window shall become the responsibility of the installation contractor who shall remove and legally dispose of same at no additional cost to the owner.

G. No window shall be removed unless it can be replaced, or the opening properly barricaded by the end of the workday. Nor shall it be removed until the opening size is confirmed to the window dimension by the General Contractor to insure the proper fit. Insofar as practical, the existing window parts shall be removed and the replacement window shall be installed in one continuous operation. Any barricades installed shall provide security against unlawful entry as well as complete weather protection.

H. Comply with all applicable laws, rules and regulations as detailed in applicable sections of this specification.

I. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

E. A two piece receptor system is required for installation at head and jambs. Receptor shall allow for installation from the inside of the building.

F. A subsill with weeps is required.

G. 3-piece structural mullions and male / female mullions as required by manufacturer.

H. The installation contractor and his representative shall be totally responsible for the installation of the window units.

I. Use only skilled tradesmen and complete all work in strict accordance with the manufacturers specifications and recommendations for the installation of window units, hardware, operators and other components as well as the approved project shop drawings and these project specifications.

J. Seal all exterior perimeter joints between windows and surrounding construction in accord with the project shop drawings. Joints and other surfaces that are to receive sealants shall be clean, free from loose debris or construction stains and totally dry. In all, prepare surfaces that are to receive sealant and apply sealant according to that manufacturer's instructions.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Testing Services: Testing and inspecting of installed windows shall take place as follows:

1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
2. Air-Infiltration Testing:

   a. Test Pressure: Test unit in accordance with ASTM E283-91 at a static air pressure difference of 6.24. Determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated. Air infiltration shall not exceed .10 cfm per foot of perimeter crack length.

3. Water-Resistance Testing:

   a. Test Pressure: Test unit in accordance with ASTM E330-90 at static air pressure 12.0 psf. Determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
   b. Allowable Water Infiltration: No water penetration.

4. Testing Extent: Three windows as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
5. Test Reports: Prepared according to AAMA 502.

C. Uniform Load Deflection Test: Test unit in accordance with ASTM E330-90 at a static pressure of +/- 90.0 psf. There shall be no glass breakage, permanent damage to fasteners, hardware parts, or frame deformation.

D. Life Cycle Test: In accordance with AAMA 910-93, there shall be no damage which would render the unit in-operable or permanently damaged and supplemental air and water tests shall not exceed primary requirements.

E. Windows will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.

C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION

SECTION 08 71 00 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Reference ***"Embassy Suites Building Standards Manual, current edition"*** for door hardware product guidelines.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:

1. Swinging doors.
2. Sliding doors.
3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Electromechanical door hardware.
3. Cylinders specified for doors in other sections.

C. Related Sections:

1. Division 08 Section "Hollow Metal Doors and Frames".
2. Division 08 Section "Flush Wood Doors".

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
2. ICC/IBC - International Building Code.
3. NFPA 70 - National Electrical Code.
4. NFPA 80 - Fire Doors and Windows.
5. NFPA 101 - Life Safety Code.
6. NFPA 105 - Installation of Smoke Door Assemblies.
7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series
2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
3. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each door hardware item.
b. Manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Warranty information for each product.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:

1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
b. Complete (risers, point-to-point) access control system block wiring diagrams.

c. Wiring instructions for each electronic component scheduled herein.

2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

G. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

H. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Seven years for heavy duty cylindrical (bored) locks and latches.
2. Five years for exit hardware.

3. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.

1. Quantity: Provide the following hinge quantity:

a. Two Hinges: For doors with heights up to 60 inches.
b. Three Hinges: For doors with heights 61 to 90 inches.
c. Four Hinges: For doors with heights 91 to 120 inches.
d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.

3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

4. Hinge Options: Comply with the following:

a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.

5. Manufacturers:

a. Bommer Industries (BO).
b. Hager Companies (HA).
c. Ives (IV).
d. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:

a. Bommer Industries (BO).
b. Hager Companies (HA).
c. Ives (IV).
d. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

C. Pivots: ANSI/BHMA A156.4, Grade 1, certified. Space intermediate pivots equally not less than 25 inches on center apart or not more than 35 inches on center for doors over 121 inches high. Pivot hinges to have oil impregnated bronze bearing in the top pivot and a radial roller and thrust bearing in the bottom pivot with the bottom pivot designed to carry the full weight of the door. Pivots to be UL listed for windstorm where applicable.

1. Manufacturers:

a. Architectural Builders Hardware (AH).
b. Ives (IV).
c. Rixson Door Controls (RF).

D. Sliding and Folding Door Hardware: Hardware is to be of type and design as specified and should comply with ANSI/BHMA A156.14.

1. Sliding Bi-Passing Pocket Door Hardware: Provide complete sets consisting of track, hangers, stops, bumpers, floor channel, guides, and accessories indicated.
2. Manufacturers:

a. Hafele Manufacturing (HF).
b. Johnson Hardware (JO).
c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).

2.3 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:

a. Ives (IV).
b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
c. Trimco (TC).

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
5. Manufacturers:

a. Ives (IV).
b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
c. Trimco (TC).

2.4 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

C. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Manufacturer’s Standard.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. New System: Key locks to a new key system as directed by the Owner.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

H. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:

a. Lund Equipment (LU).

b. MMF Industries (MM).
c. Telkee (TK).

2.5 MECHANICAL LOCKS AND LATCHING DEVICES

A. Cylindrical Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.2, Series 4000, Grade 1 certified.

1. Furnish with solid cast levers, standard 2 3/4” backset, and 1/2" (3/4" at rated paired openings) throw brass or stainless steel latchbolt.
2. Locks are to be non-handed and fully field reversible.
3. Manufacturers:

a. Sargent Manufacturing (SA) – 10 Line.
b. Schlage (SC) – ND Series.
c. Yale Locks and Hardware (YA) 5400LN Series.

B. Tubular Locksets:

1. Standard tubular locksets designed to fit ANSI standard 161 door prep without additional through-bolt preps.
2. Manufacturers:

a. Sargent Manufacturing (SA) – DL Series.
b. Schlage (SC) – LT Series
c. Yale Locks and Hardware (YA) - RL Series.

2.6 AUXILIARY LOCKS

A. Cylindrical Deadlocks: ANSI/BHMA A156.36, Grade 1, cylindrical type deadlocks to fit standard ANSI 161 preparation and 1 3/8" to 1 3/4" thickness doors. Provide tapered collars to resist vandalism and 1" throw solid steel bolt with hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other locksets.

1. Manufacturers:

a. Sargent Manufacturing (SA) - 480 Series.
b. Schlage (SC) - B600 Series.
c. Yale Locks and Hardware (YA) - D100 Series.

B. Narrow Case Deadlocks and Deadlatches: ANSI/BHMA 156.13 Series 1000 Grade 1 certified narrow case deadlocks and deadlatches for swinging or sliding door applications. All functions shall be manufactured in a single sized case formed from 12 gauge minimum, corrosion resistant steel (option for fully stainless steel case and components). Provide minimum 2 7/8" throw laminated stainless steel bolt. Bottom rail deadlocks to have 3/8” diameter bolts.

1. Manufacturers:

    a. Adams Rite Manufacturing (AD) - MS1850S / MS1950 Series.

2.7 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.8 ELECTRIC STRIKES

A. Standard Electric Strikes: Heavy duty, cylindrical and mortise lock electric strikes conforming to ANSI/BHMA A156.31, Grade 1, UL listed for both Burglary Resistance and for use on fire rated door assemblies. Stainless steel construction with dual interlocking plunger design tested to exceed 3000 lbs. of static strength and 350 ft-lbs. of dynamic strength. Strikes tested for a minimum 1 million operating cycles. Provide strikes with 12 or 24 VDC capability and supplied standard as fail-secure unless otherwise specified. Provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike where specified.

1. Manufacturers:

    a. Folger Adam EDC (FO).
    b. HES (HS).
    c. Von Duprin (VD).

2.9 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
9. Rail Sizing: Provide exit device rails factory sized for proper door width application.
10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Manufacturers:

    a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
    b. Sargent Manufacturing (SA) - 80 Series.
    c. Von Duprin (VD) - 35A/98 XP Series.

2.10 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA 156.4, Grade 1 certified surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Manufacturers:

   a. LCN Closers (LC) – 1450 Series.
   b. Norton Door Controls (NO) - 8500 Series.
   c. Sargent Manufacturing (SA) - 1431 Series.
   d. Yale Locks and Hardware (YA) - 3500 Series.

C. Door Closers, Surface Mounted (Standard Duty): ANSI/BHMA 156.4, Grade 1 certified surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.

1. Manufacturers:

   a. LCN Closers (LC) - 1260-SLIM Series.
   b. Sargent Manufacturing (SA) - 1331 Series.
   c. Yale Locks and Hardware (YA) - 2700 Series.
   d. Norton (NO) - 210 Series

2.11 SURFACE MOUNTED CLOSER HOLDERS

A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/ releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate.12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.

1. Manufacturers:

   a. LCN Door Closers (LC) - SEM7800 Series.
   b. Rixson (RF) - 980/990 Series.
   c. Sargent Manufacturing (SA) - 1560 Series.

2.12 ARCHITECTURAL TRIM

A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:

   a. Stainless Steel: 300 grade, 050-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:

   a. Hager Companies (HA).
   b. Ives (IV).
   c. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   d. Trimco (TC).

2.13 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

1. Manufacturers:

a. Hager Companies (HA).
b. Ives (IV).
c. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
d. Trimco (TC).

C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

1. Manufacturers:

a. Architectural Builders Hardware (AH).
b. Glynn Johnson (GJ).
c. Rixson Door Controls (RF).
d. Sargent Manufacturing (SA).

2.14 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.

1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:

1. National Guard Products (NG).
2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
3. Reese Enterprises, Inc. (RE).
4. Zero (ZE).

2.15 ELECTRONIC ACCESSORIES

A. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

1. Manufacturers:

a. Security Door Controls (SD) - 630 Series.
b. Securitron (SU) - BPS Series.
c. Von Duprin (VD) - PS.

2.16 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.17 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

E. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted

items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

B. The supplier is responsible for handing and sizing all products and providing the correct option for the appropriate door type and material where more than one is presented in the hardware sets. Quantities listed are for each pair of doors, or for each single door.

C. Manufacturer's Abbreviations:

1. MK – McKinney
2. PE – Pemko
3. JO - Johnson Hardware
4. RF – Rixson
5. RO – Rockwood
6. YA – Yale
7. AD - Adams Rite
8. SA – Sargent
9. HS – HES
10. VI - ASSA ABLOY Hospitality
11. OT – OTHER
12. NO – Norton
13. SU – Securitron

3.9 HARDWARE SETS

A. See Drawings

END OF SECTION

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SECTION 09 03 20 - HISTORIC TREATMENT OF PLASTER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Repair of historic interior lime plaster.
2. Replication of cast lime and gypsum plasterwork.

B. Related Requirements:

1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.
2. Section 061000 "Rough Carpentry" for wood framing, grounds, and furring that support lath and plaster.
3. Section 092613 "Gypsum Veneer Plastering" for gypsum-based veneer plaster applied on gypsum base for veneer plaster, unit masonry, and monolithic concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review minutes of Preliminary Historic Treatment Conference that pertain to historic treatment of plaster.
2. Review methods and procedures related to historic treatment of plaster including, but not limited to, the following:

a. Verify historic treatment specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
b. Materials, material application, colors, patterns, and sequencing.
c. Fire-protection plan.
d. Plasterwork historic treatment program.
e. Coordination with building occupants.

1.4 SEQUENCING AND SCHEDULING

A. Perform historic treatment of plaster in the following sequence, which includes work specified in this and other Sections:

1. Dismantle existing surface-mounted objects and hardware that overlie plaster surfaces except items indicated to remain in place. Tag items with location identification and protect.
2. Verify that temporary protections have been installed.
3. Examine condition of plaster surfaces.
4. Clean plaster surface and remove paint and other finishes to the extent required.
5. Repair and replace existing plaster and supports to the degree required for a uniform, tightly adhered surface on which to paint or apply other finishes.
6. Cure repaired surfaces and allow them to dry for proper finishing.
7. Paint and apply other finishes.
8. Reinstall dismantled surface-mounted objects and hardware unless otherwise indicated.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include recommendations for product application and use.

B. Shop Drawings: For each configuration of new or replicated plaster molding and ornament required for the work.

1. Include plans, elevations, and sections that show locations and extent of work.
2. Show full-size details of configurations, joint locations, and attachments to other work.

C. Samples for Initial Selection: For each exposed product that will be exposed and not be painted or otherwise finished and for each color and texture specified.

D. Samples for Verification: For the following products:

1. Cast Plaster: Each type and form of cast-plaster fabrication.

a. Patterns for Casting: Before manufacturing cast-plaster fabrications, submit the actual patterns from which molds will be made for casting new units. Package and ship to prevent loss or damage or make patterns available for inspection by Architect at fabrication plant.
b. Cast-Plaster Fabrications: Provide one unit of each shape and surface design, suitable and ready for installation. Submit unit samples after acceptance of patterns for casting.

2. Linear Moldings: 24-inch-long section of each configuration wet-applied molding with finished joint. Show complete pattern and applied nonlinear cast-plaster shapes, if any.

3. Nonlinear Shapes: Full-size unit of each configuration.
4. Wood Lath: 18-inch-long section.
5. Metal Lath: 18 inches square.
6. Accessories: Each type in manufacturer's standard size.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified historic treatment specialist and cast-plaster manufacturer.

B. Plasterwork Historic Treatment Program: Submit before work begins.

1.7 QUALITY ASSURANCE

A. Historic Treatment Specialist Qualifications: A qualified historic plastering specialist with expertise in matching and performing the types of historic plasterwork repairs required. Experience only in installing and repairing new plasterwork, veneer plaster, or gypsum board is insufficient experience for historic treatment work.

B. Cast-Plaster Manufacturer Qualifications: A firm regularly engaged in manufacturing custom-cast plasterwork for building restoration purposes, of same types and of similar size, complexity, and tolerances as those required for the Work.

C. Plasterwork Historic Treatment Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for historic treatment work and protection of surrounding materials and Project site.

1. Include methods and procedures to protect plastered surfaces from damage caused by construction operations, including, but not limited to, exposure to moisture, vibration, mechanical damage, and soiling.
2. If materials and methods other than those indicated are proposed for any phase of historic treatment work, add a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project.

D. Mockups: Prepare mockups of historic treatment processes for each type of plaster repair and reconstruction work to demonstrate aesthetic effects and to set quality standards for materials and execution and for fabrication and installation.

1. Locate mockups in locations that enable viewing under same conditions as the completed Work.
2. Number and Size: Two wall surfaces of at least 50 sq. ft. or approximately 48 inches in least dimension to represent surfaces and conditions for application of each type of plaster repair and reconstruction under same conditions as the completed Work. Include at least the following:

a. Install 4-sq. ft. area of wet-applied plaster replacement with grooves simulating stone joints, as indicated.

b. Patch 10-sq. ft. area of wet-applied plaster replacement with grooves simulating stone joints, as indicated.
c. Install 6 linear ft. of wet-applied plaster molding.
d. Install 6 linear ft. of cast-plaster molding, but not less than two cast units.
e. Repair 3 linear ft. of plaster cracks.
f. Reattach 4-sq. ft. area of delaminated plaster that has not fallen.

3. Simulate finished lighting conditions for review of mockups.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

B. Store materials on elevated platforms, under cover, and in a dry location with ambient temperatures continuously maintained at not less than 45 deg F.

C. Store hydrated lime and factory-prepared lime putty in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.

D. Store materials not in use in tightly covered containers.

E. Store lime putty covered with water in sealed containers.

F. Store sand where grading and other required characteristics can be maintained and contamination avoided.

G. Handle cast-plaster fabrications to prevent overstressing, chipping, defacement, and other damage.

1.9 FIELD CONDITIONS

A. Comply with plaster-material manufacturers' written instructions. For gypsum plaster, also comply with ASTM C842 requirements.

B. Temperatures: Maintain temperatures in work areas at not less than 55 deg F or greater than 80 deg F for at least seven days before application of plaster, continuously during application, and for seven days after plaster has set or until plaster has dried.

C. Conditioning: Acclimatize cast-plaster fabrications to ambient temperature and humidity of spaces in which they are installed. Remove packaging and move units into installation spaces not less than 48 hours before installing them.

D. Field Measurements: Where cast-plaster fabrications are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

E. Avoid conditions that result in plaster drying out too quickly.

1. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
2. Maintain relative humidity levels for prevailing ambient temperature that produce normal drying conditions.
3. Ventilate work areas in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

1.10 REUSABLE PLASTER MOLDS AND PATTERNS

A. On completion of the manufacturing of cast units, deliver one unused mold and pattern of each shape and size of unit delivered to Project site. Deliver to a location and at a time determined by Owner, to become Owner's property.

B. Identify each piece whether it was sized for casting lime- or gypsum-plaster fabrications and where the fabrications were used.

C. Have molds delivered carefully packed; protected from dirt, moisture, and breakage; so as to arrive in usable, undamaged condition and enable long-term storage and possible future use.

PART 2 - PRODUCTS

2.1 LIME-PLASTER MATERIALS

A. Hydrated Lime: ASTM C206, Type S or Type N.

B. Lime Putty: Slaked hydrated lime or factory-prepared lime putty according to ASTM C1489.

C. Sand Aggregates: ASTM C897.

1. Finish-Coat Sand: Match size, texture, and gradation of existing sand as closely as possible. Blend several sands if necessary to achieve suitable match.

D. Pigments for Colored Plaster: ASTM C979/C979M and having a record of satisfactory performance in lime plaster.

E. Fiber: 1/2 to 1 inch in length; composed of cattle, goat, or hog hair or body hair from horses, natural linen, cotton, hemp, or jute fiber or alkali-resistant glass or polypropylene fiber; free of grease, waxes, and oils; and beaten well to separate fibers before blending into unfibered plaster material.

1. Proportion of Fiber to Unfibered Plaster Material: 3.5 oz./cu. ft. of unfibered plaster material, adjusted as required to produce a well-fibered, cohesive, spreadable, stiff mix with fibers uniformly distributed.

F. Fabric Reinforcing: Coarse, open-weave, sackcloth made of natural linen, cotton, hemp, or jute; free of grease and oils; free of grease, waxes, and oils.

2.2 GYPSUM PLASTER MATERIALS

A. Gypsum Materials:

1. Lightweight Gypsum Ready-Mixed Plaster: ASTM C28/C28M, with mill-mixed perlite aggregate.
2. Gypsum Neat Plaster: ASTM C28/C28M for use with job-mixed aggregates.
3. Gypsum Wood-Fibered Plaster: ASTM C28/C28M.
4. High-Strength Gypsum Neat Plaster: ASTM C28/C28M; with a minimum, average, dry compressive strength of 2800 psi per ASTM C472 for a mix of 100 lb of plaster and 2 cu. ft. of sand.
5. Gypsum Gaging Plaster. ASTM C28/C28M.
6. High-Strength Gypsum Gaging Plaster: ASTM C28/C28M; with a minimum, average, dry compressive strength of 5000 psi per ASTM C472 for a neat mix.
7. Gypsum Ready-Mixed Finish Plaster: ASTM C28/C28M; manufacturer's standard, mill-mixed, gaged, interior finish.
8. Gypsum Keene's Cement: ASTM C61/C61M.

B. Hydrated Lime: ASTM C206, Type S or Type N.

C. Aggregates:

1. Aggregate for Base-Coat Plasters: ASTM C35, sand.
2. Aggregate for Float Finishes: ASTM C35, sand; graded per ASTM C842.

D. Fiber: 1/2 to 1 inch in length; composed of natural linen, cotton, hemp, or jute fiber; free of grease, waxes, and oils; and beaten well to separate fibers before blending into unfibered plaster material.

1. Proportion of Fiber to Unfibered Plaster Material: 3.5 oz./cu. ft. of unfibered plaster material, adjusted as required to produce a well-fibered, cohesive, spreadable, stiff mix with fibers uniformly distributed.

E. Fabric Reinforcing: Coarse, open-weave, sackcloth made of natural linen, cotton, hemp, or jute; free of grease and oils; free of grease, waxes, and oils.

F. Bonding Compound: ASTM C631.

2.3 LATH

A. Wood Lath: 1/4 inch by 1-1/4 inch sound, straight-grained, wood strips

B. Metal Lath:

1. Expanded-Metal Lath: ASTM C847, cold-rolled carbon-steel sheet, ASTM A653/A653M, G60, hot-dip galvanized zinc coated.

   a. Paper Backing: Kraft paper factory bonded to back of lath.
   b. Diamond-Mesh Lath: Flat 2.5 lb/sq. yd.
   c. Flat Rib Lath: Rib depth of not more than 1/8 inch, 2.75 lb/sq. yd.
   d. 3/8-Inch Rib Lath: 3.4 lb/sq. yd.

2.4 TRIM ACCESSORIES

A. General: According to ASTM C1063 for lime plaster and ASTM C841 for gypsum plaster; coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Cornerite: Fabricated from expanded-metal lath with ASTM A653/A653M, G60, hot-dip galvanized zinc coating.
2. Striplath: Fabricated from expanded-metal lath with ASTM A653/A653M, G60, hot-dip galvanized zinc coating.
3. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.

   a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
   b. Small nose cornerbead with perforated flanges; use on curved corners.
   c. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
   d. Bull nose cornerbead, radius of 3/4 inch minimum, with expanded flanges; use at locations indicated on Drawings.

4. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
5. Control Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
6. Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
7. Two-Piece Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch wide; with perforated flanges.

2.5 MISCELLANEOUS MATERIALS

A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Fasteners for Attaching Lath to Substrates:

1. For Lime Plaster: ASTM C1063.
2. For Gypsum Plaster: ASTM C841.
3. For Wood Lath: ASTM C841 requirements for wood-floor-runner or wood-furring fasteners unless otherwise indicated on Drawings.

C. Wire Ties: ASTM A641/A641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter, unless otherwise indicated.

D. Plaster-Stabilization Materials: Acrylic emulsion(s) and related installation products shall have proven effectiveness in reattaching delaminated plaster and shall have been used previously by historic treatment specialist with successful results.

1. Acrylic Emulsion(s), General: Aqueous emulsion(s) of acrylic polymer, adhesive to plaster and plaster substrates, nontoxic, and non-reemulsifiable after curing.
2. Prewet Solution: Low-viscosity acrylic emulsion.
3. Adhesive: Thickened acrylic emulsion; thickener as recommended in writing by resin manufacturer and historic treatment specialist.

E. Other Products: Select materials and methods of use based on the following, subject to approval of a mockup:

1. Previous effectiveness in performing the work involved.
2. Little possibility of damaging exposed surfaces.
3. Consistency of each application.
4. Uniformity of the resulting overall appearance.
5. Do not use products or tools that could do the following:

a. Remove, alter, or in any way harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in contract.
b. Leave an unintended residue on surfaces.

2.6 CAST-PLASTER FABRICATIONS

A. General: Fabricate cast-plaster units with uniformly finished surfaces and sharply defined details; repair hollows, voids, scratches, and other surface imperfections.

1. Fabricate units of sizes and shapes to match similar existing plasterwork unless otherwise indicated.
2. Fabricate units in lengths and sizes that minimize number of joints between abutting units unless otherwise indicated.
3. Configure joints between units so that they may be finished flush or otherwise concealed inconspicuously.
4. Maximum deviation from true line, size, or shape shall be 1/16 inch, noncumulative.

B. Composition: Fabricate units from lime- and gypsum-plaster materials. Reinforce units with fiber or fabric reinforcing.

1. Plaster Face: Molding plaster with or without aggregate as is standard with manufacturer for required surface finish.
2. Plaster Backup: Molding plaster with or without aggregate, but with high-proportion of plaster-saturated fiber or fabric reinforcing as is standard with manufacturer.

C. Thickness: Not less than 3/16-inch thickness of plaster material at any point.

D. Finish: Smooth for paint finish.

E. Embedments: Incorporate manufacturer's standard embedments for attaching units to supporting elements unless otherwise indicated. Place embedments to develop the full strength of cast-plaster fabrications. Cover embedments with not less than 3/16-inch thickness of reinforced plaster material.

F. Joint-Treatment Materials: As recommended in writing by manufacturer.

PART 3 - EXECUTION

3.1 HISTORIC TREATMENT OF PLASTER, GENERAL

A. Historic Treatment Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from building interior at 5 feet away from surface and from building exterior at 20 feet away from surface.

B. General: In treating historic plaster, disturb it as minimally as possible and as follows unless otherwise indicated:

1. Dismantle loose, damaged, or deteriorated plaster, lath, and support systems that cannot be repaired.
2. Verify extent of plaster deterioration against that indicated on Drawings. Consult Architect on types and extent of required work.
3. Verify that substrate surface conditions are suitable for repairs.
4. Provide lath, furring, and support systems for plaster included in the work of this Section.
5. Replace lost details in new, wet-applied and cast plaster that replicate existing or indicated plaster configurations.
6. Leave repaired plasterwork in proper condition for painting or applying other finishes as indicated.
7. Install temporary protective measures to protect historic surfaces that shall be treated later.

C. Illumination: Perform plastering work with adequate, uniform illumination that does not distort the flatness or curvature of surfaces.

3.2 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate and environmental conditions, installation tolerances, and other conditions affecting performance of the Work.

1. If existing substrates cannot be prepared to an acceptable condition for plastering work, notify Architect in writing.
2. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.

B. Masonry Substrates: Verify that mortar joints are struck flush. Notify Architect of undocumented masonry substrate without flush joints. Proceed with plastering as directed by Architect.

C. Begin historic plastering work only after unsatisfactory conditions have been corrected.

3.3 PREPARATION FOR PLASTERING

A. Substrates: Prepare according to plaster manufacturer's written instructions and as follows:

1. Clean surfaces to remove dust, loose particles, grease, oil, incompatible curing compounds, form-release agents, and other foreign matter and deposits that could impair bond with plaster.
2. Remove ridges and protrusions greater than 1/8 inch and fill depressions greater than 1/4 inch with patching material. Allow to set and dry.

3.4 PLASTER REMOVAL AND REPLACEMENT, GENERAL

A. Dismantle plaster that is damaged or deteriorated to the limits indicated. Carefully dismantle areas along straight edges that lie over supports, without damaging surrounding plasterwork.

B. Maintain lath and supporting members in an undamaged condition so far as practicable. Dismantle damaged lath and supports that cannot be repaired or resecured and replace with new work of same type.

C. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.

D. Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.

E. Clean substrate surfaces to remove grease, waxes, oils, waterborne staining, debris, and other foreign matter and deposits that could impair bond with repair material.

F. Wet wood lath, masonry and concrete bases before plaster application. Keep substrate damp to the touch but without visible water droplets.

G. Wet remaining plaster abutting the replacement plaster before installing new plasterwork.

H. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

I. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

3.5 FLAT LIME-PLASTER REMOVAL AND REPLACEMENT

A. General: Dismantle deteriorated plaster to existing sound plaster.

1. Inspect for lath deterioration. If any, replace lath.
2. Sand bonding surfaces of repair area, and clean the surface with a nonmetallic bristle brush.
3. Wet substrate to damp condition, but without visible water droplets, then install new plaster to original profiles.

B. Lime-Plaster Base Coats:

1. Scratch Coat: Match existing.
2. Brown Coat: 1 part lime putty, 3 parts base-coat sand.

C. Lime-Plaster Finish Coats:

1. Finish-Coat Mix for Smooth-Troweled Finish: As required to match finish of design reference sample.
2. Finish-Coat Mix for Smooth-Float Finish: As required to match finish of design reference sample.
3. Finish-Coat Mix for Sandy Float Finish: As required to match finish of design reference sample.

D. Lime-Plaster Finishes: Match finish(es) of existing:

1. Provide smooth-troweled finish unless otherwise indicated.
2. Provide smooth-float finish unless otherwise indicated.
3. Provide sandy-float finish unless otherwise indicated.

E. Hairline cracking within the plaster or plaster separation at edge of a replacement is unacceptable. Completely dismantle such work and reinstall or repair as a crack repair.

3.6 FLAT GYPSUM-PLASTER REMOVAL AND REPLACEMENT

A. General: Dismantle deteriorated plaster to existing sound plaster. Use replacement plaster mixes of gypsum, lime, and aggregate; and application according to ASTM C842 unless otherwise indicated.

1. Inspect for lath deterioration. If any, replace lath.
2. Sand bonding surfaces of repair area, and clean the surface with a nonmetallic bristle brush.
3. Wet substrate to damp condition, but without visible water droplets, then install new plaster to original profiles.

B. Bonding Compound: Apply on unit masonry and concrete plaster bases.

C. Gypsum-Plaster Base Coats:

1. Base Coats over Wood Lath: Gypsum neat plaster with job-mixed sand and fiber.
2. Base Coats over Expanded-Metal Lath: Gypsum neat plaster with job-mixed sand for scratch and brown coats.
3. Base Coats over Expanded-Metal Lath:

   a. Scratch Coat: Gypsum wood-fibered plaster; neat or with job-mixed sand.
   b. Brown Coat: Gypsum neat plaster with job-mixed sand.

4. Base Coats over Unit Masonry: Gypsum neat plaster with job-mixed sand.
5. Base-Coat Mix over Monolithic Concrete: Gypsum neat plaster with job-mixed sand.

D. Gypsum-Plaster Finish Coats:

1. Finish-Coat Mix for Smooth-Troweled Finishes: Gypsum ready-mixed finish plaster.
2. Finish-Coat Mix for Float Finishes: Gypsum Keene's cement.
3. Finish-Coat Mix for Textured Finishes: Gypsum ready-mixed finish plaster.

E. Gypsum-Plaster Finishes: Match existing.

1. Provide troweled finish unless otherwise indicated.
2. Provide float finish unless otherwise indicated.

3.7 CAST-PLASTER REMOVAL AND REPLACEMENT

A. General: Dismantle and replace cast-plaster that is damaged or deteriorated. Carefully dismantle whole cast units from joint to joint, without damaging surrounding plasterwork.

1. Coordinate removal and installation of cast plaster with other plaster repair and installation work.

2. Inspect for deterioration of supporting plaster and lath, and repair or replace deteriorated material as required for a sound substrate.
3. Maintain lath and supporting members in an undamaged condition so far as practicable. Dismantle damaged lath and supports that cannot be repaired or resecured and replace with new work of same type.
4. Sand repair bonding surfaces and clean the surface with a nonmetallic bristle brush.
5. Wetting Substrate: Wet to damp condition, but without visible water droplets.

B. Replacement Material: Replace cast lime-plaster fabrications in kind. Replace cast gypsum-plaster fabrications with cast gypsum-plaster fabrications.

C. Adhering Cast Plaster: Wet the substrate in replacement area and affix cast plaster using finish-coat plaster for smooth-troweled finish as adhesive. Support units until adhesive can fully support weight of plaster. Remove excess adhesive.

D. Install cast-plaster fabrications level, plumb, true, and aligned with adjacent materials and ready to receive required finishes. Use concealed shims secured with wet plaster where required for alignment.

1. Install replacement, cast-plaster units into bonding and coursing pattern of existing units. Maintain articulated joint widths, if any, between units to match existing joints.
2. Finish nonarticulated joints with joint-treatment materials so that they are flush or otherwise concealed inconspicuously.
3. Where cast-plaster units are joined to form composite fabrications, join units inconspicuously and as recommended in writing by manufacturer.
4. Repair hollows, voids, scratches, and other surface imperfections on units.

E. Hairline cracking within the plaster or plaster separation at edge of a replacement is unacceptable. Completely dismantle such work and reinstall or repair as a crack repair as directed by Architect.

3.8 REMOVING AND INSTALLING LATH AND ACCESSORIES

A. General: Dismantle existing plaster as necessary to expose deteriorated or rusted lath, wire ties, and support system, back to firm substrates and supports. Repair with new materials, well secured to existing lath in good condition and to building structure.

1. Cutting: Cut lath so it can be taken out completely from one support to the next. Cut to avoid cracking surrounding plaster.
2. Cut out existing base-coat plaster beyond the edges of the new lath to permit new plaster to extend onto the old lath. Then step subsequent plaster coats to permit new plaster to extend over the old material.
3. Fasten new lath to support system and to good existing lath. Wire tie at least every 6 inches.
4. Install new lath according to ASTM C1063 for lime plaster and ASTM C841 for gypsum plaster.

B. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.

C. Wood Lath: Install wood lath in same orientation and spacing as remaining wood lath and with lath ends supported by furring or framing. Stagger ends of adjacent laths over different supports, not aligned, and secure with fasteners at each end and spaced a maximum of 24 inches o.c. into supports.

D. Metal Lath: Install according to ASTM C1063 for lime plaster and ASTM C841 for gypsum plaster.

1. Partition Framing and Vertical Furring: Install flat diamond-mesh lath.
2. Flat-Ceiling and Horizontal Framing: Install flat diamond-mesh lath.
3. Curved-Ceiling Framing: Install flat diamond-mesh lath.
4. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

3.9 PATCH-TYPE REPAIR

A. General: Patch voids, fractured surfaces, and crushed areas in otherwise sound plaster that are larger than cracks.

1. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.
2. Inspect for deterioration of supporting plaster and lath, and repair or replace deteriorated material as required for a sound substrate.
3. Rake perimeter of hole to sound plaster, and slightly undercut existing plaster to enable replacement plaster to tuck behind existing plaster.
4. Replace missing lath in kind. Bridge gaps in wood lath with expanded-metal lath, overlapping wood by 6 inches and fastening them together.
5. Clean hole to remove loose materials and other foreign matter and deposits that could impair bond with repair material. Where grease, waxes, oils, waterborne staining, or other foreign matter and deposits that could impair bond with repair material have penetrated into the plaster, enlarge the hole to remove these deposits.
6. Wet substrate to damp condition, but without visible water droplets, then install patch material to original profiles.
7. Maintain adjacent plasterwork in an undamaged condition so far as practicable.

B. Lime-Plaster Mix: 3 parts lime putty, 1 part gypsum neat plaster or gypsum gaging plaster.

C. Gypsum-Plaster Mix: Gypsum neat plaster with job-mixed sand.

D. Finishing: Finish flat surfaces flush and with same texture as adjacent existing plaster. For molded plaster shapes, tool surface to restore the sharp edges and the shape of the molded shape to original contours.

E. Hairline cracking within the plaster or plaster separation at edge of a patch is unacceptable. Completely dismantle such work and reinstall or repair.

3.10 HAIRLINE CRACK REPAIR

A. General: Repair cracks 1/32 inch in width or narrower in otherwise sound plaster.

1. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.
2. Maintain adjacent plasterwork in an undamaged condition so far as practicable.

B. Existing Topcoat: Open crack in existing topcoat to at least 1/8 inch in width and check for broken fiber reinforcement in base coats.

C. Existing Base Coats: Do not open crack wider in existing base coats unless inspection or other indication shows that the fiber reinforcement has broken. Where inspections indicate failure of fiber reinforcement, proceed as for a large crack repair, but only for length of crack with broken fiber reinforcement.

D. Clean out crack to remove loose materials and other foreign matter and deposits that could impair bond with repair material. Where grease, waxes, oils, waterborne staining, or other foreign matter and deposits that could impair bond with repair material have penetrated into the topcoat plaster, widen the crack and sand surface of the exposed basecoat to remove these deposits.

E. Wet substrate to damp condition, but without visible water droplets.

F. Force repair material demonstrated in mockup into crack, filling crack to original plaster profile.

G. Finishing: Finish flat surfaces flush and with same texture as adjacent existing plaster. For molded plaster shapes, tool surface to restore the sharp edges and the shape of the molded shape to original contours.

3.11 LARGE CRACK REPAIR

A. General: Repair cracks over 1/32 inch in width in otherwise sound plaster.

1. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.
2. Maintain adjacent plasterwork in an undamaged condition so far as practicable.

B. Open crack to at least 1/8 inch in width and full depth with V-groove tool, and check for bond separation or lath deterioration.

C. Abrade side surfaces of crack and remove inner crack debris by gouging (keying) the inside area of the crack.

D. Clean out crack to remove loose materials and other foreign matter and deposits that could impair bond with repair material. Where grease, waxes, oils, waterborne staining, or other foreign matter and deposits that could impair bond with repair material have penetrated into the plaster, widen the crack to remove these deposits.

E. Wet substrate to damp condition, but without visible water droplets.

F. Install repair material demonstrated in mockup to fill crack to original plaster profile.

G. Finishing: Finish flat surfaces flush and with same texture as adjacent existing plaster. For molded plaster shapes, tool surface to restore the sharp edges and the shape of the molded shape to original contours.

H. Offset Cracks: If the crack is offset in surface plane by more than 1/8 inch, dismantle the plaster on each side of the crack, a minimum width of 6 inches and down to the lath or other substrate. Then, repair as specified for flat-plaster removal and replacement.

3.12 REATTACHMENT OF DELAMINATED PLASTER

A. General: Reattach plaster that has detached from its wooden lath.

1. Notify Architect of undocumented detrimental conditions including cracks, bulges, loose backup, rotted wood, rusted metal, and other deteriorated items.
2. Maintain adjacent plasterwork in an undamaged condition so far as practicable.

B. Verify extent of detachment of plaster that has not yet fallen by tapping on plaster surface and evaluating the hollow or solid resonance.

C. Protect floors from spillage and debris in the vicinity of work. Use materials resistant to the passage of fluids used in work.

D. Drill 1/4-inch injection ports (holes) through the plaster spaced 3 to 6 inches apart over surface of detached plaster. Dislodge loose plaster particles, and vacuum debris from holes.

E. Prewet injection ports, gaps at edges of lost plaster, back of plaster, and wooden lath with prewet solution.

F. Inject adhesive into ports, enough to fill gaps between detached plaster and lath, and inject into gaps at edges of lost plaster.

G. Clean off excess and smeared adhesive while wet.

H. Apply temporary battens over surface of treated plaster to prevent further separation during repair work. Secure battens in place against plaster with screws through the battens and plaster and into the wood lath.

I. Maintain temporary battens in place for a week or more, allowing adhesive to coalesce and dry.

J. Remove battens, patch holes and missing plaster, and repair cracks.

3.13 INSTALLATION TOLERANCES

A. Completed plaster installation shall not deviate from a true plane by more than 1/8 inch as measured by a 5-foot straightedge placed at any location on a surface, except where existing plaster is retained as a substrate for new plasterwork.

3.14 CLEANING AND PROTECTION

A. Protect work of other trades against damage. Promptly remove plaster from surfaces not indicated to be repaired or plastered. Do not scratch or damage finished surfaces.

B. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

C. Correct damage to other historic surfaces and to new work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. Remove temporary protection and enclosure of other work.

END OF SECTION

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SECTION 09 21 16.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes gypsum board shaft wall assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each component of gypsum board shaft wall assembly.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and support them on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with gypsum-shaftliner-board manufacturer's written instructions.

B. Do not install finish panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

A. Fire-Resistance Rating: As indicated.

B. Gypsum Shaftliner Board:

1. Moisture- and Mold-Resistant Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with ASTM D 3273 mold-resistance score of 10 as rated according to ASTM D 3274, 1 inch thick, and with double beveled long edges.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) American Gypsum.
2) CertainTeed Corporation.
3) Georgia-Pacific Gypsum LLC.
4) National Gypsum Company.
5) PABCO Gypsum.
6) USG Corporation.

C. Non-Load-Bearing Steel Framing, General: Complying with ASTM C 645 requirements for metal unless otherwise indicated and complying with requirements for fire-resistance-rated assembly indicated.

1. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized unless otherwise indicated.

D. Studs: Manufacturer's standard profile for repetitive, corner, and end members as follows:

1. Depth: As indicated.
2. Minimum Base-Metal Thickness: 0.030 inch

E. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.

1. Minimum Base-Metal Thickness: Matching steel studs.

F. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CEMCO; California Expanded Metal Products Co.
b. Fire Trak Corp.
c. Metal-Lite.

G. Finish Panels: As indicated.

H. Sound Attenuation Blankets: As specified in Section 092900 "Gypsum Board."

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with shaft wall manufacturer's written instructions.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written instructions for application indicated.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488/E 488M conducted by a qualified testing agency.
2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

E. Reinforcing: Galvanized-steel reinforcing strips with 0.033-inch minimum thickness of base metal (uncoated).

F. Gypsum Board Cants:

1. Gypsum Board Panels: As specified in Section 092900 "Gypsum Board," Type X, 1/2- or 5/8-inch panels.
2. Adhesive: Laminating adhesive as specified in Section 092900 "Gypsum Board."
3. Non-Load-Bearing Steel Framing: As specified in Section 092216 "Non-Structural Metal Framing."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Section 078100 "Applied Fireproofing."

B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLATION

A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated and manufacturer's written installation instructions.

B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.

C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

1. Reinforcing: Provide where items attach directly to shaft wall assembly as indicated on Drawings; accurately position and secure behind at least one layer of face panel.

D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons and floor indicators, and similar items.

E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels while maintaining continuity of fire-rated construction.

F. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

G. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.

H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.

I. Gypsum Board Cants: At projections into shaft exceeding 4 inches, install gypsum board cants covering tops of projections.

1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft wall framing.
2. Where non-load-bearing steel framing is required to support gypsum board cants, install framing at 24 inches o.c. and extend studs from the projection to shaft wall framing.

J. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of code-compliance certification for studs and tracks.

B. Evaluation Reports: For embossed, high-strength steel studs and tracks, firestop tracks, post-installed anchors, and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE

A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, or the Steel Stud Manufacturers Association.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

C. Horizontal Deflection: For composite and non-composite wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
2. Protective Coating: ASTM A653/A653M, G40 Coating with equivalent corrosion resistance of ASTM A653/A653M, G40, hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.

1. Steel Studs and Tracks:

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1) CEMCO; California Expanded Metal Products Co.
2) ClarkDietrich Building Systems.
3) MBA Building Supplies.
4) Steel Construction Systems.
5) The Steel Network, Inc.

b. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection but not less than 0.0179 inch.
c. Depth: As indicated on Drawings.

2. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1) CEMCO; California Expanded Metal Products Co.
2) ClarkDietrich Building Systems.
3) MBA Building Supplies.
4) Steel Construction Systems.
5) The Steel Network, Inc.

b. Minimum Base-Steel Thickness: As required by horizontal deflection performance requirements but not less than 0.0147 inch.
c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to tracks while allowing 1-1/2-inch minimum vertical movement.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1) CEMCO; California Expanded Metal Products Co.
2) ClarkDietrich Building Systems.
3) Fire Trak Corp.
4) Steel Construction Systems.
5) The Steel Network, Inc.

2. Double-Track System: ASTM C645 top outer tracks, inside track with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1) CEMCO; California Expanded Metal Products Co.
2) ClarkDietrich Building Systems.
3) MBA Building Supplies.
4) Steel Construction Systems.
5) The Steel Network, Inc.

D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated

assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. CEMCO; California Expanded Metal Products Co.
    b. ClarkDietrich Building Systems.
    c. Fire Trak Corp.
    d. Steel Construction Systems.
    e. The Steel Network, Inc.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ClarkDietrich Building Systems.
    b. SCAFCO Steel Stud Company.
    c. Steel Construction Systems.

2. Minimum Base-Steel Thickness: 0.0269 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch wide flanges.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ClarkDietrich Building Systems.
    b. MRI Steel Framing, LLC.
    c. Steel Construction Systems.

2. Depth: 1-1/2 inches.
3. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C645.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. ClarkDietrich Building Systems.
    b. MRI Steel Framing, LLC.
    c. Steel Construction Systems.

2. Minimum Base-Steel Thickness: 0.0179 inch.
3. Depth: 7/8 inch.

H. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. ClarkDietrich Building Systems.
b. MRI Steel Framing, LLC.
c. Steel Construction Systems.

2. Configuration: Asymmetrical or hat shaped.

I. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.

1. Depth: 3/4 inch.
2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

B. Hanger Attachments to Concrete:

1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, AC193, AC58, or AC308 as appropriate for the substrate.

a. Uses: Securing hangers to structure.
b. Type: Torque-controlled, expansion anchor, torque-controlled, adhesive anchor or adhesive anchor.
c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or Class Fe/Zn 5, unless otherwise indicated.
d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

D. Flat Hangers: Steel sheet, 1 by 3/16 inch.

E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.

1. Depth: Minimum of 1-1/2 inches.

F. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
2. Steel Studs and Tracks: ASTM C645.

a. Minimum Base-Steel Thickness: 0.0179 inch.
b. Depth: As indicated on Drawings.

3. Embossed, High-Strength Steel Studs and Tracks: ASTM C645.

a. Minimum Base-Steel Thickness: 0.0147 inch.
b. Depth:[As indicated on Drawings.

4. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch deep.

a. Minimum Base-Steel Thickness: 0.0179 inch.

5. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.

a. Configuration: Asymmetrical or hat shaped.

G. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Armstrong World Industries, Inc.
b. Rockfon (Rockwool International).
c. USG Corporation.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D226/D226M, Type I (No. 15 asphalt felt), nonperforated.

2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C754.

1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C841 that apply to framing installation.
2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C1063 that apply to framing installation.
3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C844 that apply to framing installation.

4. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

   a. Install two studs at each jamb unless otherwise indicated.
   b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
   c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 24 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 09 23 00 - GYPSUM PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Repair of damaged interior plaster and replacement of missing plaster and plaster to be removed from damage.
2. Spot repair and whole wall recoating over repaired existing plaster on the inside of exterior walls, including opening recesses.

B. Related Requirements:

1. Preservation Brief #21-NPS.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for each substrate and finish texture indicated for gypsum plastering, including accessories.

a. Size: 100 sq. ft. in repaired surface area.

2. Simulate finished lighting conditions for review of mockups.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, contamination, corrosion, construction traffic, and other causes.

B. Follow manufacturer’s written instructions.

1.6 FIELD CONDITIONS

A. Comply with ASTM C842 requirements or gypsum plaster manufacturer's written recommendations, whichever are more stringent.

B. Room Temperatures: Maintain temperatures at not less than 55 deg F or greater than 80 deg F for at least seven days before application of gypsum plaster, continuously during application, and for seven days after plaster has set or until plaster has dried.

C. Avoid conditions that result in gypsum plaster drying out too quickly.

1. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
2. Maintain relative humidity levels for prevailing ambient temperature that produce normal drying conditions.
3. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: Where indicated, provide gypsum plaster assemblies identical to those of assemblies tested for fire resistance according to ASTM E119 by a qualified testing agency.

B. Sound-Transmission Characteristics: Where indicated, provide gypsum plaster assemblies identical to those of assemblies tested for STC ratings according to ASTM E90 and classified according to ASTM E413 by a qualified testing agency.

2.2 EXPANDED-METAL LATH

A. Expanded-Metal Lath: ASTM C847, cold-rolled carbon-steel sheet with ASTM A653, G60, hot-dip galvanized-zinc coating.

1. Paper Backing: Kraft paper factory bonded to back of lath.

2. Diamond-Mesh Lath:

   a. Type: Flat or Self-furring.
   b. Weight: 2.5 lb/sq. yd.

2.3 ACCESSORIES

A. General: Comply with ASTM C841, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Metal Accessories:

1. Basis of Design: Provide products from a single source by Clark Dietrich Building Systems, AMICO, or Phillips Manufacturing.
2. Cornerite: Fabricated from expanded-metal lath with ASTM A653, G60, hot-dip galvanized-zinc coating.
3. Striplath: Fabricated from expanded-metal lath with ASTM A653, G60, hot-dip galvanized-zinc coating.
4. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.

   a. Smallnose cornerbead with expanded flanges; use unless otherwise indicated.
   b. Smallnose cornerbead with perforated flanges; use on curved corners.
   c. Smallnose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
   d. Bullnose cornerbead, radius 3/4-inch minimum, with expanded flanges; use at locations indicated on Drawings.

5. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
6. Control Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
7. Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
8. Two-Piece Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch wide; with perforated flanges.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated on Drawings.

1. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
2. Finish: Chemical-conversion coating, ASTM D1730, Type B, with factory-applied AAMA 2605 powder coatings.

2.4 MISCELLANEOUS MATERIALS

A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Bonding Compound: ASTM C631.

C. Fasteners for Attaching Metal Lath to Substrates: ASTM C841.

D. Wire: ASTM A641, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.

E. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of rated assembly.

F. Mix Additives: Use gypsum plaster accelerators and retarders from plaster manufacturer if required by Project conditions. Use only additives that manufacturer recommends in writing for use with plaster to which it is added.

2.5 BASE-COAT PLASTER MATERIALS

A. Provide compatible products for items 2.5 and 2.6 from a single source, as manufactured by one of the following:

1. National Gypsum Company
2. United States Gypsum Company (USG)

B. High-Strength Gypsum Neat Plaster: ASTM C28, with a minimum, average, dry compressive strength of 2800 psi according to ASTM C472 for a mix of 100 lb of plaster and 2 cu. ft. of sand.

2.6 FINISH-COAT PLASTER MATERIALS

A. High-Strength Gypsum Gaging Plaster: ASTM C28, with a minimum, average, dry compressive strength of 5000 psi according to ASTM C472 for a neat mix.

B. Lime: ASTM C206, Type S, special finishing hydrated lime. Provide Graymont Dolime Inc. Ivory Finish Lime or comparable compatible product.

2.7 PLASTER MIXES

A. Mixing: Comply with ASTM C842 and manufacturer's written instructions for applications indicated.

B. Mix Additives: Use accelerators and retarders, if required by Project conditions, according to manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

3.3 INSTALLATION, GENERAL

A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

B. STC-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

C. Sound-Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.

D. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.4 INSTALLING EXPANDED-METAL LATH

A. Expanded-Metal Lath: Install according to ASTM C841.

1. Partition Framing and Vertical Furring: Install flat-diamond-mesh lath.
2. Flat-Ceiling and Horizontal Framing: Install flat-diamond-mesh lath.
3. Curved-Ceiling Framing: Install flat-diamond-mesh lath.
4. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.
5. Solid-Plaster Partitions: Where supported by channel studs and L-runners, install flat-rib lath.
6. Studless Solid-Plaster Partitions: Where supported by L-runners, install 3/8-inch rib lath.

3.5 INSTALLING ACCESSORIES

A. General: Install according to ASTM C841.

B. Cornerbeads: Install at external corners.

C. Casing Beads: Install at terminations of plasterwork, except where plaster passes behind and is concealed by other work and where metal screeds, bases, or frames act as casing beads.

D. Control Joints: Locate as approved by Architect for visual effect, with spacing between joints in either direction not exceeding the following:

1. Partitions: 30 feet.
2. Ceilings: 30 feet.

E. Aluminum Trim: Install according to manufacturer's written instructions.

3.6 PLASTER APPLICATION

A. General: Comply with ASTM C842.

1. Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Bonding Compound: Apply on unit masonry and concrete substrates for direct application of plaster.

C. Base-Coat Plaster:

1. Over Expanded-Metal Lath:

a. Scratch Coat: Gypsum neat plaster with job-mixed sand.
b. Brown Coat: High-strength gypsum neat plaster with job-mixed sand.

2. Over Unit Masonry: Gypsum neat plaster with job-mixed sand.
3. Over Monolithic Concrete: Gypsum neat plaster with job-mixed sand.

D. Finish Coats:

1. Smooth-Troweled Finishes:

a. Materials: Gypsum gaging plaster and lime putty.

b. Locations: Provide smooth-troweled finish unless otherwise indicated.

2. Float Finishes:

a. Materials: Gypsum gaging plaster and lime putty.
b. Locations: Provide float finish.

3. Textured Finishes: Match existing.

a. Materials: Gypsum ready-mixed finish plaster.
b. Locations: Provide textured finish where indicated.

E. Concealed Plaster:

1. Where plaster application is concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
2. Where plaster application is concealed above suspended ceilings and in similar locations, omit finish coat.
3. Where plaster application is used as a base for adhesive application of tile and similar finishes, omit finish coat.

3.7 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.8 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION

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SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

B. Related Requirements:

1. Section 09 21 16.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
2. Section 09 22 16 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum.
b. CertainTeed Corporation.
c. Continental Building Products, LLC.
d. Georgia-Pacific Gypsum LLC.
e. National Gypsum Company.
f. USG Corporation.

2. Thickness: 5/8 inch.
3. Long Edges: Tapered.

B. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation.

b. Continental Building Products, LLC.
c. Georgia-Pacific Gypsum LLC.
d. National Gypsum Company.
e. USG Corporation.

2. Thickness: 1/4 inch.
3. Long Edges: Tapered.

C. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Gypsum.
b. CertainTeed Corporation.
c. Continental Building Products, LLC.
d. Georgia-Pacific Gypsum LLC.
e. National Gypsum Company.
f. USG Corporation.

2. Core: 5/8 inch, Type X.
3. Long Edges: Tapered.
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation.
b. National Gypsum Company.
c. USG Corporation.

2. Thickness: 5/8 inch.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet or Plastic.

2. Shapes:

    a. Cornerbead.
    b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    c. L-Bead: L-shaped; exposed long flange receives joint compound.
    d. Expansion (control) joint.
    e. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Fry Reglet Corporation.
    b. Gordon, Inc.
    c. Pittcon Industries.

2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.
2. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Everkem Diversified Products, Inc.
b. Hilti, Inc.
c. Pecora Corporation.
d. Specified Technologies, Inc.

F. Thermal Insulation: As specified in Section 07 2 100 "Thermal Insulation."

G. Vapor Retarder: As specified in Section 07 26 00 "Vapor Retarders."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges

with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Type X: Typical, unless noted otherwise.
2. Flexible Type: Apply in double layer at curved assemblies, if required.
3. Mold-Resistant Type: Restrooms, janitor’s closets, and walls with sinks or other fixtures not noted to receive tile, where tile-backer board is required..

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing

member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 APPLYING TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and other locations indicated to receive tile.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use [where indicated] <Insert requirements>.
4. Curved-Edge Cornerbead: Use at curved openings.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

    a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

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SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete masonry units (CMUs).
2. Steel and iron.
3. Galvanized metal.
4. Gypsum board.
5. Plaster.

B. Related Requirements:

1. Section 05 52 13 "Pipe and Tube Railings" for shop priming pipe and tube railings.
2. Section 09 96 00 "High-Performance Coatings" for tile-like coatings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Benjamin Moore & Co.

B. Products: Subject to compliance with requirements, provide product listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Colors: As indicated in the Material Finish Legend.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Masonry (Clay and CMUs): 12 percent.
2. Gypsum Board: 12 percent.
3. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Plaster Substrates: Verify that plaster is fully cured.

E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
h. Other items as directed by Architect.
i. Ducts.

2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:

1. High-Performance Architectural Latex System:

a. Primer/Sealer Coat: Primer, alkali resistant, water based.

1) Benjamin Moore Ultra Spec Masonry Interior/Exterior 100% Acrylic Masonry Sealer 608.

b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

c. Topcoat: Latex, interior, high performance architectural.

1) Benjamin Moore Aura Waterborne Interior 524 – Eggshell.

B. Steel and Galvanized Steel Substrates:

1. Institutional Low-Odor/VOC Latex System:

a. Prime Coat: Primer, rust inhibitive, water based.

1) Benjamin Moore Ultra Spec HP Acrylic Metal Primer HP04.

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC.

1) Benjamin Moore Aura Waterborned Interior Paint 528 – Semi-Gloss.

C. Gypsum Board and Plaster Substrates:

1. High-Performance Architectural Latex System:

a. Prime Coat: Primer sealer, latex, interior.

1) Benjamin Moore Fresh Start High-Hiding All-Purpose Acrylic Primer.

b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

c. Topcoat: Latex, interior, high performance architectural.

1) Benjamin Moore Aura Waterborne Interior Paint (522-Matt); (524-Eggshell); (526-Satin); or (528-Semi-Gloss) as noted in the Material Finish Legend.

END OF SECTION

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SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:

1. Interior Substrates:

a. Steel.
b. Galvanized metal.

B. Related Requirements:

1. Section 099123 "Interior Painting" for general field painting.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Indicate VOC content.

B. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

C. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each coating system.

a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Master Coatings Technologies: Scuffmaster

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.

B. Colors: EM8008R

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

B. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.

C. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.

D. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions.

1. Use applicators and techniques suited for coating and substrate indicated.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.5 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel and Galvanized Steel Substrates:

1. Textured Finish System

a. Prime Coat: Primer, epoxy, anti-corrosive, for metal.

1) Benjamin Moore Fresh Start Acrylic Primer NO23.

b. Intermediate Coat: Scuffmaster Burnished Metallic Basecoat: Water-based polyurethane/acrylic base coat and crosslinker.

1) Scuffmaster Burnished Metallic Basecoat.

c. Topcoat: Water-based polyurethane/acrylic pattern coat.

1) Scuffmaster Burnished Metallic Top Coat.

END OF SECTION

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SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Private-use bathroom accessories.
3. Warm-air dryers.
4. Childcare accessories.
5. Underlavatory guards.
6. Custodial accessories.

1.3 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

2.3 PRIVATE-USE BATHROOM ACCESSORIES

A. Source Limitations: Obtain private-use bathroom accessories from single source from single manufacturer.

B. Refer to Interior Design Drawings for type and manufacturer.

2.4 WARM-AIR DRYERS

A. Source Limitations: Obtain warm-air dryers from single source from single manufacturer.

B. High-Speed Warm-Air Dryer TA-800-EX:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Excel Dryer Inc.; XL-SB

2. Description: High-speed, warm-air hand dryer for rapid hand drying.
3. Mounting: Surface mounted.
4. Operation: Electronic-sensor activated with operation time of 10 to 20 seconds.
5. Cover Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin)

6. Electrical Requirements: Verify with electrical drawings.
7. Accessories: ADA Recess Kit 40502

2.5 CHILDCARE ACCESSORIES

A. Source Limitations: Obtain childcare accessories from single source from single manufacturer.

B. Diaper-Changing Station TA-901:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

   a. Koala Kare Products; a Division of Bobrick.: KB110-SSRE

2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.

   a. Engineered to support minimum of 250-lb static load when opened.

3. Mounting: Recessed.
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin), with blow-molded, high-density polyethylene, antimicrobial interior.
6. Liner Dispenser: Built in.

2.6 UNDERLAVATORY GUARDS

A. Underlavatory Guard:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Plumberex Specialty Products, Inc.
   b. Truebro by IPS Corporation.

2. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
3. Material and Finish: Antimicrobial, molded plastic, white.

2.7 CUSTODIAL ACCESSORIES

A. Source Limitations: Obtain custodial accessories from single source from single manufacturer.

B. Mop and Broom Holder MOP-10:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American Specialties, Inc.
    b. Bobrick Washroom Equipment, Inc.
    c. Bradley Corporation.

2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 42 inches.
4. Hooks: Four.
5. Mop/Broom Holders: Three, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

    a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
    b. Rod: Approximately 1/4-inch- diameter stainless steel.

7. Provide one unit in each Janitors Closet.

2.8 MATERIALS

A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

C. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.

D. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.

E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

F. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).

2.9 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION

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SECTION 10 28 19 - SHOWER DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes shower doors and enclosures.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for shower doors and enclosures.

B. Shop Drawings: For shower doors and enclosures. Include plans, elevations, sections, and attachment details.

C. Product Schedule: For shower doors and enclosures. Use same designations indicat

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For shower doors and enclosures to include in maintenance manuals.

1.5 FIELD CONDITIONS

A. Verify dimensions by field measurements before fabrication and indicate on Shop Drawings.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of tub and shower doors and enclosures that fail in materials or workmanship within specified warranty period without monetary limitation.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection.
b. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FRAMELESS ENCLOSURES

A. Frameless glass panels with U-channel on fixed glazing. Mounting and operating hardware of types and sizes required to support imposed loads.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Mincey Arezzo Series.
b. Source Direct: Series 4400.

B. Hardware and Trim: Manufacturer's standard units as indicated and as required for complete installation.

1. Materials:

a. Aluminum:

1) Finish: Bright polish.

b. Brass:

1) Finish: Chrome

c. Stainless Steel:

1) Finish: No.8, mirror finish.

C. Glazing: Safety glazing materials complying with 16 CFR 1201, Category II, with permanently etched identification acceptable to authorities having jurisdiction.

1. Glass Nominal Thickness: As determined by manufacturer based on panel size
2. Clear Glass: ASTM C 1048, Type I, Quality-Q3, Class I (clear), Kind FT.

3. Protective, Self-Cleaning, Glass Coating: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.

D. Fasteners: Manufacturer's standard stainless-steel or other noncorrosive fasteners.

E. Sealant: Mildew-resistant, single-component, nonsag, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

F. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

   a. Sheet and Plate: ASTM B 209.
   b. Extrusions: ASTM B 221.

2. Stainless-Steel Sheet: ASTM A 666, Type 302 or 304.
3. Stainless-Steel Bars and Shapes: ASTM A 276, Type 302 or 304.
4. Copper-Alloy Sheet and Shapes: ASTM B 36/B 36M.
5. Copper-Alloy Extrusions: ASTM B 455, alloy UNS No. C38500 (architectural brass).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare and install as recommended in manufacturer's written instructions unless more stringent requirements are contained in GANA's "Glazing Manual."

B. Clean substrates, removing projections, filling voids, and sealing joints.

C. Set units level, plumb, and true to line, without warp or rack of frames and panels, and anchor securely in place.

D. Fasten components securely in place, with provisions for thermal movement. Install with concealed fasteners unless otherwise indicated.

E. Install components to drain and return water to tub or shower.

F. Install doors to produce smooth operation and tight fit at contact points.

G. Repair, refinish, or replace components damaged during installation.

3.2 ADJUSTING AND CLEANING

A. Adjust operating parts and hardware for smooth, quiet operation and watertight closure. Lubricate hardware and moving parts.

B. Remove nonpermanent labels, and clean surfaces immediately after installation.

END OF SECTION

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SECTION 10 44 13 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguisher.

B. Related Requirements:

1. Section 104416 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets

1.3 PREINSTALLATION CONFERENCE

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to fire-protection cabinets, including, but not limited to, the following:

a. Schedules and coordination requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
2. Show location of knockouts for hose valves.

B. Shop Drawings: For fire-protection cabinets.

1. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For each type of exposed finish required, prepared on samples 6 by 6 inches square.

D. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.6 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

2.3 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Basis of Design: Subject to compliance with requirements, provide Larsen's Manufacturing Co. FS SS2712-RL product, or comparable product by one of the following:

a. Guardian Fire Equipment, Inc.
b. JL Industries, Inc.; a division of the Activar Construction Products Group.
c. Nystrom, Inc.
d. Potter Roemer LLC.

B. Cabinet Construction: One-hour fire rated, unless otherwise indicated in a wall with a different rating.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- thick cold-rolled steel sheet lined with minimum 5/8-inch- thick fire-barrier material. Provide factory-drilled mounting holes.

C. Cabinet Material: Stainless steel sheet.

1. Shelf: Same metal and finish as cabinet.

D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).

1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

E. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim.

F. Cabinet Trim Material: Stainless steel sheet].

G. Door Material: Stainless steel sheet

H. Door Style: Horizontal duo panel.

I. Door Glazing: Tempered float glass (clear)

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide projecting door pull and friction latch.
2. Provide concealed hinge permitting door to open 180 degrees.

K. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.

a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

1) Location: Applied to cabinet door
2) Application Process: Silk-screened
3) Lettering Color: Black

4) Orientation: Horizontal

4. Alarm: Manufacturer's standard alarm that actuates when fire-protection cabinet door is opened and that is powered by batteries.

L. Materials:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304.

a. Finish: ASTM A480/A480M No. 4 directional satin finish

2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear)

2.4 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Miter corners and grind smooth.
2. Provide factory-drilled mounting holes.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.

1. Fabricate door frames of one-piece construction with edges flanged.
2. Miter and weld perimeter door frames and grind smooth.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at height indicated below:

1. Fire-Protection Cabinets: 42 inches above finished floor to top of fire extinguisher.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 10 44 16 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Requirements:

1. Section 104413 "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Amerex Corporation.
b. Babcock-Davis.
c. Guardian Fire Equipment, Inc.
d. JL Industries, Inc.; a division of the Activar Construction Products Group.
e. Larsens Manufacturing Company.
f. Nystrom, Inc.
g. Potter Roemer LLC.

2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
3. Valves: Manufacturer's standard.
4. Handles and Levers: Manufacturer's standard.

5. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

B. Wet-Chemical Type (Food Preparation Areas): UL-rated 2-A:1-B:C:K, 2.5-gal. nominal capacity, with potassium acetate-based chemical in stainless-steel container; with pressure-indicating gage.

C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Amerex Corporation.
b. Babcock-Davis.
c. Guardian Fire Equipment, Inc.
d. JL Industries, Inc.; a division of the Activar Construction Products Group.
e. Larsens Manufacturing Company.
f. Nystrom, Inc.
g. Potter Roemer LLC.

2. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Horizontal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: Top of fire extinguisher to be at 42 inches above finished floor.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION

SECTION 10 56 13 - METAL STORAGE SHELVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Four-post metal storage shelving.

1.2 COORDINATION

A. Coordinate sizes and locations of blocking and backing required for installation of metal storage shelving attached to wall and ceiling assemblies.

B. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, speakers, sprinklers, access panels, electrical switches or outlets, and floor drains.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For metal storage shelving.

1. Include plans, elevations, sections, and attachment details.
2. Include installation details of connectors, lateral bracing, and special bracing.

PART 2 - PRODUCTS

2.1 FOUR-POST METAL STORAGE SHELVING

A. Wire-Type, Four-Post Metal Storage Shelving: Complying with MH 28.1; field assembled from factory-formed components. Shelves span between supporting corner posts that allow shelf-height adjustment over full height of shelving unit. Provide fixed top and bottom shelves, adjustable intermediate shelves, and accessories indicated.

1. Load-Carrying Capacity per Shelf: 200 lb, uniformly distributed.
2. Posts: Fabricated from 1-inch- OD, round tubing of indicated material; with grooves or notches at 1 inch o.c. to receive shelf-to-post connectors. Label posts with numbers at not less than 2 inches o.c. for determining shelf height.

a. Post Material: Stainless steel.
b. Post Base: Bolt leveler.

c. Post Cap: Nylon or plastic.
d. Unit Configuration: Configure shelving units as individual, freestanding assemblies.

3. Framed-Type Wire Shelves: Stainless-steel wire-over-wire construction, with shelf frame fabricated from same material and with same finish as posts; with manufacturer's standard post collar, designed to engage collet (wedge), welded at each corner.
4. Truss-Type Wire Shelves: Stainless-steel wire-over-wire construction, with downturned wire truss edges; with manufacturer's standard post collar, designed to engage collet (wedge), welded at each corner.
5. Shelf-to-Post Connectors: Manufacturer's standard one-piece collet (wedge), designed to engage post collar attached to shelves.
6. Bracing: Manufacturer's standard diagonal cross bracing, as required for stability, load-carrying capacity of shelves, and number of shelves.
7. Accessories:

a. Shelf Inlay: Manufacturer's standard static-dissipative plastic mat.
b. Shelf-Label Holders: Clear plastic, designed to clip onto front edge of shelf.

8. Stainless-Steel Finish: Manufacturer's standard nondirectional-polish finish.

2.2 ANCHORS

A. Wall Anchors: Manufacturer's standard, galvanized-steel anchors designed to secure metal storage shelving to adjacent wall. Provide one per shelving unit for each shelving unit adjacent to a wall unless additional anchors are indicated in calculations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install metal storage shelving level, plumb, square, rigid, true, and with shelves flat and free of dents or distortion. Make connections to form a rigid structure, free of buckling and warping.

1. Install exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
2. Install braces, straps, plates, brackets, and other reinforcements as needed to support shelf loading and as required for stability.
3. Adjust post-base bolt leveler to achieve level and plumb installation.
4. Install seismic restraints.

B. Accessories:

1. Shelf Inlays: Install one per shelf.

3.2 ERECTION TOLERANCES

A. Erect four-post metal storage shelving to a maximum tolerance from vertical of 1/2 inch in up to 10 feet of height, not exceeding for heights taller than 10 feet.

3.3 ADJUSTING

A. Adjust metal storage shelving so that connectors and other components engage accurately and securely.

B. Adjust and lubricate operable components to operate smoothly and easily, without binding or warping. Check and readjust operating hardware.

C. Touch up marred finishes or replace metal storage shelving that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal storage shelving manufacturer.

D. Replace metal storage shelving components that have been damaged beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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SECTION 14 21 00 – ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1. SECTION INCLUDES

A. Complete electric traction elevator systems.

1. Passenger type.
2. Service type.

B. Report by Van Deusen & Associates, Inc., dated February 26, 2019. See attached exhibit.

C. Elevator Maintenance Contract.

D. Pre-engineered elevator interior finish system including the following:

1. Rear wall and side wall panels.
2. Handrails.
3. Corner/flat reveals.
4. Panel binders.
5. Protective pads.

1.2. RELATED REQUIREMENTS

A. Section 26 05 19 – Low Voltage Electrical Power Conductors.

B. Section 26 05 26 – Grounding and Bonding for Electrical Systems.

C. Section 26 05 29 – Hangers and Supports for Electrical Systems.

D. Section 26 05 33 - Raceways and Boxes for Electrical Systems.

E. Section 26 05 53 – Identification for Electrical Systems.

F. Section 26 27 17 – Electrical Wiring.

G. Section 26 51 00 - Interior Lighting.

1.3. REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASME A17.1 - Safety Code for Elevators and Escalators; 2013.

C. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks; 2014.

D. ASME QEI-1 - Standard for the Qualification of Elevator Inspectors; 2013.

E. ASTM International (ASTM): ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

F. NFPA 13 - Standard for the Installation of Sprinkler Systems; 2016.

G. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.

1.4. ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Convene meeting at least one week prior to start of this work.

1. Review schedule of installation, proper procedures and conditions, and coordination with related work.

1.5. SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on following items:

1. Signal and operating fixtures, operating panels, and indicators.
2. Car design, dimensions, layout, and components.
3. Car door and frame details.
4. Electrical characteristics and connection requirements.
5. Product Data: Provide manufacturer’s data sheets on each product to be used.

C. Shop Drawings: Submit drawings and details on following items:

1. Elevator Equipment and Machines: Size and location of driving machines, power units, controllers, governors, and other components.
2. Hoistway Components: Size and location of car machine beams, guide rails, buffers, ropes, and other components.
3. Interface with building security system.
4. Electrical characteristics and connection requirements.
5. Details of construction, including relationships with adjacent materials. Include installation and maintenance instructions. For each finished product, minimum 2-1/2 inches by 2 1/2 inches.

D. Samples: Submit samples illustrating car floor material, car interior finishes, car and hoistway door and frame finishes, and handrail material and finish in the form of cut sheets or finish color selection brochures.

E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

F. Initial Maintenance Contract.

G. Maintenance Contract: Submit proposal to Owner for standard one year continuing maintenance contract agreement in accordance with ASME A17.1 and requirements as indicated, starting on date initial maintenance contract is scheduled to expire.

1. Indicate in proposal the services, obligations, conditions, and terms for agreement period and for renewal options.

H. Operation and Maintenance Data:

1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
2. Operation and maintenance manual.
3. Schematic drawings of equipment, and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on machine room and hoistway apparatus.

1.6. QUALITY ASSURANCE

A. Maintain one copy of each quality standard document on site.

B. Manufacturer Qualifications: Minimum 10 years of experience in manufacture of architectural surface materials and fabrication of elevator cab interiors.

C. Installer Qualifications: Minimum 3 years of experience in the installation of elevators.

1.7. DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to installation site in manufacturer’s original packaging. Handle products in accordance with manufacturer’s instructions. Store in dry, secure location, protected against direct sunlight and excessive heat. Protect finished surfaces.

1.8. PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer’s limits.

1.9. WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's warranty for elevator operating equipment and devices for one year against defects and workmanship, from Date of Substantial Completion.

1.10. APPROXIMATE CAB INTERIOR DIMENSIONS (TO BE FIELD VERIFIED).

A. Inside cab width and depth for Elevators 1,2,3,4,5,7,8 (there is no 6):

1. Maintain existing size.

B. Inside cab height for Elevator 10:

1. Match existing depth.

PART 2 - PRODUCTS

2.1. MANUFACTURERS

A. Basis of Design - Electric Traction Elevators: Kone.

B. Other Acceptable Manufacturers - Electric Traction Elevators:

1. Otis Elevator Company ; Non-proprietary equipment required: *(www.otis.com).*
2. Schindler Elevator Corporation ; Non-proprietary equipment required: *(www.us.schindler.com).*
3. ThyssenKrupp Elevator ; Non-proprietary equipment required: *(www.thyssenkruppelevator.com).*

C. Products other than Basis of Design are subject to compliance with specified requirements and prior approval of Architect. By using products other than Basis of Design, the Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

2.2. ELECTRIC TRACTION ELEVATORS

A. Electric Traction Passenger Elevators 1,2,3,4,5,7,8 (there is no 6):

1. Electric Traction Elevator Equipment:

a. Replace overhead gear machine.

1) Replace seal and bearings.
2) Replace drive sheaves.
3) Replace hoist ropes.

2. Drive System:

a. Variable voltage alternating current (AC).

3. Operation Control Type:

    a. Destination Based Dispatching - Group.

4. Rated Net Capacity: 2500 pounds.
5. Rated Speed: 700 feet per minute.
6. Number of Stops: Existing (19 - #1,2,3,5,8) or (22 - #4) or (20 - #7) to remain.

2.3. ELECTRIC TRACTION ELEVATORS

A. Electric Traction Service Elevator 10 (This elevator uses hoistway from previous passenger elevators 9 and 10 combined into one service elevator):

1. Electric Traction Elevator Equipment:

    a. Replace overhead gear machine.

        1) Replace seal and bearings.
        2) Replace drive sheaves.
        3) Replace hoist ropes.

2. Drive System:

    a. Variable voltage alternating current (AC).

3. Operation Control Type:

    a. Service Type Simplex. Independent Operation Control.

4. Rated Net Capacity: 4000 pounds.

5. Rated Speed: 700 feet per minute.

6. Number of Stops: Existing (20) to remain.

2.4. COMPONENTS

A. Elevator Equipment:

1. Motors, Controllers, Controls, Buttons, Wiring, Devices, and Indicators: Comply with NFPA 70. Refer to Division 26 Sections.
2. Guide Rails, Cables, Counterweights, Sheaves, Buffers, Attachment Brackets and Anchors: Design criteria for components includes safety factors in accordance with applicable requirements of Elevator Code, ASME A17.1, current edition.
3. Buffers:

    a. Oil type for elevators with speed greater than 200 feet per minute. Drain and add new oil.

B. Electrical Equipment:

1. Motors: New 480v.
2. Boxes, Conduit, Wiring, and Devices: As required by NFPA 70. Refer to Division 26 Sections.
3. Spare Conductors: Provide ten percent in extra conductors and two pairs of shielded cables for future use in traveling cables.

2.5. PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).

B. Accessibility Requirements: Comply with ADA Standards.

C. Perform electrical work in accordance with NFPA 70.

D. Comply with fire protection sprinkler system of the hoistway design in accordance with NFPA 13 requirements and authorities having jurisdiction.

2.6. OPERATION CONTROLS

A. Elevator Controls: Provide landing operating panels and landing indicator panels.

1. Landing Operating Panels: Metallic type, one for originating "Up" and one for originating "Down" calls, one button only at terminating landings; with illuminating indicators.
2. Landing Indicator Panels: Illuminating except first floor and repair indicator.
3. Comply with ADA Standards for elevator controls.
4. Elevator control manufacturer/supplier to provide Architect with style options available for selection prior to ordering.

B. Interconnect elevator control system with building fire alarm, smoke alarm, and as applicable systems.

C. Door Operation Controls:

1. Program door control to open doors automatically when car arrives at floor landing.
2. Render "Door Close" button inoperative when car is standing at dispatch landing with doors open.
3. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equipped with infrared door detection device.

D. Lobby Monitoring Panel:

1. Locate status indicator and control panel for each individual elevator and group of elevators to match existing. Illustrate locations on shop drawing submittals for review.
2. Mount panel in console per ADA and manufacturer requirements. Illustrate locations on shop drawing submittals for review.
3. Coordinate size and style of panel with console manufacturer.
4. Etch face plate markings in panel, and fill with paint of contrasting color.
5. Include direction indicator displaying landing "Up" and "Down" calls registered at each landing floor.
6. Include position and motion display for direction of travel of each elevator. Display appropriate graphic characters on non-glare screen. Indicate position of cars at rest and in motion.
7. Include a "Remove From In Service" switch for each elevator that then calls car to ground floor and parks car with doors open.
8. Include emergency power selector switch for each group of elevators that overrides automatic emergency power selection.
9. Include "Firefighter's Service Switch" that manually recalls each elevator to main floor.

E. Provide "Firefighter's Emergency Operation" in accordance with ASME A17.1, applicable building codes, and authorities having jurisdiction (AHJ).

1. Designated Landing: Main Lobby.

2.7. OPERATION CONTROL TYPE

A. Destination Dispatching:

1. Refer to description provided in ASME A17.1.
2. Refer to additional description in the Exhibit report.

2.8. SERVICE CONTROL TYPE

A. Independent Service Control:

1. Provide key operated "Independent Service" on car operating panel. Key activation will remove that car from normal operation and cancel pre-registered car calls.
2. Car will respond to selected floor. Car will not respond to any calls from landing call buttons. Car will only respond to calls placed on the car operating panel. Doors will remain open at last landing requested. Doors will close with a constant pressure on "Door Close" button.
3. Key activation to normal operation will return car to normal operation.

B. Restricted Access Service Control:

1. Program down traveling cars to stop at main floor landing prior to proceeding to a designated lower dispatch landing.

2. Program up traveling cars to stop at main floor landing prior to proceeding to a designated higher dispatch landing.
3. Do not stop a down traveling car with a registered car button call for landing below the lower dispatch landing, unless the call in that car or a down button call at lower dispatch landing is in registration.
4. Answer a landing button call registered at a landing below the primary dispatch landing by either an approaching down traveling car or an unselected car at the primary dispatch landing.
5. If, within a predetermined period of time after a car responds to a down landing call at the primary dispatch landing, no call is registered in that car for down travel, or at a landing below, close the doors, turn-off the landing lantern, and dispatch an available car.
6. Do not stop a car at the primary dispatch landing when traveling up from a landing below the primary dispatch landing, with one or more car button calls in registration for service above a lower dispatch landing, unless a call for that landing is registered in that car or no other car is available at a lower dispatch landing.
7. Reverse cars automatically to the lowest registered car call or to an up landing call when responding to calls below the lowest dispatch landing.
8. Keyed Lobby Lock-out: Provide a key operated switch in car operating panel that performs the following when activated:

    a. Cancels registered car calls.
    b. When activated, no new car calls will be registered, except at landing where lock-out feature is located.
    c. Restricts car calls registered to specific floors only, except the main access floor and those floors enabled by lock-out switches.
    d. Landing calls are answered in normal manner.

9. Car Call Lock-out: Provide a key operated switch with key removable from "On" or "Off" position in car operating panel that performs the following when activated:

    a. Restricts or permits registration of a specific landing button.
    b. Landing calls are answered in normal manner.

10. Car Call Security Lock-out: Provide a security card activated switch in car operating panel that performs the following when activated:

    a. Restricts or permits registration of each landing button.
    b. Landing calls are answered in normal manner.

11. Landing Call Lock-out: Provide a key operated switch with key removable from "On" or "Off" position in landing control station that performs the following when activated:

    a. Restricts or permits landing call registration for that landing.
    b. Causes the elevator to not respond to that landing.

12. Design "Restricted Access Service" operation to override "Normal" or "Independent Service" operation.
13. Allow "Firefighter's Emergency Operation" to take control priority over "Restricted Access Service Control".

2.9. EMERGENCY POWER

A. Building Emergency Power Supply: Supplied by existing backup generator; provide elevator system components as required for emergency power characteristics with phase rotation the same as for normal power.

1. Verify transfer switches and auxiliary contacts are existing.

B. Emergency Lighting: As selected from manufacturers standard line.

C. Upon transfer to emergency power, advance one elevator at a time to a pre-selected landing, stop car, open doors, disable operating circuits, and hold in standby condition.

2.10. CAR AND HOISTWAY ENTRANCES

A. Elevators 1,2,3,4,5,7,8, and 10:

1. Car and Hoistway Entrances , All floors:

a. Hoistway Fire Rating: Existing.
b. Elevator Door Fire Rating: 1-1/2 Hours.
c. Car Door Material: Steel with rigid sandwich panel construction.
d. Hoistway Door Material: New car side; partial new hoistway side.
e. Door Operation: Center opening, two speed.
f. Car door finish: Satin Bronze No. 4 finish.
g. Door Width: Existing width.
h. Door Height: Existing height.
i. Sills: Extruded aluminum.

B. Sills/Thresholds: Configure to align with frame return and coordinate with floor finish.

2.11. CAR EQUIPMENT AND MATERIALS

A. Basis of Design for Cab Finishes:

1. SnapCab; US Headquarters & Manufacturing, 175 Titus Ave., Warrington, PA 18976; 1-888-766-7834. Email: sales@SnapCab.com; Web: www.SnapCab.com.
2. Elevator Interior Wall Panel System, Interlocking Panel Type comprised of removable wall panels with interlocking joints, 1/8 inch black shadow lines set into surface, toe kicks, top caps with sight and vent guards, panel binders at exposed panel edges near doors and corner/flat reveals.
3. Panel Model: Milano II.

B. Products other than Basis of Design are subject to compliance with specified requirements and prior approval of Architect. By using products other than Basis of Design, the Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

C. Elevator Cars:

1. Car Operating Panel: Provide main and auxiliary; flush-mounted applied face plate, with illuminated call buttons corresponding to floors served with "Door Open/Door Close" buttons, "Door Open" button, "Door Close" button, and alarm button.

a. Panel Material: Integral with front return; one per car.
b. Car Floor Position Indicator: Above door with illuminating position indicators.
c. Locate alarm button where it is unlikely to be accidentally actuated; not more than 54 inch above car finished floor.
d. Provide matching service cabinet integral with front return panel, with hinged door and keyed lock in each car.
e. Provide card reader.
f. Provide voice annunciator system.
g. Provide intercom system.
h. Provide following within service cabinet as part of car operating panel:

1) Switch for each auxiliary operational control , keyed.
2) Switches for light and inspection control.
3) Emergency light.
4) Telephone cabinet and hard-wired connection with hands-free telephone.
5) Control for each other special feature specified.

i. Finish: Satin Bronze No. 4 finish.

D. Flooring: Carpet provided by General Contractor, installed by General Contractor.

E. Wall Panel Core: 1/2 inch thickness fire-rated resin medium density fiberboard, Class B or better fire rated as per ASTM E 84. Panel backer sheet and adhesives as per manufacturer to achieve fire rating as tested. Panel core to be type for mirror or stone face.

F. Wall Panel Face:

1. Bronze Face: Smooth surface panels of bronze, 0.040 inch thickness, No. 4 satin finish. Panel assembly to be Class B or better fire rated as per ASTM E 84.

a. Layer: Satin bronze face on Layer 3.

2. Mirror face: Clear safety mirror, 1/4 inch thickness, ANSI stamped. Panel assembly to be Class B or better fire rated as per ASTM E 84.

a. Layer: Mirror face on Layer 4 rear wall only; full width.

3. Stone Veneer Face: Stone veneer panels, 1/8 inch thick, on 1/4 inch thick aluminum honeycomb backer. Panel assembly to be Class B or better fire rated as per ASTM E 84. Polished finish.

a. Layer 2: Stone veneer face.

1) Stone Type: Negro Marquina.

b. Layer 4: Stone veneer face.

1) Stone Type: Botticino Fiorito (side walls)

G. Toe Kick and Toe Kick Binder with Concealed Ventilation Gap for Interlocking Panels:

1. Satin No. 4 finish 0.04 inch thick bronze toe kick with anodized mill finish aluminum binder with Satin No. 4 bronze cover.

H. Top Cap:

1. Black powder coat finish aluminum top cap with integrated pad hook channel.

I. Corner and Flat Reveals:

1. Satin Bronze 0.04 inch thick, No. 4 finish.

J. Panel Binders: Standard at exposed panel edges near door jambs.

1. Black powder coat finish aluminum.

K. Handrails: Pre-installed on wall panel to measure 32 inches above finished floor unless indicated otherwise.

1. Location: Back and Side walls.

2. Type: Flat Bar 3/8 inches thick.

a. Width: 1-1/2 inches.
b. Material and Finish: Satin bronze with No. 4 finish.

L. Ceiling:

1. Coved Ceiling: Refurbish existing coved ceiling: Includes sanding, finishing and re-painting existing coved ceiling at perimeter of existing elevator cabs. Final color to be selected from full range of manufacturer's line of paint colors. Sheen to match existing.
2. Supported Brass Ceiling: Existing supported ceiling in center of cab is a polished brass metal enclosure held in place with screws accessed from the underside of the enclosure. Existing ceiling is to be removed, cleaned and prepped with a

rubbed satin finish No. 4 to match the new Satin No. 4 Bronze finish being specified for the new materials. Once complete, enclosure is to be re-installed in its original location w/ new screws to match rubbed satin finish.

a. Lighting: Refer to new specification Section 26 51 00 Interior Lighting.

M. Car Accessories:

1. Protective Pads: Heavy-Duty cover, padded with impact-resistant fill material, sewn with piping edges; fire resistant in compliance with ASME A17.1 ; brass grommets for supports, covering side and rear walls and front return , with cut-out for control panel; provide one set for each elevator.

a. Color: Tan or Grey as selected by the Owner.
b. Provide at least 4 inch clearance from bottom of pad to finished floor.
c. Pad Supports: Existing to remain. Provide supports if none exist.

PART 3 - EXECUTION

3.1. EXAMINATION

A. Verify existing conditions before starting this work.

B. Verify that hoistway, pit, and machine room are ready for work of this section.

C. Verify hoistway shaft and openings are of correct size and within tolerance.

D. Verify location and size of machine foundation and position of machine foundation bolts.

E. Verify that electrical power is available and of correct characteristics.

3.2. PREPARATION

A. Arrange for temporary electrical power for installation work and testing of elevator components. Comply with requirements of Section 01 5000 - Temporary Facilities and Controls.

B. Maintain elevator pit excavation free of water.

C. Prepare interior of cab surfaces using the methods recommended by the manufacturer in printed installation instructions for achieving the best result for the substrate under the project conditions.

D. Protect elevator finishes, fixtures and equipment from damage.

3.3. INSTALLATION

A. Coordinate this work with installation of hoistway wall construction.

B. Install system components, and connect equipment to building utilities.

C. Provide conduit, electrical boxes, wiring, and accessories. Refer to Sections 26 05 33 and 26 27 17.

D. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.

E. Adjust equipment for smooth and quiet operation.

F. Install in accordance with manufacturer's instructions. Install in proper relationship to adjacent materials.

1. Do not make structural changes to elevator cab.
2. Do not install work in a manner that interferes with the safe operation of the elevator.

3.4. FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Testing and inspection by regulatory agencies certified in accordance with ASME QEI-1 will be performed at their discretion.

1. Schedule tests with agencies and notify Owner and Architect.
2. Obtain permits as required to perform tests.
3. Document regulatory agency tests and inspections in accordance with requirements.
4. Perform tests required by regulatory agencies.
5. Furnish test and approval certificates issued by authorities having jurisdiction.

C. Perform testing and inspection in accordance with requirements.

1. Inspectors shall be certified in accordance with ASME QEI-1.
2. Perform tests in accordance with ASME A17.2.
3. Provide at least two weeks written notice of date and time of tests and inspections.
4. Supply instruments and execute specific tests.

D. Operational Tests:

1. Perform operational tests in the presence of Owner and Architect.

3.5. ADJUSTING

A. Adjust for smooth acceleration and deceleration of car to minimize passenger discomfort.

B. Adjust with automatic floor leveling feature at each floor landing to reach 1/4 inch maximum from flush with sill.

3.6. CLEANING

A. Remove protective coverings from finished surfaces.

B. Clean surfaces and components in accordance with manufacturers written instructions.

3.7. CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. Demonstration: Demonstrate operation of system to Owner's personnel.

1. Use operation and maintenance data as reference during demonstration.
2. Conduct walking tour of project.
3. Briefly describe function, operation, cleaning and maintenance of each component.

C. Training: Train Owner's personnel on cleaning and operation and maintenance of system.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide minimum of two hours of training.
3. Instructor: Contractor's training personnel.
4. Location: At project site, unless noted otherwise.

3.8. PROTECTION

A. Do not permit construction traffic within car after cleaning.

B. Protect installed products until date as established by Owner.

C. Touch-up, repair, or replace damaged products and materials before Date of Substantial Completion.

3.9. MAINTENANCE

A. Provide Initial Maintenance Contract of elevator system and components in accordance with ASME A17.1 and requirements as indicated for 12 months from Date of Substantial Completion.

B. Perform maintenance contract services using competent and qualified personnel under the supervision and direct employ of the elevator manufacturer or installer.

C. Include systematic examination, adjustment, and lubrication of elevator equipment.

D. Perform work without removing cars from use during peak traffic periods.

END OF SECTION

Vertical Transportation Systems Consultants
vda®
Van Deusen & Associates, Inc.
331-888-3063
Fax: 856-354-8573
E-mail: contact@vdassoc.com
600 E. Diehl Road, Suite 140 • Naperville, IL 60563

February 26, 2019

VIA E-MAIL:
kennyjackson@me.com

Kenneth Jackson
BDMD Architects
626 N Illinois Street
Indianapolis, IN 46204

Re: Embassy Suites (Old Federal Reserve), 925 Grand Boulevard, Kansas City, MO
Vertical Transportation – VDA No. 57036

Dear Mr. Jackson:

Thank you for allowing VDA® (Van Deusen & Associates, Inc.) the opportunity to provide you with a revised elevator analysis for the above referenced project.

Per your request, our analysis has been structured to provide a base study using the building configuration and populations provided by your office utilizing the existing elevator hoistways in the old Federal Reserve Building which is being converted to a new Hilton Embassy Suites Hotel.

Below are the results of the Traffic Analysis which we conducted on the proposed Guest Suites Elevators for this project.

If you have any questions on the above study, please contact our office.

Very truly yours,

Jeffrey Peterson
Senior Associate

JP/hl

cc: Mark Braun – VDA

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EXECUTIVE SUMMARY

This report is an update to the VDA Traffic Analysis Report issued on November 13, 2017 to Focus Architecture. The revised building design by BDMD Architects changed the following:

- Eliminated the pool on the 21st floor level.
- Eliminated the roof top bar on the 22nd floor level.
- The number of hotel keys was reduced from 312 to 284.
- The ballroom population on the 20th floor was increased from 500 to 614.
- Meeting rooms were added to levels 2 and 4.
- The restaurant on level 2 was replaced with several Lounges located in the South, West and North sides.

This traffic study focused on the theoretical effectiveness of the proposed elevator configuration (using the assumptions listed in this report) during the most demanding peak elevator traffic times during the day. The theoretical results of this study are compared to both the Hilton design standards and Industry design standards. Because this project has a 614-person Ballroom located on 20th Floor, the most demanding time period for elevator service will be when the ball room is being loaded and emptied. The Industry standard for a hotel ballroom requires it to be loaded in a one (1) hour time limit and unloaded in a thirty (30) minute time period.

The time periods utilized for this traffic analysis are as follows:

A. 7:00 a.m. to 11:00 a.m.

- Hotel Guest Traffic
- Level 2 – Load Meeting Rooms (8:00 a.m. to 9:00 a.m.)
- Level 4 – Load Meeting Rooms (8:00 a.m. to 9:00 a.m.)

B. 11:00 a.m. to 4:00 p.m.

- Hotel Guest Traffic
- Level 2 – Meeting Rooms (breaks and lunch)
- Level 4 – Meeting Rooms (breaks and lunch)

C. 4:00 p.m. to 6:00 p.m.

- Hotel Guest Traffic
- Level 2 – Unload Meeting Rooms
- Level 4 – Unload Meeting Rooms
- Level 2 – Lounges open

D. 6:00 p.m. to 7:00 p.m.

- Hotel Guest Traffic
- Level 20 – Ballroom load
- Level 2 – Lounges

E. 10:00 p.m. to 10:30 p.m.

- Hotel Guest Traffic
- Level 2 – Lounges
- Level 20 – Ballroom Unload

The results of this theoretical study show a bank of seven (7) passenger elevators using Destination Dispatch controls at a speed of 700 fpm, is required in order to meet Hilton performance standards as well as Industry performance standards for the hotel industry. The use of Destination Dispatch controls is necessary on this project for the following reasons:

1. The straight-line configuration of the existing elevator core. The distance between the first car in the group and the last car in the group is so long that in order to comply with ADA standards the elevator door dwell times would need to be increased (the doors will stay open longer). The additional dwell time would reduce the performance of the elevators below both Hilton and Industry standards. Destination Dispatch will inform the guests of exactly what elevator to take thus not requiring longer door dwell times.
2. Destination Dispatch will also improve security for hotel guests. Even though "ghost riders" will continue to be an issue with Destination Dispatch if non-hotel guests can use the same elevators as hotel guests, Destination Dispatch will automatically group people together in the same elevator who are going to the same floor. This will help with the non-hotel guests going to the meeting rooms and ballroom.

The results show during the morning check-out peak period (7:00 a.m. to 11:00 a.m.) and the afternoon period from 11:00 a.m. to 4:00 p.m.) the number of passenger elevators could be reduced from seven (7) to six (6) elevators and still meet Hilton and the Industry performance standards. This would be the time frame where building management could take one (1) of the passenger cars out of the bank and use it as a dedicated hotel guest service car for back of house requirements. This would allow the one (1) new hotel fire service elevator (combining of the current elevator 9 and 10 into a single larger stretcher accessible service elevator), to be utilized for the needs of the ballroom (food and beverages) as well as the meeting rooms on levels 2 and 3 and the lounges on level 2.

All seven (7) passenger elevators will be needed starting at 4:00 p.m. This is when the meeting rooms on level 2 and 4 start to unload, the Lounges on level 2 open for business in addition to the normal hotel guest check-in and two-way traffic.

The most demanding time for elevator service is between 6:00 p.m. and 7:00 p.m. This is the time when the ballroom is loading. The elevators will still have the demand from the hotel guests, meeting rooms, and the lounges. In order to meet the Hilton handling capacity for hotel guests and still load the ballroom in sixty (60) minutes, all seven (7) elevator cabs will need to have an average maximum load of 79%. The maximum capacity of the existing passenger elevators is fifteen (15) people. This means for the one (1) hour ballroom load the theoretical loading of the elevators is twelve (12) people per car.

The industry standard for maximum car load for a hotel is 50%. Anything more than 50% full, people begin to feel uncomfortable and may choose not to enter the elevator, (thus reducing the performance of the elevators). A ballroom is more like an office building regarding maximum car loading. Office building elevators should not exceed 80% maximum loading. Depending on the type of ballroom event, the maximum car loading may be less than 80% but for this study purpose, it should not exceed 80% of maximum car load.

Due to the limitations of the existing elevators and the adaptive reuse of an existing building, not every Hilton design standard for vertical transportation will be able to be achieved. Those limitations are described in this report.

BUILDING OVERVIEW

The main hotel guest elevator tower is currently split into two (2) groups of elevators (1, 2, 3, 4 & 5) and (7, 8, 9 & 10). There is no Elevator #6. Both existing groups form one (1) single-line of elevators.

The proposed hotel design is to remove the end elevators, (Elevators #9 &#10), and install one (1) new larger custom size service elevator using the hoistway of existing cars #9 and #10. The remaining seven (7) elevators using destination dispatching controls would serve the hotel guest floors as well as the Ballroom on floor 20.

All existing elevators will be modernized with new machines, motors, controllers, fixtures, car doors and cabs.

HILTON DESIGN STANDARDS:

Guest Suites:

1. 15% handling capacity @ 100% Occupancy.
2. Thirty-five (35) second average lobby wait time @ 100% Occupancy.
3. Guest elevators to have a minimum size of 3,000 lbs. capacity. All of the existing elevator hoistway sizes in this project have a maximum size of 2,500 lbs.
4. At least one (1) elevator must be sized for a medical stretcher. None of the existing elevators in this project are large enough for a medical stretcher. The new fire / service elevator using the hoistway's of elevators #9 and #10 must be configured to accommodate a stretcher (24" x 80").
5. Minimum width of the passenger elevator door opening shall be 3'-6". All the existing elevators have 4'-0" two speed center opening doors, which meets this design requirement.
6. Minimum height of door opening shall be 7'-0". Existing elevators meet this requirement.
7. Minimum clear inside cab height shall be 7'-6". Existing elevators meet this requirement.

Service Elevators:

1. Commercial support services such as move-ins / move-outs, receiving / shipping of materials, as well as in-house maintenance and janitorial functions are required to be handled by a **minimum of two (2) dedicated service elevators** (one for each 250 rooms served). This project would have one (1) dedicated service car and if needed one (1) of the passenger elevators in the group could be used as a second service elevator.

2. The minimum capacity for the service cars is 3,000 lbs. One of the passenger elevators which could be used as a service elevator during the morning and afternoon hours is only 2,500 lbs.

3. The desired proportion of the cab is greater depth than width. This requirement could be an issue since the one passenger swing car does not meet this and depending on the final design of the service elevator, it may not meet this requirement either.

4. The minimum width of the elevator door opening shall be 44" with two door configurations. The existing elevators have 48" two speed center opening doors, which meets this requirement.

ASSUMPTIONS UTILIZED FOR THE TRAFFIC STUDY:

Hotel Guest Elevators:

1. 100% of the hotel population will arrive at grade level via personal vehicles after parking in the parking garage.

2. 70% of the hotel guests will take their luggage with them in the elevator after checking in to their room.

3. The speed of all seven (7) existing guest passenger elevators is 700 fpm.

4. Level 2 has three (3) meeting rooms with a total population of fifty-four (54) people.

   i) As directed by Sean Bryant, all staff and service population are assumed to use the service elevators and are not included in the floor populations.

   ii) 50% of the meeting room population is assumed to be hotel guests.

   iii) 50% of the meeting room population is assumed to be non-hotel guests.

5. Level 2 has three (3) lounge areas with a total population of sixty-eight (68) people.

   i) 90% of this population is assumed to be hotel guests.

      (1) 25% of this population is assumed to use the stairs from the lobby and not the elevators.

      (2) 75% of this population is assumed to use the elevators from Level 2 to their room level.

   ii) 10% of the lounge population is assumed to be non-hotel guests.

      (1) 25% of this population is assumed to use the stairs from the lobby and not the elevators.

      (2) 75% of this population is assumed to use the elevators from Level 2 to the Lobby Level.

   iii) The lounge population is assumed to be turned over once every hour.

6. Level 4 has six (6) meeting rooms with a total population of 178.

   i) As directed by Sean Bryant all staff and service population are assumed to use the service elevators and are not included in the floor populations.

   ii) 50% of the meeting room population is assumed to be hotel guests.

   iii) 50% of the meeting room population is assumed to be non-hotel guests.

7. Level 20 is a ballroom with a population of 614 people.

   i) 60% are assumed to be Hotel Guests.

   ii) 40% are assumed to be Non-Hotel Guests.

8. All seven (7) passenger elevators (cars 1,2,3,4,5,7,8) will have access to the ballroom on level 20 for loading and unloading of events.

Hotel Service Elevators:

1. One (1) dedicated service elevator (new custom service car #9) for Hotel Room and Ballroom Meeting Rooms and Lounge service.

2. One (1) guest passenger elevator can be taken out of the bank and dedicated to guest room services during morning and afternoon hours only.

3. All populations for housekeeping, room service, maintenance and similar back of house traffic are excluded from our analysis.

Parking Garage Elevators:

1. There are currently two (2) existing garage passenger elevators #12 & #13 which operate as a duplex and will be modernized (controls, fixtures, doors and cabs). These elevators serve eight (8) floors and open in the front only at levels (B, Lobby, D, AB, CD, EF, GH and IJ).

2. The data provided to VDA was 450 parking spaces in the garage for guests of the hotel (402 above the Lobby Level). Using 1.3 people per car the total garage population is 585 people which is 100% of the Hilton design standards for the hotel guest population.

3. All non-hotel guests will not be using the parking garage.

DESIGN CRITERIA

In general, the performance of an elevator or group of elevators is measured by the handling capacity, as expressed as a percentage of the total building population that can be carried by the elevators in a five-minute period, and its efficiency, as determined by the average time between elevators arriving at the main floor.

1. The Five-Minute Handling Capacity

It is expressed as the number of passengers or as a percentage of the total population that can be carried by the elevators in five-minute period. The handling capacity is calculated by dividing 5 minutes (300 seconds) by the interval and multiplying the result by the number of passengers in the elevator. Traffic patterns in hotels are more complex. The most demanding time for this project is between (4:00 p.m. to 6:00 p.m.). During this time, there will be guests checking-in, Ballroom loading, meeting rooms unloading on levels 2 and 4 and two-way traffic to and from the lounges on level 2. A simulation model was utilized for this study.

It should be noted the maximum capacity of an elevator is defined by Code through measurement of the available inside area of the elevator cab. Taking this capacity and dividing by an average of 165 lbs. per person plus 40 lbs. for luggage provides the maximum theoretical passenger capacity. It is uncommon to find an elevator loading to this maximum as it requires all persons in the elevator to squeeze tightly together. Our study also takes into consideration the existing cab area by dividing the actual inside cab measurements by 3.39 sqft per person for hotel guests (factoring in luggage) and 2.26 sqft per person for the guests using the elevators for the ballroom, meeting rooms and lounges.

The maximum loading for hotel guests should be no more than 50% of the maximum observed load. If the loading is beyond 60% hotel guests will feel crowded and not enter the elevator. When this happens, queuing begins to form in the lobby and people start to complain of poor elevator service.

The maximum loading for the ballroom, meeting rooms and lounge guests should be no more than 80% of the maximum observed load per elevator.

The existing 2,500 lbs. capacity elevators have a max loading = fifteen (15) people. Hotel guest max load should be no more than eight (8) people and for the ballroom, meeting rooms and lounge it should be no more than twelve (12) people per car.

2. Average Wait Time

This is the average waiting time of passengers begins when a person registers a hall call and ends when a responding elevator arrives and starts opening its doors.

3. Destination Dispatching

Destination Based Dispatching (DD) system differs from the conventional two-button dispatching system in that the passengers no longer "call for an elevator" via an electromechanical hall button and wait until the elevator arrives to enter their desired destination floor at the car push button panel.

With DD operation, passengers register their desired floor destinations in the elevator lobby via an input device (keypad or touchscreen) and are instantaneously assigned to an elevator. That elevator will then transport them and other passengers going to common areas in the building to their desired destination, making the fewest contiguous stops. Destination-based dispatching algorithms optimize passenger car loading, providing a more efficient and organized Lobby queuing to achieve a reduced time to a person's destination by making fewer stops to the same floors.

Destination Based Dispatching algorithms tend to move the building's population more efficiently as measured by new industry-accepted metrics Average Time to Destination which is calculated by adding the Average Wait Time and the Average Travel Time (the time when a person registers their hall call to the time the elevator arrives at their final destination with the doors open).

Neither of these metrics; however, are used when evaluating traditional two-button dispatching systems, simply because they cannot be accurately measured in the two-button dispatching system, since this type of system can only measure the waiting time of the first person to register a hall call. The system does not know how many passengers have gathered after the initial call is registered. For this reason, it is quite difficult to make a head-to-head comparison of the two (2) systems using a standard metric.

The industry standard metric used to compare results is the Average Time to Destination (ATTD). Hotels have a preferred ATTD time of no more than 90 seconds.

Based on the Hilton brand design standards and accepted industry standards for both hotels and parking garages; the elevators in this facility were measured against the following characteristics based on heavy two-way traffic periods:

Building Use	Elevator Handling Capacity	Average Wait Time	Average Time To Destination
Hilton Hotel Design Standards	Minimum 15%	≤ 35 seconds	N/A
Hotel – Industry DD Standards	Minimum 12%	≤ 35 seconds	90 Seconds
Parking Garage – Industry Standards	Minimum 10%	≤ 35 seconds	N/A

BUILDING DATA

Hotel:

Building Classification:	Hotel / Mid-Level
Floor-to-Floor Heights:	See attached Table 1 for building data, floor-to-floor heights & populations

Hotel Tower Population Summary Data:

Hotel Occupancy:	100% Capacity
Hotel / Tower Population:	511 (284 Keys @ 1.8 guests per key - per Hilton Standards)
Ball Room Population on Level 20:	614 (25% Hotel guests and 75% Non-Hotel guests)
Lounge Population on Level 2:	68 (90% guests 10% non-guests)
Meeting Room Population on Level 2:	54 People (50 % Hotel guests and 50% Non-hotel guests)
Stair Usage:	0% hotel guest floors
- Level 2: Meeting Rooms	25% of population from Lobby for Non-Hotel guests 0% of Hotel guest population
- Level 2: Lounges	25% of population from Lobby for Non- Hotel guests 25% of Hotel guest population
- Level 4: Meeting Rooms	0% of population from Lobby for Non- Hotel guests 0% of Hotel guest population
Entrance Utilization:	Level 1 Ground = 100%

Hotel Elevator Parameters:

Capacity:	2,500 lbs. – Passenger (Existing)
Speed/Type	Hotel Guest Cars: 700 fpm / Overhead gearless AC
Door size (existing):	Hotel Guest Cars: 48" Two-Speed Center Opening
Door Speed:	1.5 seconds open, 2.9 seconds closed
Pre-Open Door Time:	0.5 seconds

Parking Garage:

Building Classification:	Parking Garage
Floor to Floor Heights:	See attached Table 2 for building data, floor-to-floor heights & populations
Parking Garage Population:	585 total population (1.3 pass / vehicle x 450 spaces) (523 population above lobby level and 62 at lobby level)
Occupancy:	100% Capacity
Stair Usage:	0%
Entrance Utilization:	Level 1 (Lobby Level) - 100%

Garage Elevator Parameters:

Capacity:	4,000 lbs. – Passenger (existing)
Speed/Type:	350 fpm / Overhead/MRL gearless AC
Peak Traffic Period:	Will vary by population group and time of day
Door size (existing):	48" Single-Speed Center Opening
Door Speed:	1.5 seconds open, 2.9 seconds closed
Pre-Open Door Time:	0.5 seconds

TRAFFIC ANALYSIS RESULTS

Parking Garage Elevators

Total # of Cars in Group	Speed	Average Handling Capacity	Ave Car Loading with Luggage	Average Wait Time
2	350fpm	**10%**	6 people	31.7

Base Study / Conventional Dispatch (Two Button) Control System

Parking Garage / Passenger Elevator Group: Two (2) car duplex

Handling Capacity: Industry Minimum 10% (5-min Handling Capacity)

Car Speed: 350 fpm

Comment

1. Using the industry standard for five-minute handling capacity of 10% for a parking garage, the two (2) 4, 000 lb. capacity elevators will meet Hilton design standards for thirty-five (35) second average wait time.

Hotel Guest Elevators

The hotel guest elevators were studied using simulations at different peak time periods, the results are shown below:

A. 7:00 a.m. to 11:00 a.m.

- Hotel Guest Check-out
- Level 2 – Load Meeting Rooms (8:00 a.m. to 9:00 a.m.)
- Level 4 – Load Meeting Rooms (8:00 a.m. to 9:00 a.m.)

Number of Elevators	Hilton Standard Handling Capacity for Hotel Guests Rooms 15%	Max Ave Car Load <= 50% Preferred <= 60% Acceptable > 60% Unacceptable	Hilton Standard 5-min Ave Wait Time @ Lobby Level SECONDS *(<=35 Seconds)*	Average Travel Time Seconds	ATTD "Ave Time To Destination" Preferred (<= 90 seconds)
7	15%	38.2	16.0	37.5	53.50
6	15%	46.4	23.0	44.9	67.90
5	15%	60.6	59.1	61.5	120.60

The simulated theoretical results show during this time period six (6) elevators are required to meet Hilton and Industry standards for average wait times and Industry standards for average time to destination. During this time period, one of the seven (7) guest passenger elevators could be taken out of the bank and dedicated to serving the hotel guest rooms.

B. 11:00 a.m. to 4:00 p.m.

- Hotel Guest Check-in and Checkout + two-way traffic
- Level 2 – Meeting Rooms two-way traffic for breaks and lunch
- Level 4 – Meeting Rooms two-way traffic for breaks and lunch

Number of Elevators	**Hilton Standard** Handling Capacity for Hotel Guests Rooms **15%**	Max Ave Car Load <= 50% Preferred <= 60% Acceptable > 60% Unacceptable	**Hilton Standard** 5-min Ave Wait Time @ Lobby Level SECONDS *(<=35 Seconds)*	Average Travel Time Seconds	ATTD "Ave Time To Destination" Preferred (<= 90 seconds)
7	15%	41.9	14.1	38.2	52.3
6	15%	51.3	18.4	44.5	62.9
5	15%	**68.2**	**38.5**	**62.7**	**101.2**

From 11:00 a.m. to 4:00 p.m. represents the lowest time period for elevator demand. The simulated theoretical results still show a need for six (6) guest passenger elevators are required to meet Hilton and Industry standards for average wait times and Industry standards for average time to destination. One of the seven (7) guest passenger elevators could continue to be taken out of the bank and dedicated to serving the hotel guest rooms during this time period.

C. 4:00 p.m. to 6:00 p.m.

- Hotel Guest Check-in + two-way traffic
- Level 2 – Unload Meeting Rooms
- Level 4 – Unload Meeting Rooms
- Level 2 – Lounges open (two-way traffic)

Number of Elevators	**Hilton Standard** Handling Capacity for Hotel Guests Rooms **15%**	Max Ave Car Load <= 50% Preferred <= 60% Acceptable > 60% Unacceptable	**Hilton Standard** 5-min Ave Wait Time @ Lobby Level SECONDS *(<=35 Seconds)*	Average Travel Time Seconds	ATTD "Ave Time To Destination" Preferred (<= 90 seconds)
7	15%	47.8	14.3	41.3	55.7
6	15%	57.4	20.0	48.8	68.8

This peak time period is when the Hotel Guests are checking-in and wanting to get up to their rooms while at the same time the meeting rooms on rooms on levels 2 and 4 are unloading and the lounges on level 2 are open for business. The lounge population is based on a turn every hour. The simulated theoretical results show the need for all seven (7) passenger elevators will be required to meet the necessary capacity requirements.

D. 6:00 p.m. to 7:00 p.m.

- Hotel Guest Check-in + two-way traffic
- Level 20 – Ballroom load
- Level 2 – Lounges open (two-way traffic)

Number of Elevators	Hilton Standard Handling Capacity for Hotel Guests Rooms 15%	Max Ave Car Load Hotel Guests <= 50% Preferred Ballroom Guests <= 80% Preferred	Hilton Standard 5-min Ave Wait Time @ Lobby Level SECONDS *(<=35 Seconds)*	Average Travel Time Seconds	ATTD "Ave Time To Destination" Preferred (<= 90 seconds)
7	15%	79.1	15.5	48.8	64.2
6	15%	91.4	22.8	58.3	81.2

This time period represents the highest Peak Demand for elevator service. During this time period the elevators are to serve the Hotel Guests checking-in; loading 614-person ballroom on level 20; as well as the two-way traffic to and from the lounges on Level 2. The lounge population is based on a turn every hour.

The above chart shows the simulated theoretical results. It shows all seven (7) elevators will be at their maximum handling capacity. Even though the average lobby wait times are within Hilton standards, the elevator cabs will be full, (12 people per car which is right at the maximum capacity of 80%).

E. 10:00 p.m. to 10:30 p.m.

- Hotel Guest Check-in + two-way traffic
- Level 2 – Lounges open (two-way traffic)
- Level 20 – Ballroom Unload (614 persons)

This peak period is critical as the entire population of the ballroom is to be emptied during this time. We first wanted to determine how many elevators would theoretically be required to handle the remaining hotel traffic during this time frame, (two-way traffic for the Lounge population on level 2 and a reduced Hotel Guest Check-in two-way traffic). To try and simulate a worst-case scenario, the assumption for Hotel Guest Check-in two-way traffic between 10:00 p.m. and 10:30 p.m. was 25% of the hotel maximum.

Number of Elevators	Hilton Standard Handling Capacity for Hotel Guests Rooms 15%	Max Ave Car Load <= 50% Preferred <= 60% Acceptable > 60% Unacceptable	Hilton Standard 5-min Ave Wait Time @ Lobby Level SECONDS *(<=35 Seconds)*	Average Travel Time Seconds	ATTD "Ave Time To Destination" Preferred (<= 90 seconds)
3	15%	12.3	19.6	34.2	53.8
2	15%	26.5	42.7	49.2	91.9

The simulated theoretical study results show three (3) hotel passenger cars are needed to meet Hilton's design requirement for an average lobby wait time of thirty-five (35) seconds.

If three (3) of the seven (7) hotel passenger elevators are needed to handle the hotel guests and lounge populations, then we need to determine if the remaining four (4) passenger elevators is enough to unload the entire 614-person population of the ballroom in thirty (30) minutes.

Number of Cars	30 Min Empty Ballroom 1800 seconds	Round Trip Time Seconds	# number of available Trips	Car Load % <= 50% Preferred <= 80% Maximum	Total # of People per Trip	People Moved in 30 min (Ballroom Population 614)
7	1800	75.6	24	24.7	26	618
6	1800	78.6	23	30.0	27	618
5	1800	82.0	22	37.5	28	617
4	1800	86.9	21	49.7	30	618
3	1800	95.9	19	73.2	33	618

The above chart shows four (4) dedicated hotel passenger elevators would be able unload the 614-person population in thirty (30) minutes with an acceptable car capacity of 49.7%. Depending on the type of ballroom event, a capacity greater than 50% may or may not be acceptable.

Additional Elevator Design Considerations

1. Additional training of staff and guests on using destination dispatch.

2. Timing of events for security purposes should be reviewed as hotel guests and non-hotel guests will be using the same elevators to access lounges & meeting rooms on level 2 along with meeting rooms on level 4 and the ballroom level. Destination Dispatching will help with grouping of people going to like floors but does not eliminate hotel guests riding with non-hotel guests.

3. The location of the service elevator relative to the guest areas, kitchen and back of house operations should be reviewed to confirm if acceptable.

4. The capacity and loading classification of the service elevator should be reviewed and compared to the largest load (weight or capacity) expected to be moved in all areas of the facility.

5. The layout and design of the new service elevator should be reviewed as there is considerable cost and lead-time considerations between an elevator manufacturer's standard product versus a custom designed service elevator.

6. Design and location of the new service elevator may create cross traffic issues with hotel guests in the elevator lobbies when moving food and beverages to the ballroom and meeting rooms.

7. Scheduling of deliveries and ball room food deliveries using the one new service elevator #9 should be reviewed with hotel operations management as to not interfere/conflict with hotel guest room service, maid service, maintenance, etc. One of the passenger elevators may need to be taken out of the bank and used as hotel guest service elevator.

7. Based on the change in use and change in occupancy; multiple major elevator code provisions would typically be applicable for this project. Local code review required to determine if variances will be permitted.

8. Further review is recommended with local AHJ regarding requirements for IBC 2012 code.

9. If project is to follow 2012 IBC Code, Elevators serving levels 120' above the main egress floor:

    - Must be a minimum of 3, 500 lb. capacity.
    - No fewer than two (2) fire access elevators shall be provided to service every floor in the building.
    - The fire service access elevator(s) hoistway shall be located in a shaft enclosure complying with IBC section 708, also complying with the IBC High Rise section 403.

- Fire Access Elevators(s) must open into fire service access elevator lobbies, with direct access to stairs, 150 sqft or greater, and have fire resistance rating of less than one (1) hour. Lobby doors must be ¾ hour fire rated and comply with section 716.5.3. Fire service access lobbies are not required at levels of exit discharge.
- Fire Access Elevators shall be monitored at the fire command center.
- Emergency power shall be provided to all fire access elevators, and with all related building provisions and lighting.
- All wiring related to the fire access elevators, and the support of these elevators, shall be protected by a construction having a two (2) hour rating.
- Interior hoistway lighting shall be provided the entire height of the hoistway at not less than 1 footcandle.
- Automatic sprinklers shall not be installed in the hoistway or elevator machine rooms.
- The sprinkler system must have a water flow initiating device for each floor that is monitored by the building's fire alarm system. An approved method to prevent water from infiltrating the shaft from the elevator lobbies shall be provided.
- Please refer to Section 403.6 and 3007 of the 2012 IBC Code for the exact code language.

END OF REPORT

TABLE 1

				Hotel Guest Elevators 7 Car Group (Destination Dispatch)							New Custom Service Elevator			
				1	2	3	4	5	7	8	9			
Elevator Configuration				Passenger	Passenger	Passenger	Passenger	Passenger	Passenger	Passenger	Service/Fire Car			
Existing Elevator Speed				700fpm	700fpm	700fpm	700fpm	700fpm	700fpm	700fpm	700fpm			
Elevator System				Gearless	Gearless	Gearless	Gearless	Gearless	Gearless	Gearless	Gearless			
Capacity				2500	2500	2500	2500	2500	2500	2500	TBD			
Existing Platform Dimensions				6'-0" x 6'-0"	6'-0" x 6'-0"	6'-1" x 6'-0"	6'-2" x 6'-0"	6'-2" x 6'-0"	6'-0" x 6'-0"	6'1" x 6'-0"	TBD			
Existing Entrances Type				2SCO	2SCO	2SCO	2SCO	2SCO	2SCO	2SCC	TBD			
Existing Entrance Size				4'-0" x 7'0"	4'-0" x 7'0"	4'-0" x 7'0"	4'-0" x 7'0"	4'-0" x 7'0"	4'-0" x 7'0"	4'-0" x 7'0"	TBD			
Operation		FL to FL		Group	Group	Group	Group	Group	Group	Group	Simplex			
		Feet	IN									# of Suites	Hilton Stds 1.8 Occupants per Suite	Population Per Floor
21	Mechanical	15	3		F						=			0
20	BALL ROOM	15	2	F	F	F	F	F	F	F	=	Ball Room		614
19	Suites	16	0	F	F	F	F	F	F	F	=	19	1.8	34
18	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
17	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
16	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
15	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
14	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
13	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
12	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
11	Suites	13	7	F	F	F	F	F	F	F	=	18	1.8	32
10	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
9	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
8	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
7	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
6	Suites	13	7	F	F	F	F	F	F	F	=	19	1.8	34
5	Suites	16	0	F	F	F	F	F	F	F	=	19	1.8	34
4	Office & Meeting Rms (no support staff)	10	6	F	F	F	F	F	F	F	=	Office/Meeting Rms		178
3b	Intermediate Floor	10	0								=			0
3a	Intermediate Floor	10	0								=			0
2	Balcony Level - Meeting Rms & Lounges	10	0	F	F	F	F	F	F	F	=	Mtg Rm & Lounges		122
1	Lobby	14	0	F	F	F	F	F	F	F	=	Lobby		0
B	Basement	14	6				F		F		=			0
Total Travel				263'-1"	278'-3"	263'-1"	277'-7"	263'-1"	277'-7"	263'-1"	292'-9"			1425
	Front Openings			19	20	19	20	19	20	19	23			

Table 2
Garage Elevator - Design Paramaters

			FL to FL						
					12	13			
Elevator Configuration					Passenger	Passenger			
Elevator Speed					350	350			
Elevator System					Geared	Geared			
Existing Capacity					4000	4000			
Existing Platform Dimensions					7'2"X7'2"	7'2"X7'2"			
Existing Entrances Type					SSCO	SSCO			
Existing Entrance Size					3'-6"" x 7'-0"	3'-6" x 7'-0"			
Operation					Duplex	Duplex			
			Feet	**IN**			# of Parking Spaces	Calculated Population Per Car	**Population Per Floor**
7	IJ				F	F	67	1.3	**87**
6	GH		10	6	F	F	67	1.3	**87**
5	EF		10	6	F	F	67	1.3	**87**
4	CD		10	6	F	F	67	1.3	**87**
3	AB		10	6	F	F	67	1.3	**87**
2	Dock		15	9	F	F	67	1.3	**87**
1	Lobby		14	0	F	F	48	0	**0**
B	Basement		14	3	F	F			**0**
Total Travel					90'-0"	90'-0"	450		**571**
Front Openings					8	8			
Rear Openings					0	0			

SECTION 21 01 00 - GENERAL FIRE SUPPRESSION REQUIREMENTS

PART 1 GENERAL

1.01 Description of Work

A. The Fire Protection Contract includes all labor, materials and equipment required for the complete fire suppression system(s) as shown and herein specified.

1.02 Related Documents

A. The drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements (Division 1) and Section 26 01 13 - Electrical Connections, apply to the work specified in DIVISION 21 – FIRE SUPPRESSION.

1.03 Description of Work

A. The fire protection contract includes all labor, materials and equipment required for the complete fire suppression system(s) as shown and herein specified.

B. Provide all devices and accessories as necessary for complete and working systems.

C. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems..

1.04 Quality Assurance

A. Each major component of equipment shall have the manufacturer's name; address, model number and rating on a nameplate securely affixed.

B. All equipment of one type (such as heads, pumps, valves, etc.) shall be the products of one manufacturer, unless otherwise specified.

C. In the event of discrepancies between the drawings and specifications, the contractor shall advise the engineer before proceeding with the work in order that correct progress is ensued.

D. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel." Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.05 Shop Drawings and Submittals

A. Shop drawings shall be submitted as specified in Division 1. Product data shall be submitted for all materials and equipment specified in DIVISION 21.

B. Shop drawings for equipment ‘Packages” shall be complete and include all items to be provided by a manufacturer’s representative or supply house. No partial submittals will be reviewed or approved without a complete and total equipment submittal.

C. Each shop drawing shall include a letter indicating all deviations from the drawings and/or specifications.

D. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Dimensional drawings showing layout, connection points, and detailed layout of

components.

4. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.
5. Conspicuously mark on each submittal the exact model, fittings, accessories, and devices to be supplied. When a schedule is shown on the drawings or in the specifications, provide a copy of that schedule with the shop drawing indicating the equipment capacities and characteristics of the actual equipment being proposed.

E. Contractor shall check all shop drawings to verify that they meet the requirements of the drawings and specifications before forwarding to the architect and engineer. All shop drawings submitted shall bear the stamp of the contractor to show that they have been reviewed in detail.

F. No work shall be fabricated, and no equipment ordered, until the architect and engineer have returned acceptable reviewed shop drawings.

G. Welder certificates, signed by Contractor, certifying that welders comply with requirements specified under "Quality Assurance" article of this section.

1.06 Project Sequencing

A. The contractor shall refer to the architectural plans and specifications for areas of work and general schedules to determine the scope of work required during each phase of the construction.

B. All temporary valves, etc. not indicated, but required by phasing, shall be included in the base bid.

1.07 Substitutions

A. The materials, products, and equipment described in these specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. Listing of these manufacturers shall in no way be construed as a device intended to limit the bidders to those specifically listed.

B. Reference to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number, shall be interpreted as having established a standard of quality and shall not be construed as limiting competition. Articles, fixtures, etc. of equal quality by manufacturers listed in this specification for the applicable use, shall be acceptable, subject to performance, spatial, structural, and electrical constraints of the project design.

C. No substitution will be considered unless written request for approval has been received by the engineer at least ten working days prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and complete description of the proposed substitute including shop drawings, performance and test data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment, or work that incorporation of the proposed substitute would require, shall be included. The burden of proof of the merit of the proposed substitute is on the proposer. The engineer's approval or disapproval of a proposed substitution shall be final.

D. Approval of a proposed substitution prior to receipt of bids shall be set forth in an Addendum. Approvals made in any other manner shall not be considered binding.

E. The Engineer reserves last opinion as to a product’s equality or superiority to that specified.

1.08 Definitions

A. Furnish: The term “furnish” is used to mean “supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations.”

B. Install: The term “install” is used to describe operations at the project site including the actual “unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.”

C. Provide: The term “provide” means “to furnish and install, complete and ready for the intended use.”

D. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including all items incidental to the Work, including all services necessary for proper installation and operation. The Installation shall be included under the guarantee required by this Division.

The design engineer, referred to as “engineer” shall mean the engineering firm, HOSS & BROWN ENGINEERS, INC., Contact person: Casey Steiner, PE

1.09 Record Drawings

A. During the progress of the work of this section, this Contractor shall maintain an accurate record of all changes made in the installation of the system(s). Upon completion of the work, accurately transfer all record information to an unmarked full-size set with neatly handwritten or typed notes. Scan full-size drawings to PDF at 300 dpi.

1.10 Operation and Maintenance Manuals

A. Three (3) Flash Drives containing PDFs of Operation and Maintenance (O&M) Manuals shall be submitted as described below. Files and folder names shall be clearly labeled. Folder structure and names shall be intuitive and clearly labeled.

B. Before project close-out, submit O&M operating, maintenance instructions, and parts lists for equipment provided. Include in the manual a list of emergency service organizations capable of rendering service for each piece of equipment.

C. Keep in a safe place all keys, wrenches, and other specialty tools furnished with equipment. Present to owner at project close-out and receive a receipt showing he has received the same.

D. At the completion of the project furnish to the Architect for the Owner O&M brochures divided and tabbed, containing all data, diagrams, capacities, spare part numbers, manufacturers service and maintenance data, warranties, guarantees, etc., including local contacts and escalation schedule complete with addresses and telephone numbers, of all equipment, apparatus, and system components furnished and installed under this Division of the specifications.

1.11 Codes and Ordinances

A. All work shall be in accordance with applicable codes, rules, ordinances, and regulations of local, state, and federal governments and other authorities having jurisdiction.

B. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.

C. The contractors shall secure and pay for the necessary permits and certificates of inspection for their trade. Keep record of all permits and inspections and submit two

copies to the engineer with request for final inspection.

1.12 Owner Training

A. When training is required by any section of these specifications, all training sessions shall be recorded on a single DVD. Provide two copies of the DVD at the end of construction. The contractor shall prepare a letter of receipt to be signed by the owner when the tapes are delivered.

B. Contractor shall demonstrate to the owner that all mechanical systems installed under this division of the specifications are complete and operating as intended.

C. Any adjustments or other additional work required as a result of failure of any system to comply with the intent of this specification shall be accomplished at no additional cost to the Owner.

1.13 Warranty

A. This contractor shall warrant that the complete systems installed under this contract shall be free of defects in workmanship and materials for a period of one (1) year from the date of substantial completion by the arch/owner.

B. If defects occur during the one year guarantee period, this contractor shall repair or replace such defects at no expense to the owner and to the satisfaction of the owner and engineer.

PART 2 PRODUCTS

2.01 General

A. Where the quality of required material is not specified, the Contractor shall furnish a first class standard item as approved by the Architect/Engineer.

B. Capacities of equipment and materials shall not be less than those indicated.

C. All work performed shall provide a neat and workmanlike appearance when completed, to the satisfaction of the engineer.

D. Provide 3-1/2” concrete base for all floor mounted equipment unless shown or noted otherwise. Provide 6x6 welded wire fabric reinforcing minimum or as required by the structural engineer.

E. Adequately protect equipment from damage after delivery to the jobsite. Cover with heavy polyethylene plastic. Elevate equipment when there is danger of water damage. Equipment damaged will be rejected.

F. Any scratches to factory finishes shall be touched up using factory supplied paint before final acceptance. If extensive damage to factory finishes has occurred, equipment panels shall be replaced to the satisfaction of the engineer. If rust has formed, remove as recommended by the manufacturer prior to touch-up.

2.02 Equal Products of Listed Manufacturers

A. In general, the specifications and drawings identify required materials and equipment by naming first the manufacturer whose product was used for the basis of design. The manufacturer’s product, series, model, catalog, and/or identification numbers shall set quality, construction, and dimensional requirements for comparing the other manufacturer’s products. The capacity and performance of all equipment shall meet or exceed what is indicated on the drawings and/or scheduled.

B. Where other manufacturer’s names are listed, they are considered an acceptable manufacturer for the product specified; however, the listing of their names implies no

prior approval of any product unless specific model or catalog numbers have been shown.

C. Where other than first named products are used, it shall be the responsibility of the contractor to determine prior to bid time that his proposed materials and equipment selections do not require adjustments in the mechanical, electrical , structural, or architectural requirements as shown on the drawings. The contractor shall include in his bid all costs associated with any required adjustments.

PART 3 EXECUTION

3.01 Installation

A. Install all equipment in strict accordance with NFPA requirements, the manufacturer's recommendations, Hilton Standards, and the shop drawings reviewed by the Engineer.

B. The complete installation shall function as designed and intended with respect to efficiency, capacity, and noise level, etc. Any abnormal noise caused by rattling equipment, piping, ducts, conduit, air devices, or squeaks in rotating equipment will not be acceptable

C. Locations of equipment, piping, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.

D. Any item interfering with proper placement of other work shall be removed and relocated without extra cost if reasonable coordination would have eliminated the interference. Damage to other work caused by this contractor shall be restored as specified for new work.

E. Written dimensions are preferred over scaled dimensions. When written dimensions are not available, the contractor shall be responsible for determining the proper installed location.

F. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus, and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification.

G. Contractor shall perform initial start-up of systems. Owner’s operating personnel shall be present during this operation.

H. It is the contractor’s responsibility to provide materials and trim which properly fit the types of ceiling, wall, or floor finishes installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.

I. This contractor shall provide all miscellaneous steel, etc., for the proper installation of the systems specified and/or indicated on the plans.

3.02 Connections to Building Structure

A. Any item connecting to building structure shall be done in a manner accepted by the structural engineer.

B. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.

3.03 Cleaning

A. Periodically during construction and prior to Owner acceptance of the building, Contractor shall remove from the premises and dispose of all packing material and

debris.

3.04 Visit to the Site

A. Before submitting his bid, the Contractor shall visit the location of the job and shall fully understand the scope of the work to be done and the conditions under which it is to be performed. In no case shall additional compensation be granted when existing conditions could reasonably be determined.

3.05 Existing Utilities

A. Locate and mark all known utilities prior to proceeding with work. Proceed with caution since unmarked utilities may exist on site.

B. Should any existing utilities be damaged or disrupted, immediately notify Owner and repair to existing conditions.

C. The Contractor shall closely coordinate all utility downtime with the Owner and Architect giving a minimum fourteen (14) day notice prior to downtime.

D. Downtimes are to be held to a minimum duration with the Owner being notified as to the extent of said downtime.

End of Section 21 01 00

SECTION 21 05 13 - ELECTRICAL PROVISIONS OF FIRE SUPPRESSION WORK

PART 1 GENERAL

1.01 Description of Work

A. The contractors responsible for Division 21 work shall coordinate with the Electrical Contractor to insure motor starters of the proper size are furnished. Further, the Fire Protection Contractor shall furnish all electric control items indicated to the Electrical Contractor for installation and connection, unless noted otherwise.

PART 2 PRODUCTS

2.01 Motor Starters and Controllers

A. The Fire Protection Contractor shall provide all motor starters and controllers required for equipment provided in the fire suppression contract that is not integral with equipment.

PART 3 EXECUTION

3.01 Motor Starters and Controllers

A. The Fire Protection Contractor shall coordinate all motor starters type and size with the Electrical Contractor to insure compatibility with the motors provided in this contract.

ITEM	Furnished By	Set By	Power Wiring	Control Wiring
Pumps	FPC	FPC	EC	EC
Flow switches, alarms, interlocks, etc.	FPC	FPC	EC	EC
Pressure switches, interlocks, etc	FPC	FPC	EC	EC

FPC = Fire Protection Contractor
EC = Electrical Contractor

End of Section 21 05 13

SECTION 21 05 14 - SERVICES

PART 1 GENERAL

1.01 Description of Work

A. Provide the services as shown on plans and specified.

1.02 Existing Conditions

A. Locate and mark all known utilities prior to proceeding with work. Proceed with caution since unmarked utilities may exist on site.

B. Should any existing utilities be damaged or disrupted, immediately notify Owner and repair to existing condition.

1.03 Utility Fees - EDIT

A. The Contractor shall pay any and all required utility service fees associated with this project.

1.04 Utility Connection Coordination

A. The Contractor shall contact and coordinate all aspects of the utility connections outlined and shown hereinafter.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 Fire Protection

A. Contractor shall connect the new service line to the existing City service line presently installed in the basement. Contractor shall remove and replace backflow device at the service entrance location.

End of Section 21 05 14

SECTION 21 05 15 – FIRE SUPPRESSION RELATED WORK

PART 1 GENERAL

1.01 Description of Work

A. The following is the work required by the General Contractor to facilitate the work of the Fire Protection Contractor.

1. Openings and chases.

B. The following is the work required by the Fire Protection Contractor to facilitate the work of his Contract.

1. Cutting and patching
2. Pipe sleeves

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 General Contractor's Work

A. The General Contractor shall leave such openings and chases in new construction for pipes, cabinets, access doors, and equipment as may be necessary or directed by the Architect to facilitate the work of the Fire Protection Contractor and to refinish around same. The Fire Protection Contractor shall properly advise in due time as to the location and sizes of such openings and chases.

3.02 Fire Protection Contractor's Work

A. The Fire Protection Contractor shall be responsible for locating and setting his own pipe sleeves and be aware of the job progress to avoid unnecessary delay for setting of same.

B. The Fire Protection Contractor shall be responsible for cutting his own holes in existing construction and for patching and finishing around same, unless noted otherwise, to the satisfaction of the Architect. Any holes left in walls when existing pipe is removed by this Contractor shall be patched and finished by this Contractor.

End of Section 21 05 15

SECTION 21 05 16 - EXPANSION COMPENSATORS

PART 1 GENERAL

1.01 Description of Work

A. Provide expansion compensators as specified and as indicated on the drawings.

B. Provide flexible pipe expansion compensators with guides as per manufacturer's recommendations. Bellows-type and slip type compensators are not acceptable

1.02 Approved Manufacturers

A. The basis for the specification is Metraflex and shall represent the minimum level of construction.

PART 2 PRODUCTS

2.01 Expansion Joints

A. Provide Metraflex, "Metraloops", or approved equal, flexible loop type compensators constructed of two flexible sections of hose and braid, two 90° elbows and one 180° return bend.

B. Expansion compensators shall impart minimal thrust loads to anchors and shall be installed in a neutral, pre-compressed or pre-extended condition as required by installation temperatures.

C. Compensators shall be guided to direct movement into the Metraloop. One guide will be required within four pipe diameters on either side of the compensator.

D. The compensator shall be supported at the 180° turn bend installed in the horizontal plane. No support is required if installed in the vertical plane.

E. Compensators in steel system shall be stainless steel hose and braid with threaded, grooved, or flanged ends:

LINES	SERIES
½" to 2"	MLT rated for 4" movement
2½" & larger	MLF , MFW or MFG rated for 4" movement

PART 3 EXECUTION

3.01 Installation

A. Each compensator shall be installed in strict compliance with manufacturer's recommendations.

End of Section 21 05 16

SECTION 21 05 17 – FIRESTOPPING FOR FIRE SUPPRESSION SYSTEMS

PART 1 GENERAL

1.01 Related Documents

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 Definitions

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 General Description of the Work of this Section

A. Only tested firestop systems shall be used in specific locations as follows:

1. Penetrations for the passage of piping and other fire suppression equipment through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
2. Repetitive penetrations in fire-rated floor assemblies.

1.04 References

A. Test Requirements: ASTM E-814-02, "Standard Method of Fire Tests of Through Penetration Fire Stops"

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 (August 24,2000) and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually. The UL Fire Resistance Directory includes the following:

1. Firestop Devices (XHJI)
2. Fire Resistance Ratings (BXUV)
3. Through-Penetration Firestop Systems (XHEZ)
4. Fill, Voids, or Cavity Material (XHHW)
5. Forming Materials (XHKU)

C. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

D. Inspection Requirements: ASTM E 2174 – 01, “Standard Practice for On-site Inspection of Installed Fire Stops.”

E. ASTM E-84-01, “Standard Test Method for Surface Burning Characteristics of Building Materials.”

F. All major building codes: ICBO, SBCCI, BOCA, and IBC.

G. NFPA 101 - Life Safety Code

1.05 Quality Assurance

A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop System installation must meet requirements of ASTM E-814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes

having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.

1.06 Submittals

A. Submit Product Data: Manufacturer’s specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's UL approved installation instructions.

B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor’s name who will install firestop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to job-site.

1.07 Installer Qualifications

A. Engauge an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A manufacturer’s willingness to sell its firestopping products to the Contractor or to an Installer engauged by the Contractor does not in itself confer qualification on the buyer.

1.08 Delivery, Storage, and Handling

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.09 Project Conditions

A. Do not use materials that contain flammable solvents.

B. Scheduling

1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when

temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 PRODUCTS

2.01 Firestopping, General

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.02 Acceptable Manufacturers

A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma, Phone 800-879-8000
2. 3M Fire Barrier Products.

2.03 Materials

A. Use only firestop products that have been UL 1479, ASTM E-814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices are installed prior to concrete placement for use with non-combustible and combustible plastic pipe penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device: Add Aerator adaptor when used in conjunction with aerator (“sovent”) system.
2. Hilti CP 681 Tub Box Kit for use with tub installations.

C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe and copper pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 604 Self-leveling Firestop Sealant
3. Hilti CP 620 Fire Foam
4. Hilti CP 606 Flexible Firestop Sealant
5. Hilti CP 601s Elastomeric Firestop Sealant

D. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, and plastic pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant

E. Firestop collar or wrap devices attached to assembly around combustible plastic pipe, the following products are acceptable:

1. Hilti CP 642 Firestop Collar
2. Hilti CP 643 Firestop Collar

3. Hilti CP 645 Wrap Strips

F. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

PART 3 EXECUTION

3.01 Preparation

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Coordination

A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.03 Installation

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration joint materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
2. Protect materials from damage on surfaces subjected to traffic.

3.04 Field Quality Controls

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.05 Adjusting and Cleaning

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

End of Section 21 05 17

SECTION 21 05 19 - METERS AND GAUGES

PART 1 GENERAL

1.01 Description of Work

A. Provide gauges as specified.

PART 2 PRODUCTS

2.01 Manufacturers

A. Provide devices by one of the following manufacturers.

1. Marshalltown
2. Trerice
3. Weiss Instruments
4. Weksler Instruments

2.02 Pressure Gauges

A. Provide dial type with enameled steel or cast aluminum case, white dial, case relief vent, recalibration device and AISI 316 stainless steel Bourdon tube, tip and socket.

B. Gauges shall be installed with brass pipe fittings, unions, gauge cock, and pulsation dampers.

C. Unless indicated otherwise, ranges on gauges shall be as follows:

1. 0-100 psi – within sprinkler system

PART 3 EXECUTION

3.01 Installation of Pressure Gauges

A. Install in the following locations, and elsewhere as indicated:

1. At building fire protection water service entrance.

End of Section 21 05 19

SECTION 21 05 23 - PIPING SPECIALTIES AND VALVES

PART 1 GENERAL

1.01 Description of Work

A. Valves shall be installed at locations shown and specified; the locations shall be accessible. All valves shall be installed with their stems or spindles horizontal or above.

B. Provide unions or grooved mechanical couplings where shown at all equipment connections and at other points where disconnection of piping will be required.

1.02 Approved Manufacturers

A. The basis for the valve specification is Nibco and MEPCO and shall represent the minimum level of construction. Equipment manufactured by NVent, Apollo, Milwaukee, and Victaulic shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Valves

A. Bronze or brass ball valves rated at 150 PSI SWP and 600 PSI WOG, shall have two or three piece stainless steel, cast bronze, or brass bodies with TFE seats, stainless steel full port ball, separate packing nut with adjustable stem packing, and anti-blowout stem . Valves ends shall have full depth ANSI, Vic-Press™, or extended solder connections, and manufactured to comply with MSS-SP 110, shall be used in 3" and smaller copper and steel lines for fire protection duties. NVent PL-200, Victaulic Series 569, NIBCO T585-70-66, Jomar T/S 100-SS-n in uninsulated applications and NIBCO T585-70-66-EL in insulated lines. Victaulic Series 726 when using grooved end valves.

B. Butterfly valves rated 300 psi working pressure, grooved end or lug style, ductile iron body with 2” extended neck for insulation, and 10 position lever shall be used in 4" and larger copper and steel lines for all fire protection duties. Valves to have electroless nickel coated ductile iron or aluminum bronze disc with pressure responsive EPDM synthetic rubber seat, 400 series stainless steel stem and shall not have exposed stem to disc fasteners. (Stem shall be offset from the disc centerline to provide full 360-degree circumferential seating.) Valves to be rated at full pressure rating for dead end bi-directional service. Valves to be manufactured in compliance with MSS-SP 67. Provide with isolating flanges when used in copper lines. NIBCO LD2000-3 (4” thru 6”), NIBCO LD 2000-5 (8” thru 12”), and Victaulic Vic-300 MasterSeal™ when using grooved end valves through 12”. Victaulic Series W706 shall be used for grooved end piping systems 14” through 24”.

C. Y-pattern swing-type check valve manufactured in accordance with MSS-SP 80, Class 150 psi B62 cast bronze body shall be used in 2 1/2" and smaller lines for fire protection duties. NIBCO T-433Y. Victaulic Series 712 when using grooved end valves.

D. Swing-type check valve manufactured in accordance with MSS-SP 71, class 125, grooved ASTM A536 ductile iron or flanged ASTM A126 class B cast iron body with bronze trim or wafer-style with stainless steel spring, bronze disc plates, rubber seat and cast iron body, shall be used in 3" and larger lines for fire protection duties. NIBCO T-433Y. For vertical line applications use NIBCO T-480. When using grooved end valves, Victaulic Series 712 swing check valve for horizontal installations, Victaulic Series 716, or Victaulic Series W715 for vertical or horizontal installations.

2.02 Double Check Style Backflow Preventers with Detectors - ½" through 10" (Fire Protection)

A. Provide Ames C300 or C300N, or approved equal, double check detector valve assembly where indicated to create potable and non-potable water system and protect main service line. Backflow device shall be FM listed for fire protection use.

B. Double check assembly shall consist of two independent Tri-link Check modules within a single housing with sleeve access port, four test cocks, and two drip tight shutoff valves. Tri-Link Checks shall be removable and serviceable without the use of special tools.

C. Housing and valve bodies and cover shall be manufactured of stainless steel and shall be designed to 175 psi cold water working pressure at a temperature range of 33 F to 110 F.

D. Tri-Link Checks shall have reversible elastomer discs and in operation shall produce a drip tight closure against the reverse flow of liquid caused by back pressure or back siphonage.

E. The by-pass meter assembly shall consist primarily of a bronze water meter in series with a bronze double check valve. The meter shall be the total registration type with accurate registration between 1 and 20 GPM flow rates. The by-pass double check shut-off valves and test cocks shall be resilient seated ball valves with full flow characteristics.

2.03 Unions

A. Threaded type ground joint unions shall be used on piping 2" and smaller. Flanged connections shall be used on pipe 2½" and larger.

B. Unions are not required in installations using Victaulic grooved mechanical couplings.

C. Unions shall not be installed in walls or partitions or above non-accessible ceilings.

D. Pressure ratings on unions shall be equal to or greater than the lines they are in.

E. Dielectric unions or Victaulic Style 47 dielectric waterway fittings shall be used where copper lines connect to other types of materials.

PART 3 EXECUTION

End of Section 21 05 23

SECTION 21 05 29 - PIPING SUPPORTS, ANCHORS, AND SEALS

PART 1 GENERAL

1.01 Description of Work

A. Provide piping support, anchors, and seals as specified and indicated on drawings.

B. Pipe shall not pass through footings or beams without the consent of the Architect.

1.02 Submittals

A. Shop drawings of the fire-stopping method shall be approved prior to the setting of any sleeves and shall clearly define the UL fire-stopping method and required sleeve clearances.

1.03 Approved Manufacturers

A. The basis for this specification is B-Line Systems Inc. and shall represent the minimum level of construction. Equipment manufactured by Erico and Grinnell shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Hangers and Sleeves

A. Pipe hangers for lines 1/2” to 2” shall be adjustable swivel ring hanger equal to B-Line Figure B-3170NF and B-3170CT for ferrous and copper piping respectively with hanger rods in diameters as required by the hanger swivel rings. Upper ends supported as hereinafter specified with the proper B-Line upper attachments.

B. Pipe hangers for lines 2 1/2” to 4” shall be light duty clevis hanger equal to B-Line Figure B-3104 and B-3104CT for ferrous and copper piping respectively with hanger rods in diameters as required by the hanger rod holes. Upper ends supported as hereinafter specified with the proper B-Line upper attachments.

C. Pipe hangers for lines 6” and larger shall be standard clevis hanger equal to B-Line figure B3100 and B3100C for ferrous and copper piping respectively with hanger rods in diameters as required by the hanger rod holes. Upper ends supported as hereinafter specified with the proper B-Line upper attachments.

D. Provide B-Line Figure B-3373 and B-3373CT riser clamps for ferrous and copper piping, respectively, at each floor and at other locations where vertical support is necessary.

E. Pipe sleeves will be required in all pipe and duct penetrations through exterior walls, masonry walls, floors and fire rated gyp. board walls. Sleeves shall be either Schedule 5 steel pipe, field fabricated from minimum 16 gauge steel with 2" overlap at the seam, or as required by U.L. listed fire-stopping system.

F. Pipe sleeves will not be required in existing wall or floor penetrations of masonry construction when such openings are made by "core-drilling".

PART 3 EXECUTION

3.01 Pipe Sleeves

A. Space between sleeves and pipes in outside walls shall be filled or tightly caulked with oakum, butyl rubber, link seals or other approved equally effective material to resist the penetration of water. Pipe sleeve shall be sufficient diameter to provide approximately 1/2" clearance around pipe, and in the case of insulated pipe, approximately 1/2" around insulation.

B. Space between sleeves and pipes in other wall construction shall be diameter as required to provide the clearance required by the U.L. listed fire-stopping method chosen by the Contractor.

C. Sleeves shall be set no closer than three pipe diameters center to center, be set 3/4" past all wall surfaces, and securely anchored to the wall.

3.02 Pipe Hangers

A. Upper ends of hanger rods in steel structures shall be supported angle iron laid across top chord of bar joists, or from side beam clamps.

B. Upper ends of hanger rods other constructions shall be supported as approved by the Structural Engineer of record.

C. Hanger and support spacing for horizontal steel and copper piping shall not exceed the values given in the following table, unless noted otherwise:

NOMINAL PIPE SIZE	STEEL PIPE	COPPER PIPE
1/2" - 1-1/4"	7'	5'
1-1/2" - 2"	9'	6'
2-1/2" - 3"	11'	10'
4"	14'	10'
6"	17'	--
8"	19'	--
10" - 12"	22'	--

D. Fire protection piping shall be supported in accordance with NFPA requirements.

E. Spacing of supports and braces for exposed vertical piping shall not exceed the hanger spacing specified for horizontal pipe, unless otherwise indicated.

End of Section 21 05 29

SECTION 21 05 53 – FIRE PROTECTION IDENTIFICATION

PART 1 GENERAL

1.01 Description of Work

A. Provide fire protection identification as specified and indicated on the drawings.

B. This Section includes the following mechanical identification materials and their installation:

1. Equipment markers
2. Access panel and door markers
3. Pipe markers
4. Valve tags
5. Valve schedules

1.02 Submittals

A. Product Data: For each type of product indicated.

B. Valve Schedules: Provide valve numbering scheme and identification type for each piping system. Furnish extra copies (in addition to mounted copies) to include in Operation and Maintenance Manuals.

1.03 Coordination

A. Coordinate installation of identifying devices with completion of insulation and jacketing surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with location of access panels and doors.

PART 2 PRODUCTS

2.01 Manufacturers

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:

1. Seton
2. Brady
3. Craftmark
4. Brimar Industries, Inc.

2.02 Equipment Identification Devices

A. Equipment Markers: Engraved, color-coded laminated plastic.

1. Terminology: Match schedules as closely as possible.
2. Data:
   a. Name and plan number.
   b. Equipment service.
   c. Design capacity.
   d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
3. Size: 2-1/2” by 4” for control devices, dampers, and valves; 4-1/2” by 6” for equipment.
4. Letter Size: Minimum 1/4 “ for name of units if viewing distance is less than 24 inches, 1/2“ for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

5. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

B. Access Panel and Door Markers: 1/16" thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8" holes for attachment.

1. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

2.03 Piping Identification Devices

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ANSI/ASME A13.1, unless otherwise indicated.
2. Type and Size of Letters: Comply with ANSI/ASME A13.1, unless otherwise indicated.
3. Legends: Spelled out in full or commonly used and accepted abbreviations.
4. Pipes with OD, Including Insulation, Less Than 6": Full-band pipe markers extending 360 degrees around pipe at each location.
5. Pipes with OD, Including Insulation, 6" and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
6. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pretensioned Pipe Markers: Pre-coiled semi rigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Shaped Pipe Markers: Preformed semi rigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.

2.04 Valve Tags

A. Valve Tags: Stamped or engraved with ¼" letters for piping system abbreviation and ½" numbers, with numbering scheme to match existing numbering scheme on temperature control drawings. Provide 5/32" hole for fastener.

1. Material: 3/32" thick laminated plastic with 2 black surfaces and white inner layer.
2. Valve-Tag Fasteners: Brass beaded wire-link chain, beaded chain or S-hook.
3. Valve tag size and shape: 1 ½" round.

2.05 Valve Schedules

A. Valve Schedules: For each piping system, on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on temperature control drawings), location of valve (room or space), normal-operating position (open, closed, or modulating) and variations for identification. Mark valves for emergency shutoff and similar special uses.

B. Valve-Schedule Frames: Glazed display frame for removable mounting on walls for each page of valve schedule. Include mounting screws.

C. Frame: Extruded aluminum.

D. Glazing: ASTM C 1036, Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.

2.06 Equipment Locators on Ceiling

A. Provide ¼" round colored dot stickers (as available at office supply stores) on ceiling grid

for locating equipment and valves. Adhere stickers to the ceiling grid as close to each piece of equipment as possible. Colors shall be as follows.

1. Zone/Isolation water valves Red

B. Approval shall be obtained from Architect prior to applying dots.

PART 3 EXECUTION

3.01 Equipment Identification

A. Install equipment markers on or near each piece of plumbing equipment.

B. All equipment shall be labeled as directed by the owner or as designated on the drawings if the owner has no other preference.

C. Locate equipment markers where accessible and visible. Include markers for the following general categories of equipment:

1. Main control and operating valves including safety devices.
2. Meters, gauges, thermometers and similar units.
3. Pumps.

D. Install access panel markers with screws on equipment access panels.

3.02 Piping Identification

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

B. All piping shall be labeled as directed by the owner or as designated on the drawings if the owner has no other preference.

C. Locate pipe markers where accessible and visible.

1. Pipes with OD, Including Insulation, Less Than 6”: Pretensioned pipe markers. Use size to ensure a tight fit.
2. Pipes with OD, Including Insulation, 6” and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.

D. Locate pipe markers where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and locations as follows:

1. Near each valve and control device
2. Near each branch connection. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings and non-accessible enclosures.
4. At access doors and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25’ along each run.
7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

3.03 Valve Tags

A. Install tags on valves and control devices in piping systems; valves within factory-fabricated equipment units. List tagged valves in a valve schedule.

End of Section 21 05 53

SECTION 21 11 00 - PIPE AND FITTINGS

PART 1 GENERAL

1.01 Description of Work

A. Provide the pipe and fittings as specified and indicated on the drawings.

1.02 Quality Assurance

A. Welders Qualifications: All welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing. Welders of steam and condensate return piping shall be holders of ASME 'R' and 'PP' or 'S' stamps.

B. Welding procedures and testing shall comply with ANSI Standard B31.1.0 - Standard Code for Pressure Piping, Power Piping, and The American Welding Society, Welding Handbook.

C. Soldering and Brazing procedures shall conform to ANSI B9.1 Standard Safety Code for Mechanical Refrigeration.

D. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

E. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

1.03 Product Description

A. BlazeMaster® CPVC fire sprinkler pipe and fittings are extruded/molded from CPVC compounds
manufactured by Lubrizol Advanced Materials. The pipe and fitting compounds shall meet cell class
23547 and 24447, respectively, as defined by ASTM D1784, and shall be certified by NSF International
for use with potable water. Both pipe and fitting compounds shall be pressure rated by Plastics Pipe Institute (PPI).

B. Acceptable Manufacturers

1. Harvel Plastics, Inc. Kuebler Rd., PO Box 757 Easton, PA 18044.
   Phone (610) 252-7355. FAX (610) 253-4436.
2. IPEX, Inc. 6810 Invader Crescent Mississauga,ON L5T 2B6.
   Phone (905) 670-7676. FAX (905) 670-5295.
3. NIBCO INC. 1516 Middlebury Street Elkhart, IN 46516.
   Phone (574) 295-3000. FAX (574) 295-3307.
4. Tyco Fire Suppression & Building Products 451 N. Cannon Avenue Lansdale, PA 19446.
   Phone (215) 362-0700. FAX (215) 362-5385.
5. The Viking Corporation 210 N. Industrial Park Drive Hastings, MI 49058.
   Phone (269) 945-9501. FAX (269) 945-4495.

PART 2 PRODUCTS

2.01 Above Grade Piping and Fittings

A. Schedule 40 grade, ASTM A-53, black steel pipe shall be used for all Fire Protection main line piping. Victaulic UL listed and FMG approved fittings and couplings shall be used for all joints and fittings. Schedule 10 black steel pipe shall be permitted in lieu of

Schedule 40 steel pipe to meet N.F.P.A. 13 requirements, however joining methods will be strictly limited to Victaulic couplings and fittings. The use of threaded lightwall piping (Allied XL), and the use of lightwall materials, is strictly prohibited.

1. Rigid type couplings shall be fully installed at visual pad-to-pad offset contact. Tongue and recess couplings, or any couplings that require exact gapping of housings on each side of the coupling at specified torques, are not permitted.
   a. 1-1/4" through 4": Factory assembled for direct stab installation without field disassembly. Victaulic Style 009 EZ.
   b. 5" through 8": Victaulic FireLock™ Style 005.
   c. 10" and Larger: Victaulic Zero-Flex® Style 07.
2. Flexible Type: For use in locations where vibration attenuation and stress relief are required, and for seismic applications. Victaulic Style 75 and 77.

2.02 Above Grade Piping and Fittings

A. Pipe shall meet or exceed the requirements of ASTM F442 material designation CPVC 4120-06 in standard dimension ratio (SDR) 13.5 may be used for branch lines on individual floors. Additionally, the pipe must be marked with the following pressure ratings: "320 PSI @ 73° F", "175 PSI @ 150° F" and "100 PSI @ 180° F".

B. Fittings shall meet or exceed the requirements of ASTM F437 (schedule 80 threaded), ASTM F438 (schedule 40 socket) and ASTM F439 (schedule 80 socket).

C. Both pipe and fittings shall be Listed by Underwriters Laboratories for use in wet automatic fire sprinkler systems and shall bear the logo of the Listing Agency. See UL Fire Protection Equipment Directory, categories VIWT and HFYH.

D. Ancillary products coming into contact with pipe and fittings must be chemically compatible as determined by CPVC pipe and fittings manufacturer or compound manufacturer, and thus Listed on pipe, fittings or compound manufacturer's chemical compatibility program(i.e. FGG/BM/CZ™ System Compatible Program).

E. All socket type joints shall be made up employing solvent cements that meet or exceed the requirements of ASTM F493. The standard practice for safe handling of solvent cements shall be in accordance with ASTM F402. Solvent cement shall be listed by NSF International for use with potable water, and approved by the manufacturers. The solvent cements shall be compatible with their CPVC pipe and fittings.

F. Follow manufacturer's instructions for set and cure times for solvent cement joints. Avoid significant stresses during set and cure times. Do not apply any stress that will disturb an un-dried joint. Sprinkler fittings shall be allowed to cure in accordance with the manufacturer's guidelines and the contractor shall assure the outlets are clear of any excess cement prior to installing sprinklers.

G. CPVC pipe and fittings shall be listed by UL and also either rULC or C-UL for use in:

1. Light Hazard Occupancies as defined by NFPA 13.
2. Ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed
   400 ft., per section 6.3.6.2 of NFPA 13, 2007 Edition.
3. Residential Occupancies up to four stories in height as defined by NFPA 13R.
4. One and two family dwellings and manufactured homes as defined by NFPA 13D.
5. Air handling (plenum) spaces as defined by NFPA 90A.
6. Maximum design temperature/pressure rating shall not be less than175 psi at 150°F.
7. Refer to UL and FM** (if applicable).
8. Refer to CPVC pipe and fitting manufacturers' installation instructions.

PART 3 EXECUTION

3.01 Fire Protection Piping

A. Piping systems shall incorporate all necessary facilities for testing and draining the system. Provide auxiliary system drains for portions of the system that are trapped. System test drain shall be installed at an accessible location and shall discharge onto grade.

B. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs. Sprinkler Bulb protector must remain in place until the sprinkler is completely installed. Remove the bulb protector by hand after installation and before the system is placed in service. (Do not use any tools to remove the bulb protector.)

C. Fire protection piping shall all be tested in accordance with NFPA and UBC requirements

D. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be of an elastomer grade suitable for the intended service, and shall be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation. (A distributor's representative is not considered qualified to conduct the training or jobsite visit(s).)

3.02 Exposed and Concealed Piping

A. All piping shall be concealed in walls, below floors, or above ceilings unless indicated otherwise or shown running through areas with exposed structure. All pipe shall be installed parallel or perpendicular to building surfaces.

3.03 CPVC Installer Qualifications

A. Contractor Training Certificates for Chlorinated Polyvinyl Chloride (CPVC) Fire Sprinkler Systems. Fire
Sprinkler Contractor must submit to the Engineer documentation that lists personnel assigned
to this project prior to beginning construction who have successfully completed formal CPVC fire

sprinkler systems training conducted by an authorized CPVC manufacturer's representative. The Contractor Training Certificates shall be specific to the manufacturer of the pipe and fittings. Personnel's training certificates must be current and have been updated within the past two (2) years. (Note: this training does not imply compliance with any local or state contractor certification or licensing laws.)

End of Section 21 11 00

SECTION 21 12 00 - STANDPIPE SYSTEM

PART 1 GENERAL

1.01 Standpipe Systems

A. Provide the dry standpipe or wet standpipe systems in the building stair enclosures as indicated on the drawings and as required by NFPA-14. Refer to section 21 11 00 for pipe and fitting.

B. The piping indicated on the plans are schematic in nature and are provided mainly for coordination purposes. The actual design and final valve placement shall be determined by the Fire Protection Engineer designing the system.

1.02 Approved Manufacturers

A. The basis for this specification is Fire End and Croker and shall represent the minimum level of construction. Equipment manufactured by Tyco/Grinnell shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Wet Standpipe Components

A. Provide the Class III wet standpipe system as indicated and specified. System shall contain, but not be limited to, all piping, valves, test lines, drains, and etc., as shown or required by NFPA-14 for a complete system.

B. Provide a wall mounted, polished brass Fire Department connection, equal to Fire End and Croker No. 6010, 2-way clapper, 4" x (2) 2-1/2", where indicated on the Drawings for each of the 4 risers, with hose threads complying with local Fire Department Standards. Installation shall include check valve and ball drip assembly, pipe to drain or discharge onto grade. Connection shall be labeled "Standpipe and Sprinkler Zone *".

C. Roof manifold shall be Fire End and Croker Model 6870, cast brass, 4 x 2 1/2 x 2 1/2 x 2 1/2 complete with Hose valve shall be Fire End and Croker Model 5015, 300 lbs. cast brass angle hose valve with polished brass finish and red iron wheel handle. Provide with #5713 cap and chain.

D. Hose valve shall be Fire End and Croker Model 5015, 300 lbs. cast brass angle hose valve with polished brass finish and red iron wheel handle. Provide with #5713 cap and chain.

E. Provide pressure reducing valves for the lower three pressure zones complete with high pressure alarm, upstream and downstream pressure gauges, maintenance isolation valves, and pressure relief valve. Valves shall be UL/FM approved for fire protection use

F. All control valves in the sprinkler system shall be provided with supervisory switches. Switches will alarm when a valve is not in its normal operating position.

G. Provide water flow alarm apparatus for the system. Alarm device shall be a listed alarm check valve with all necessary attachments required to give an alarm. Flow alarm devices shall be installed per NFPA requirements.

H. Provide flow switches as indicated on the drawings and as required by NFPA.

PART 3 EXECUTION

3.01 Design and Installation

A. Design and install a standpipe system for fire protection. All elements and components

of the system shall be in compliance with NFPA Pamphlet 14 "Standard for the Installation of Standpipe and Hose Systems". Components shall be listed in current Underwriters Laboratories "Fire Protection Equipment List". Final acceptance shall be based on submission of test certificates, and completion of all regulatory body recommendations submitted following their final inspection.

B. Submittals shall be provided showing detailed fire protection drawings and hydraulic calculations per NFPA-14 requirements including complete standpipe system layout drawings with hydraulic calculation reference points and area of application indicated.

C. The systems shall be designed and installed by a licensed Sprinkler Contractor in full accordance with NFPA and all codes and standards. Shop drawings, layout and design shall be approved by the Local Authority Having Jurisdiction and the Engineer prior to installation.

End of Section 21 12 00

SECTION 21 13 00 - WET SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 Sprinkler System

A. Provide an automatic sprinkler system in the building as indicated on the drawings. Refer to section 21 11 00 for pipe and fitting.

B. The piping indicated on the plans are schematic in nature and are provided mainly for coordination purposes. The actual design and final head placement shall be determined by the fire protection engineer designing the system.

PART 2 - PRODUCTS

2.01 Sprinkler Components

A. Provide sprinkler system as indicated. System shall contain, but not be limited to, all piping, valves, test lines, drains, and etc., as shown or required by NFPA-13 for a complete system.

B. Heads shall be Central Sprinkler as listed below. Equivalent sprinkler heads by Viking, Star, Grinnell or Reliable are acceptable for the heads specified. Head temperature ratings shall be 165°F unless otherwise specified. Sprinkler heads in elevator shafts and machine rooms shall be 212° F temperature activated.

1. Upright Sprinklers: Central Sprinkler Model GBQR upright automatic sprinkler, rough bronze finish
2. Upright Sprinklers with Shields: Central Sprinkler Model GBQR with WSG-2 Guard and Assembly, upright automatic sprinkler, rough bronze finish
3. Semi-Recessed Pendants: Central Sprinkler Model GBQR recessed automatic sprinkler, flat white finish, adjustable 2-piece escutcheon
4. Fully Recessed Sprinklers: Central Sprinkler Model GB4-FR (concealed) adjustable flush-concealed auto sprinkler, cover plate with flat white finish.
5. Side Wall Sprinklers: Central Sprinkler Model GB Sidewall, flat white finish

D. Sprinkler heads in areas with sheet rock ceilings shall be fully recessed head type.

E. Sprinkler heads in lay-in ceilings shall centered within the ceiling tiles with a tolerance of +/- 2 inches.

F. All control valves in the sprinkler system shall be provided with supervisory switches. Switches will alarm when a valve is not in its normal operating position.

G. Provide water flow alarm apparatus for the system. Alarm device shall be a listed alarm check valve with all necessary attachments required to give an alarm. Flow alarm devices shall be installed per NFPA requirements.

H. Provide flow switches as indicated on the drawings and as required by NFPA.

I. At the Contractors option, sprinkler system final connections may be FlexHead Industries Inc. flexible piping connections. The flexible connection shall include a fully welded, braided and leak tested connector with a one-piece ceiling bracket,

attachment hub and self-securing integrated ceiling grid mounting bracket. The flexible piping system shall be UL listed and FM approved suitable for their intended use.

PART 3 - EXECUTION

3.01 Design and Installation

A. Design and install a complete automatic sprinkler system for fire protection. All elements and components of the system shall be in compliance with NFPA Pamphlet 13, "Standard for the Installation of Sprinkler Systems". Components shall be listed in current Underwriters Laboratories "Fire Protection Equipment List". Final acceptance shall be based on submission of test certificates, and completion of all regulatory body recommendations submitted following their final inspection.

B. Sprinkler head spacing, pipe sizing and flow calculations shall be hydraulically calculated. Design criteria shall be as follows:

1. For **Light Hazard**, provide a water density of 0.1 GPM per square foot over the most hydraulically remote 1500 square feet. Light hazard shall be installed in all areas of the building except mechanical rooms, storage rooms, and janitor’s closets or others required by NFPA 13.
2. For **Ordinary Hazard Group I**, provide a water density of 0.15 GPM per square foot over the most hydraulically remote 1500 square feet. Ordinary hazard, group I includes the following area types: mechanical rooms, storage rooms, janitor closets, restaurant Service areas (Kitchens), Automotive Show rooms/parking areas and as listed in NFPA 13.
3. For **Ordinary Hazard Group II**, provide a water density of 0.2 GPM per square foot over the most hydraulically remote 1500 square feet. Ordinary hazard, group II includes Mercantile, Library stack rooms up to 12’ in height, manufacturing areas, repair garages, machine shops and as listed in NFPA 13.
4. For **Extra Hazard Group I** provide a water density of 0.3 GPM per square foot over the most hydraulically remote 2500 square feet. Refer to NFPA for occupancy area requirements.
5. For **Extra Hazard Group II** provide a water density of 0.4 GPM per square foot over the most hydraulically remote 2500 square feet. Refer to NFPA for occupancy area requirements.
6. For **Residential Areas** per NFPA 13R and head manufacturers design requirements.

C. Size sprinkler piping by hydraulic calculations in accordance with NFPA Standard 13, Chapter 7. Hydraulic calculations shall include inside and outside hose requirements. Hose requirements shall be inserted at the locations in the system per NFPA. Pipe sizing shall provide an allowance of 10 psig in excess of base requirements. Head locations shall conform to the spacing shown on the Mechanical Drawings, Architectural Drawings, the Architectural Details, and elsewhere as required to provide a fully sprinklered building.

D. Orifice size, "K" factor, temperature rating, and model identification of installed heads shall be identical to system hydraulic calculation design data. Provide the final design and layout and hydraulic calculations required for the approval of the fire protection systems in accordance with requirements of the insurance interest

having jurisdiction, state and local codes. Velocity pressure shall not be considered in the hydraulic calculations.

E. Submittals shall be provided showing detailed fire protection drawings and hydraulic calculations per NFPA-13 requirements including complete sprinkler system layout drawings with hydraulic calculation reference points and area of application indicated.

F. Sprinklers shall be shown on drawings and submittals and shall be specifically identified with the applicable style or series designation as published in the appropriate agency listing or approval. Trade names or other abbreviated designations are not permitted.

G. The systems shall be designed and installed by a licensed Sprinkler Contractor in full accordance with NFPA and all codes and standards. Shop drawings, layout and design shall be approved by the Local Authority Having Jurisdiction and the Engineer prior to installation.

End of Section 21 13 00

SECTION 21 31 00 – CENTRIFUGAL FIRE PUMPS

PART 1 GENERAL

1.01 Description of Work

A. Provide the fire pump(s) as specified and shown on the drawings.

1.02 Approved Manufacturers

A. The basis for the equipment in this specification is Aurora and shall represent the minimum level of construction. Equipment from alternate manufacturers shall be permitted to bid these specifications

1.03 Shop Drawings

A. Shop drawings shall be submitted as specified in Division 1.

B. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Dimensional drawings showing layout, connection points, and detailed layout of components.
4. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.

PART 2 PRODUCTS

2.01 Centrifugal Fire Pump

A. Furnish and install where shown on plans Aurora Fire Pump System(s) complete with pump, driver, controller and accessories. The pumping unit shall be listed by Underwriters' Laboratories, Inc. and/or shall be fully approved by the Associated Factory Mutual Fire Insurance Companies, where applicable. The pumping unit shall meet all requirements of the National Fire Protection Association Pamphlet No.20.

B. The Fire Pump shall be designed to deliver 1000 G.P.M. when operating at 225 PSIG. The pump shall also deliver not less than 150% of rated capacity at a pressure not less than 65% of rated pressure. The shut off pressure shall not exceed 140% of rated pressure. Suction pressure is 50 PSIG. The pump shall operate at a maximum synchronous speed of 3500 R.P.M.

C. The Fire Pump shall be (one of the following):

1. AURORA MODEL 485 HORIZONTAL BASE MOUNTED: horizontal split case, bronze fitted, TWO STAGE, single suction centrifugal pump.

- The driver shall be a horizontal, foot mounted, open drip-proof (or T.E.F.C.), ball bearing type, AC, induction, squirrel cage motor: wound for 480volts, 3 phase, 60 Hertz. The motor shall be of such capacity that 115% of the full-load ampere rating shall not be exceeded at any condition of pump load. Locked rotor current shall not exceed the values specified in NFPA Pamphlet No.20.
- Pump and motor shall be mounted on a common baseplate of steel (or

optional with drip rim). Pump and motor shall be checked for alignment after the pump base has been installed and grouted in place.

D. Casings shall be of cast iron having a minimum tensile strength of 35,000 P.S.I. Bearing housing supports, and suction and discharge flanges shall be integrally cast with the lower half of the casing. Removal of the upper half of the casing must allow the rotating element to be removed without disconnecting the suction and discharge flanges.

E. Impellers shall be of the enclosed type and shall be of vacuum cast bronze. Impellers shall be dynamically balanced, keyed to the shaft, and held in place with threaded shaft sleeves.

F The pump shaft shall be made of SAE 1045 Steel or equal, accurately machined to give a true running rotating element. Shaft shall be protected by bronze sleeves which are key locked and threaded so that the sleeves tighten with the rotation of the shaft. An o-ring shall seal between the impeller hub and the shaft sleeve to protect the pump shaft.

G. Pump shall be equipped with renewable bronze casing rings so designed that hydraulic pressure will seat them against a shoulder in the pump case around the full periphery of the wearing ring. The wearing rings will be locked by dowelling to prevent rotation. The rotating element uses heavy duty grease lubricated ball bearings and shall be equipped with water slingers. Bearing housings shall be so designed to flush lubricant through the bearing.

H. All pumps where the suction pressure is expected to average 40 P.S.I. or below, shall be provided with a lantern ring connected to the pressure side of the pump by a cored passage in the parting flange of the pump. Stuffing boxes shall be equipped with split bronze packing glands designed for easy removal for packing inspection and maintenance.

I. The fire pump unit shall include the following accessories, as required by NFPA standards (depending on the conditions under which the pumps are to be installed).

a. Flow metering device
b. Eccentric tapered suction reducer
c. Concentric tapered discharge increaser
d. Discharge tee
e. Base elbow
f. Hose valves
g. Caps and chains
h. Hose valve header
i. Blind flange
j. Pressure gauges
k. Main relief valve (mandatory for engine drives)
l. Circulation relief valve
m. Relief cone - enclosed (mandatory for engine drives)
n. Automatic air release valve
o. Splash shield (electric drive only)
p. Balldrip valve
q. Coupling guard

2.01.1 Fire Pump Controller

A. The Fire Pump motor control shall be U .L. Listed and/ or F.M. Approved, where

applicable. It shall be completely assembled, wired and tested by the control manufacturer before shipment from the factory, and shall be labeled "Fire Pump Controller." The controller shall be located as close as practical and within sight of the motor. The controller shall be so located or protected that it will not be injured by water escaping from the pump or connections. The controller shall be of the combined manual and automatic, wye delta type, and shall be complete with:

1. Disconnect switch - externally operable, quick-break type.
2. Circuit breaker - time delay type with trips in all phases set for 300% of the motor full-load current. The interrupting capacity of circuit breaker shall be 65K asymmetrical amperes.
3. Motor starter – wye-delta type capable of being energized automatically through the pressure switch or manually by means of an externally operable handle.
4. Pressure switch set to cut in and out at the designed pressures.
5. Running period timer - set to keep motor in operation, when started automatically, for a minimum period of one minute for each 10 HP motor rating, but not to exceed 7 minutes.
6. Pilot lamp - to indicate circuit breaker closed and power available.
7. Ammeter test link and voltmeter test studs.
8. Alarm relay - to energize an audible or visible alarm through an independent source of power to indicate circuit breaker open or power failure.
9. Manual selection station - a two position station shall be provided on the enclosure marked " Automatic" and "Non-automatic."
10. Means shall be provided on the Controller to operate an alarm signal continuously while the pump is running.

B. Control equipment shall meet all requirements of NFPA No.20.

PART 3 - EXECUTION

3.01 Testing

A. The pump and electric motor (or engine) shall be thoroughly shop-tested by the respective manufacturers as required by NFPA Pamphlet No.20. The control panel shall also be tested as a unit. All such tests shall be conducted prior to shipment.

B. The pump, driver, controller and all accessories shall be purchased under a unit contract. The pump shall be given a complete performance test with POSITIVE SUCTION PRESSURE. A certified performance curve shall be prepared and submitted. Pumps shall also be hydrostatically tested to twice the shut off pressure, but in no case less than 250 lbs. per sq. inch.

C. In the case of diesel drives, the pump manufacturer shall perform a second pump operational test as a unit with the job engine. Test data shall be furnished.

D. The pump manufacturer shall assume unit responsibility and shall provide the services a factory trained representative to supervise and/or be available to conduct final field acceptance tests.

End of Section 21 31 00

SECTION 22 01 00 - GENERAL PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 Related Documents

A. The drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements (Division 1) and Section 26 01 13 - Electrical Connections, apply to the work specified in DIVISION 22 – PLUMBING

1.02 Description of Work

A. The plumbing contract includes all labor, materials and equipment required for the complete plumbing systems as shown and herein specified.

B. Provide all devices and accessories as necessary for complete and working systems.

C. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.

1.03 Quality Assurance

A. Each major component of equipment shall have the manufacturer's name; address, model number and rating on a nameplate securely affixed.

B. All equipment of one type (such as fixtures, pumps, valves, etc.) shall be the products of one manufacturer, unless otherwise specified.

C. In the event of discrepancies between the drawings and specifications, the contractor shall advise the engineer before proceeding with the work in order that correct progress is ensued.

D. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel." Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.04 Shop Drawings and Submittals

A. Shop drawings shall be submitted as specified in Division 1. Product data shall be submitted for all materials and equipment specified in DIVISION 23

B. Shop drawings for equipment ‘Packages” shall be complete and include all items to be provided by a manufacturer’s representative or supply house. No partial submittals will be reviewed or approved without a complete and total equipment submittal.

C. Each shop drawing shall include a letter indicating all deviations from the drawings and/or specifications.

D. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, RPM, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Dimensional drawings showing layout, connection points, and detailed layout of components.
4. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.
5. Conspicuously mark on each submittal the exact model, fittings, accessories, and devices to be supplied. When a schedule is shown on the drawings or in the

specifications, provide a copy of that schedule with the shop drawing indicating the equipment capacities and characteristics of the actual equipment being proposed.

6. Tags for equipment submitted shall match the tags indicated on the design drawings or specifications. Where equipment is noted on the drawings and not scheduled, refer to plan note and sheet number on the submittal.

E. Contractor shall check all shop drawings to verify that they meet the requirements of the drawings and specifications before forwarding to the architect and engineer. All shop drawings submitted shall bear the stamp of the contractor to show that they have been reviewed in detail.

F. No work shall be fabricated, and no equipment ordered, until the architect and engineer have returned acceptable reviewed shop drawings.

G. Welder certificates, signed by Contractor, certifying that welders comply with requirements specified under "Quality Assurance" article of this section.

1.05 Project Sequencing

A. The contractor shall refer to the architectural plans and specifications for areas of work and general schedules to determine the scope of work required during each phase of the construction.

B. All temporary valves, dampers, etc. not indicated, but required by phasing, shall be included in the base bid.

1.06 Substitutions

A. The materials, products, and equipment described in these specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. Listing of these manufacturers shall in no way be construed as a device intended to limit the bidders to those specifically listed.

B. Reference to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number, shall be interpreted as having established a standard of quality and shall not be construed as limiting competition. Articles, fixtures, etc. of equal quality by manufacturers listed in this specification for the applicable use, shall be acceptable, subject to performance, spatial, structural, and electrical constraints of the project design.

C. No substitution will be considered unless written request for approval has been received by the engineer at least ten working days prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and complete description of the proposed substitute including shop drawings, performance and test data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment, or work that incorporation of the proposed substitute would require, shall be included. The burden of proof of the merit of the proposed substitute is on the proposer. The engineer's approval or disapproval of a proposed substitution shall be final.

D. Approval of a proposed substitution prior to receipt of bids shall be set forth in an Addendum. Approvals made in any other manner shall not be considered binding.

E. The Engineer reserves last opinion as to a product’s equality or superiority to that specified.

1.07 Definitions

A. Furnish: The term “furnish” is used to mean “supply and deliver to the project site, ready

for unloading, unpacking, assembly, installation and similar operations."

B. Install: The term "install" is used to describe operations at the project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."

C. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."

D. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including all items incidental to the Work, including all services necessary for proper installation and operation. The Installation shall be included under the guarantee required by this Division.

E. The design engineer, referred to as "engineer" shall mean the engineering firm, HOSS & BROWN ENGINEERS, INC., Contact person: Casey Steiner.

1.08 Record Drawings

A. During the progress of the work of this section, this Contractor shall maintain an accurate record of all changes made in the installation of the system(s). Upon completion of the work, accurately transfer all record information to an unmarked full-size set with neatly handwritten or typed notes. Scan full-size drawings to PDF at 300 dpi.

1.09 Operation and Maintenance Manuals

A. Three (3) Flash Drives containing PDFs of Operation and Maintenance (O&M) Manuals shall be submitted as described below. Files and folder names shall be clearly labeled. Folder structure and names shall be intuitive and clearly labeled.

B. Before project close-out, submit O&M operating, maintenance instructions, and parts lists for equipment provided. Include in the manual a list of emergency service organizations capable of rendering service for each piece of equipment. Include in the manual a set of as-built prints.

C. Keep in a safe place all keys, wrenches, and other specialty tools furnished with equipment. Present to owner at project close-out and receive a receipt showing he has received the same.

D. At the completion of the project furnish to the Architect for the Owner O&M brochures divided and tabbed, containing all data, diagrams, as-built plans, capacities, spare part numbers, manufacturers service and maintenance data, warranties, guarantees, etc., including local contacts and escalation schedule complete with addresses and telephone numbers, of all equipment, apparatus, and system components furnished and installed under this Division of the specifications.

1.10 Codes and Ordinances

A. All work shall be in accordance with applicable codes, rules, ordinances, and regulations of local, state, and federal governments and other authorities having jurisdiction.

B. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.

C. The contractors shall secure and pay for the necessary permits and certificates of inspection for their trade. Keep record of all permits and inspections and submit two copies to the engineer with request for final inspection.

1.11 Owner Training

A. When training is required by any section of these specifications, all training sessions shall be recorded on a single DVD. Provide two copies of the DVD at the end of construction. The contractor shall prepare a letter of receipt to be signed by the owner when the tapes are delivered.

1.12 Warranty

A. This contractor shall warrant that the complete systems installed under this contract shall be free of defects in workmanship and materials for a period of one (1) year from the date of substantial completion by the arch/owner.

B. If defects occur during the one year guarantee period, this contractor shall repair or replace such defects at no expense to the owner and to the satisfaction of the owner and engineer.

PART 2 PRODUCTS

2.01 General

A. Where the quality of required material is not specified, the Contractor shall furnish a first class standard item as approved by the Architect/Engineer.

B. Capacities of equipment and materials shall not be less than those indicated.

C. All work performed shall provide a neat and workmanlike appearance when completed, to the satisfaction of the engineer.

D. Provide 3 ½" concrete base for all floor mounted equipment unless shown or noted otherwise. Provide 6x6 welded wire fabric reinforcing minimum or as required by the structural engineer.

E. Adequately protect equipment from damage after delivery to the jobsite. Cover with heavy polyethylene plastic. Elevate equipment when there is danger of water damage. Equipment damaged will be rejected.

F. Any scratches to factory finishes shall be touched up using factory supplied paint before final acceptance. If extensive damage to factory finishes has occurred, equipment panels shall be replaced to the satisfaction of the engineer. If rust has formed, remove as recommended by the manufacturer prior to touch-up.

2.02 Equal Products of Listed Manufacturers

A. In general, the specifications and drawings identify required materials and equipment by naming first the manufacturer whose product was used for the basis of design. The manufacturer's product, series, model, catalog, and/or identification numbers shall set quality, construction and dimensional requirements for comparing the other manufacturer's products. The capacity and performance of all equipment shall meet or exceed what is indicated on the drawings and/or scheduled.

B. Where other manufacturer's names are listed, they are considered an acceptable manufacturer for the product specified; however, the listing of their names implies no prior approval of any product unless specific model or catalog numbers have been shown.

C. Where other than first named products are used, it shall be the responsibility of the contractor to determine prior to bid time that his proposed materials and equipment selections do not require adjustments in the Plumbing, electrical , structural, or architectural requirements as shown on the drawings. The contractor shall include in his bid all costs associated with any required adjustments.

PART 3 EXECUTION

3.01 Installation

A. Install all equipment in strict accordance with the manufacturer's recommendations and the shop drawings reviewed by the Engineer.

B. The complete installation shall function as designed and intended with respect to efficiency, capacity, and noise level, etc. Any abnormal noise caused by rattling equipment, piping, ducts, conduit, air devices, or squeaks in rotating equipment will not be acceptable

C. Locations of equipment, piping, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.

D. Any item interfering with proper placement of other work shall be removed and relocated without extra cost if reasonable coordination would have eliminated the interference. Damage to other work caused by this contractor shall be restored as specified for new work.

E. Written dimensions are preferred over scaled dimensions. When written dimensions are not available, the contractor shall be responsible for determining the proper installed location.

F. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus, and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification.

G. Contractor shall perform initial start-up of systems and shall provide necessary supervision and labor to make the first seasonal change-over of systems requiring same. Owner’s operating personnel shall be present during this operation.

H. It is the contractor’s responsibility to provide materials and trim which properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.

I. This contractor shall provide all miscellaneous steel, etc., for the proper installation of the systems specified and/or indicated on the plans.

3.02 Connections to Building Structure

A. Any item connecting to building structure shall be done in a manner accepted by the structural engineer.

B. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.

3.03 Cleaning

A. Periodically during construction and prior to Owner acceptance of the building, Contractor shall remove from the premises and dispose of all packing material and debris.

3.04 Visit to the Site

A. Before submitting his bid, the Contractor shall visit the location of the job and shall fully understand the scope of the work to be done and the conditions under which it is to be performed. In no case shall additional compensation be granted when existing conditions could reasonably be determined.

3.05 Existing Utilities

A. Should any existing utilities be damaged or disrupted, immediately notify Owner and repair to existing conditions.

B. The Contractor shall closely coordinate all utility downtime with the Owner and Architect giving a minimum fourteen (14) day notice prior to downtime.

C. Downtimes are to be held to a minimum duration with the Owner being notified as to the extent of said downtime.

End of Section 22 01 00

SECTION 22 05 13 - ELECTRICAL PROVISIONS OF PLUMBING WORK

PART 1 GENERAL

1.01 Description of Work

A. The contractors responsible for Division 22 work shall coordinate with the Electrical Contractor to insure electrical and controls of the proper size are furnished. Further, the Plumbing Contractor shall furnish all electric control items indicated to the Electrical Contractor for installation and connection, unless noted otherwise.

B. Refer to Section 26 01 13 - ELECTRICAL CONNECTIONS for required electrical connections.

PART 2 PRODUCTS

2.01 Motor Starters

A. The Electrical Contractor shall provide all motor starters required for equipment provided in the Plumbing contract that is not integral with equipment.

PART 3 EXECUTION

3.01 Motor Starters

A. The Plumbing Contractor shall coordinate all motor starters type and size with the Electrical Contractor to insure compatibility with the motors provided in this contract.

ITEM	Furnished By	Set By	Power Wiring	Control Wiring
Pumps	PC	PC	EC	EC
Loose motor starters, disconnect switches, thermal overloads and heaters.	EC	EC	EC	EC
Aquastats	PC	PC	EC	EC

PC = Plumbing Contractor
EC = Electrical Contractor

End of Section 22 05 13

SECTION 22 05 15 - PLUMBING RELATED WORK

PART 1 GENERAL

1.01 Description of Work

A. The following is the work required by the General Contractor to facilitate the work of the Plumbimg Contractor.

1. Openings and chases.

B. The following is the work required by the Plumbing Contractor to facilitate the work of his Contract.

1. Cutting and patching.
2. Excavation and backfilling.
3. Pipe sleeves.

1.02 Related Documents

A. Refer to Division 2 for backfilling requirements.

B. Unless otherwise addressed in the specification, as a minimum, backfill in 6” lifts, compacting to a minimum of 90%. The first 12” of fill above any buried item outside the building shall be sand in order to contrast with other fill material. Provide a yellow warning tape at the top of the sand layer.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 General Contractor's Work

A. The General Contractor shall leave such openings and chases in new construction for pipes, cabinets, access doors, and equipment as may be necessary or directed by the Architect to facilitate the work of the Plumbing Contractor and to refinish around same. The Plumbing Contractor shall properly advise in due time as to the location and sizes of such openings and chases.

3.02 Plumbing Contractor's Work

A. The Plumbing Contractor shall be responsible for locating and setting his own pipe sleeves, and be well aware of the job progress to avoid unnecessary delay for setting of same.

B. The Plumbing Contractor shall be responsible for cutting his own holes in existing construction and for patching and finishing around same, unless noted otherwise, to the satisfaction of the Architect. Any holes left in walls when existing pipe is removed by this Contractor shall be patched and finished by this Contractor.

C. The Plumbing Contractor shall do all excavating and backfilling necessary to complete work under this contract. Lines shall be used to lay out the trenches for underground work. Trenches shall be of sufficient width and shall be cribbed or braced to prevent cave-in or settlement. Trenches close to walls and columns of the building shall not be excavated without the Architect's prior consent. The bottoms of trenches shall be tamped hard and graded to secure the required fall before laying pipe. Bell holes shall be excavated so the pipe will rest on solid ground for its entire length.

D. Hand backfill and tamp backfill into place at sides of pipes, leaving tops and joints exposed until pipe runs have been tested and approved.

E. All sidewalks, streets, or alley surfaces that have to be broken in connection with this contract shall be patched to the satisfaction of the Architect.

End of Section 22 05 15

SECTION 22 05 16 - EXPANSION COMPENSATORS

PART 1 GENERAL

1.01 Description of Work

A. Provide expansion compensators as specified and as indicated on the drawings.

B. Provide flexible pipe expansion compensators with guides as per manufacturer's recommendations. Bellows-type and slip type compensators are not acceptable.

1.02 Approved Manufacturers

A. The basis for this specification is Metraflex and shall represent the minimum level of construction.

PART 2 PRODUCTS

2.01 Expansion Joints

A. Provide Metraflex, "Metraloops", or approved equal, flexible loop type compensators constructed of two flexible sections of hose and braid, two 90° elbows and one 180° return bend.

B. Expansion compensators shall impart minimal thrust loads to anchors and shall be installed in a neutral, pre-compressed or pre-extended condition as required by installation temperatures.

C. Compensators shall be guided to direct movement into the Metraloop. One guide will be required within four pipe diameters on either side of the compensator.

D. The compensator shall be supported at the 180° turn bend installed in the horizontal plane. No support is required if installed in the vertical plane.

E. The compensators in copper lines shall be bronze hose and braid with copper sweat ends:

LINES	SERIES
1/2" to 4"	MLS rated for 4" movement (MLG may be substituted for larger lines)

PART 3 EXECUTION

3.01 Installation

A. Each compensator shall be installed in strict compliance with manufacturer's recommendations.

End of Section 22 05 16

SECTION 22 05 17 - FIRESTOPPING FOR PLUMBING SYSTEMS

PART 1 GENERAL

1.01 Related Documents

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 Definitions

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 General Description of the Work of this Section

A. Only tested firestop systems shall be used in specific locations as follows:

1. Penetrations for the passage of piping and other Plumbing equipment through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
2. Repetitive plumbing penetrations in fire-rated floor assemblies. Penetrations for the installation of tubs, showers, aerators and other plumbing fixtures.

1.04 References

A. Test Requirements: ASTM E-814-02, "Standard Method of Fire Tests of Through Penetration Fire Stops"

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 (August 24, 2000) and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually. The UL Fire Resistance Directory includes the following:

1. Firestop Devices (XHJI)
2. Fire Resistance Ratings (BXUV)
3. Through-Penetration Firestop Systems (XHEZ)
4. Fill, Voids, or Cavity Material (XHHW)
5. Forming Materials (XHKU)

C. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

D. Inspection Requirements: ASTM E 2174 – 01, “Standard Practice for On-site Inspection of Installed Fire Stops.”

E. ASTM E-84-01, “Standard Test Method for Surface Burning Characteristics of Building Materials.”

F. All major building codes: ICBO, SBCCI, BOCA, and IBC.

G. NFPA 101 - Life Safety Code

1.05 Quality Assurance

A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop system installation must meet requirements of ASTM E-814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.

1.06 Submittals

A. Submit Product Data: Manufacturer’s specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's UL approved installation instructions.

B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor’s name who will install firestop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to job-site.

1.07 Installer Qualifications

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A manufacturer’s willingness to sell its firestopping products to the Contractor or to an Installer engauged by the Contractor does not in itself confer qualification on the buyer.

1.08 Delivery, Storage, and Handling

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.09 Project Conditions

A. Do not use materials that contain flammable solvents.

B. Scheduling

1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 PRODUCTS

2.01 Firestopping, General

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.02 Acceptable Manufacturers

A. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma, Phone 800-879-8000
2. 3M Fire Barrier Products.

2.03 Materials

A. Use only firestop products that have been UL 1479, ASTM E-814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices are installed prior to concrete placement for use with non-combustible and combustible plastic pipe penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device: Add Aerator adaptor when used in conjunction with aerator (“sovent”) system.
2. Hilti CP 681 Tub Box Kit for use with tub installations.

C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe and copper pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 604 Self-leveling Firestop Sealant
3. Hilti CP 620 Fire Foam
4. Hilti CP 606 Flexible Firestop Sealant
5. Hilti CP 601s Elastomeric Firestop Sealant

D. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, and plastic pipe the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant

E. Firestop collar or wrap devices attached to assembly around combustible plastic pipe, the following products are acceptable:

1. Hilti CP 642 Firestop Collar

2. Hilti CP 643 Firestop Collar
3. Hilti CP 645 Wrap Strips

F. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

PART 3 EXECUTION

3.01 Preparation

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Coordination

A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.03 Installation

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration joint materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
2. Protect materials from damage on surfaces subjected to traffic.

3.04 Field Quality Controls

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.05 Adjusting and Cleaning

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

End of Section 22 05 17

SECTION 22 05 23 - PIPING SPECIALTIES AND VALVES

PART 1 GENERAL

1.01 Description of Work

A. Valves shall be installed at locations shown and specified; the locations shall be accessible. All valves shall be installed with their stems or spindles horizontal or above.

B. Provide unions or grooved Plumbing couplings where shown at all equipment connections and at other points where disconnection of piping will be required.

C. Strainers shall be provided at locations shown.

1.02 Approved Manufacturers

A. The basis for the valve specification is Nibco and MEPCO and shall represent the minimum level of construction. Equipment manufactured by NVent, Apollo, Milwaukee, Wheatley, and Victaulic shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Valves

A. Bronze or brass ball valves rated at 150 PSI SWP and 600 PSI WOG, shall have two or three piece stainless steel, cast bronze, or brass bodies with TFE seats, stainless steel full port ball, separate packing nut with adjustable stem packing, and anti-blowout stem. Valves ends shall have full depth ANSI, Vic-Press™, or extended solder connections, and manufactured to comply with MSS-SP 110, shall be used in 3" and smaller copper and steel lines for domestic water duties. NVent PL-200, Victaulic Series 569, NIBCO T585-70-66, Jomar T/S 100-SS-n in uninsulated applications and NIBCO T585-70-66-EL in insulated lines. Victaulic Series 726 when using grooved end valves.

B. Butterfly valves rated 300 PSI working pressure, grooved end or lug style, ductile iron body with 2” extended neck for insulation, and 10 position lever shall be used in 4" and larger copper and steel lines for all domestic water duties. Valves to have electrode-less nickel coated ductile iron or aluminum bronze disc with pressure responsive EPDM synthetic rubber seat, 400 series stainless steel stem and shall not have exposed stem to disc fasteners. (Stem shall be offset from the disc centerline to provide full 360-degree circumferential seating.) Valves to be rated at full pressure rating for dead end bi-directional service. Valves to be manufactured in compliance with MSS-SP 67. Provide with isolating flanges when used in copper lines. NIBCO LD2000-3 (4” thru 6”), NIBCO LD 2000-5 (8” thru 12”), and Victaulic Vic-300 MasterSeal™ when using grooved end valves through 12”. Victaulic Series W706 shall be used for grooved end piping systems 14” through 24”. Jomar 600 series for lug type and Jomar 900 series for wafer type.

C. Y-pattern swing-type check valve manufactured in accordance with MSS-SP 80, Class 150 PSI B62 cast bronze body shall be used in 2 1/2" and smaller lines for domestic water duties. NIBCO T-433Y, Jomar T/S 511. Victaulic Series 712 when using grooved end valves.

D. Swing-type check valve manufactured in accordance with with MSS-SP 71, class 125, grooved ASTM A536 ductile iron or flanged ASTM A126 class B cast iron body with bronze trim or wafer-style with stainless steel spring, bronze disc plates, rubber seat and cast iron body, shall be used in 3" and larger lines for domestic water duties. NIBCO T-433Y, Jomar T/S 501. For vertical line applications use NIBCO T-480. When using grooved end valves, Victaulic Series 712 swing check valve for horizontal installations, Victaulic Series 716, or Victaulic Series W715 for vertical or horizontal installations.

E. Victaulic / TA Hydronics Series 787 or 786, MEPCO model MBVT, or engineer approved equal NIBCO T or S-1710, bronze body, globe style manual valve with flow measuring taps shall be used for all balancing valves 2" and smaller for domestic water duties.

F. Victaulic / TA Hydronics Series 789 or 788,MEPCO model MBVF, or engineer approved equal NIBCO F or G-737, cast iron body, wye patterned globe style manual valve with flow measuring taps shall be used for all balancing valves 2 ½" and larger for domestic water duties.

G. Nibco, or engineer approved equal, bronze or brass ball valves rated at 150 PSI SWP and 600 PSI WOG, shall have two piece cast bronze or brass bodies with TFE seats, stainless steel full port ball, separate packing nut with adjustable stem packing, and anti-blowout stem. Valves with threaded ends, shall be used in 3" and smaller steel lines for all natural gas duty. Valve to be NIBCO T585-70-UL or Jomar T100NE with U.L. listing and CSA listing

2.02 Unions

A. Screwed or solder type ground joint unions shall be used on piping 2" and smaller. Flanged connections shall be used on pipe 2½" and larger.

B. Unions are not required in installations using Victaulic grooved plumbing couplings.

C. Unions shall not be installed in walls or partitions or above non-accessible ceilings.

D. Pressure ratings on unions shall be equal to or greater than the lines they are in.

E. Dielectric unions or Victaulic Style 47 and Precision Plumbing Products Clearflow dielectric waterway fittings shall be used where copper lines connect to other types of materials.

2.03 Escutcheons

A. Provide nickel-brass or chrome plated escutcheons on exposed pipes where they pass through walls, ceilings, and base cabinet penetrations.

2.04 Strainers

A. Provide Victaulic, Watts, Dunham, Wheatley, or engineer approved equal, strainers where shown with pressure ratings equal to or greater than line operating pressure.

B. Provide ball valves in blowoff tapping of all strainers.

C. Strainers screens shall be stainless steel with 1/8” perforations for water service.

PART 3 EXECUTION

End of Section 22 05 23

SECTION 22 05 29 - PIPING SUPPORTS, ANCHORS AND SEALS

PART 1 GENERAL

1.01 Description of Work

A. Provide piping support, anchors, and seals as specified and indicated on drawings.

B. Pipe shall not pass through footings or beams without the consent of the Architect.

1.02 Submittals

A. Shop drawings of the fire-stopping method shall be approved prior to the setting of any sleeves and shall clearly define the UL fire-stopping method and required sleeve clearances.

1.03 Approved Manufacturers

A. The basis for pipe hangers is B-Line Systems Inc. and shall represent the minimum level of construction. Equipment manufactured by Erico and Grinnell shall be permitted to bid these specifications.

B. The basis for roof supports is Dura-Blok as manufactured by B-Line Systems Inc. and shall represent the minimum level of construction. Equivalent products shall be permitted to bid these specifications upon submission for approval.

PART 2 PRODUCTS

2.01 Hangers and Sleeves

A. All insulated horizontal piping shall be supported from outside the insulation. Provide inserts and saddles as recommended by the insulation manufacturer.

B. Pipe hangers for lines 1/2” to 2” shall be adjustable swivel ring hanger equal to B-Line Figure B-3170NF and B-3170CT for ferrous and copper piping respectively with hanger rods in diameters as required by the hanger swivel rings. Upper ends supported as hereinafter specified with the proper B-Line upper attachments.

C. Pipe hangers for lines 2 1/2” to 4” shall be light duty clevis hanger equal to B-Line Figure B-3104 and B-3104CT for ferrous and copper piping respectively with hanger rods in diameters as required by the hanger rod holes. Upper ends supported as hereinafter specified with the proper B-Line upper attachments.

D. Pipe hangers for lines 6” and larger shall be standard clevis hanger equal to B-Line figure B3100 and B3100C for ferrous and copper piping respectively with hanger rods in diameters as required by the hanger rod holes. Upper ends supported as hereinafter specified with the proper B-Line upper attachments.

E. Provide B-Line Figure B-3373 and B-3373CT riser clamps for ferrous and copper piping, respectively, at each floor and at other locations where vertical support is necessary.

F. Pipe sleeves will be required in all pipe and duct penetrations through new exterior walls, masonry walls, floors and fire rated gyp. board walls. Sleeves shall be either Schedule 5 steel pipe, field fabricated from minimum 16 gauge steel with 2" overlap at the seam, or as required by U.L. listed fire-stopping system.

G. Pipe sleeves will not be required in existing wall penetrations of masonry construction when such openings are made by "core-drilling".

PART 3 EXECUTION

3.01 Pipe Sleeves

A. Space between sleeves and pipes in outside walls shall be filled or tightly caulked with oakum, butyl rubber, link seals or other approved equally effective material to resist the penetration of water. Pipe sleeve shall be sufficient diameter to provide approximately 1/2" clearance around pipe, and in the case of insulated pipe, approximately 1/2" around insulation.

B. Space between sleeves and pipes in other wall construction shall be diameter as required to provide the clearance required by the U.L. listed fire-stopping method chosen by the Contractor.

C. Sleeves shall be set no closer than three pipe diameters center to center, be set 3/4" past all wall surfaces, and securely anchored to the wall.

3.02 Pipe Hangers

A. Upper ends of hanger rods shall be supported angle iron laid across top chord of bar joists, or from side beam clamps in steel structure.

B. Upper ends of hanger rods in other construction types shall be as recommended by the Structural Engineer of record.

C. Hanger and support spacing for horizontal steel and copper piping shall not exceed the values given in the following table:

NOMINAL PIPE SIZE	STEEL PIPE	COPPER PIPE
1/2" - 1-1/4"	7'	5'
1-1/2" - 2"	9'	6'
2-1/2" - 3"	11'	10'
4"	14'	10'
6"	17'	--
8"	19'	--
10" - 12"	22'	--

D. Soil, waste, vent and drain pipe as well as roof drain lines shall have a minimum of one hanger per pipe section at the joints and at changes in direction and branch connections. If FM approved couplings are used, pipe may be hung with one hanger per 10 foot lengths and at every third fitting where they are contiguous in conformance with manufactures installation instructions.

E. No pipe hanger rod shall be less than 6" in length unless otherwise shown or approved.

F. Spacing of supports and braces for exposed vertical piping shall not exceed the hanger spacing specified for horizontal pipe, unless otherwise indicated.

3.03 Flashings

A. All vent pipes passing through the roof shall be flashed by the roofing contractor.

End of Section 22 05 29

SECTION 22 05 50 – TESTING AND ADJUSTING

PART 1 GENERAL

1.01 Description of Work

A. Provide testing and adjusting of the systems as specified and indicated on drawings.

B. Systems shall be fully tested, before covering or concealing, in the presence of the Owner's representative.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 Piping Systems, Integrity Test

A. The following piping systems shall be fully tested before covering and concealing in the presence of the Owner's representative. All leaks shall be repaired in a satisfactory manner.

1. Domestic water piping interior lines shall be tested in accordance with the IPC/UPC as follows:
   a. Hydrostatically tested at 100 PSI (or system pressure) for a period of 1 hour with no drop in water pressure.
   b. Air tested at minimum 50 PSI for 20 minutes with no loss of pressure.
2. All fittings and joints in gas piping shall be soap tested while holding a 50- PSI air pressure.

B. Soil, waste, vent and roof drain pipe underground shall be tested before complete covering. This test shall be made by extending a 10' length of pipe vertically, temporarily caulking, and filling with water. This test shall remain 12 hours.

C. Soil, waste, vent and roof drain pipe in the building shall be tested in accordance with IPC/UPC as follows:

1. Minimum hydrostatic pressure of 10 feet of water for a period of 1 hour with no drop in water level. System shall be visually inspected after the 1 hour duration for leaks
2. Air tested at minimum 5 PSI for 20 minutes with no loss of pressure.

3.02 Other Requirements

A. All flush valves, faucets and other plumbing items shall be properly adjusted.

B. All hot water recirculating valves shall be balanced to the flows noted on the drawings using gauges supplied by the valve manufacturer.

C. Domestic water piping system shall be purged of deleterious matter and disinfected prior to utilization per IPC as follows:

1. The pipe system shall be flushed with clean, potable water until dirty water does not appear at the points of outlets.
2. The system, or part thereof, shall be filled with a water/chlorine solution containing at least 50 ppm of chlorine, and the system or part thereof shall be valved off and allowed to stand for 24 hours; or the system or part thereof shall be filled with a water/chlorine solution containing 200 ppm of chlorine and allowed to stand for 3 hours.
3. Following the required standing time, the system shall be flushed with clean potable water until the chlorine is purged from the system.

4. The procedure shall be repeated where shown by a bacteriological examination that contamination remains present in the system.

End of Section 22 05 50

SECTION 22 05 53 - PLUMBING IDENTIFICATION

PART 1 GENERAL

1.01 Description of Work

A. Provide HVAC identification as specified and indicated on the drawings.

B. This Section includes the following Plumbing identification materials and their installation:

1. Equipment markers
2. Access panel and door markers
3. Pipe markers

1.02 Submittals

A. Product Data: For each type of product indicated.

1.03 Coordination

A. Coordinate installation of identifying devices with completion of insulation and jacketing surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with location of access panels and doors.

PART 2 PRODUCTS

2.01 Manufacturers

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:

1. Seton
2. Brady
3. Craftmark
4. Brimar Industries, Inc.

2.02 Equipment Identification Devices

A. Equipment Markers: Engraved, color-coded laminated plastic.

1. Terminology: Match schedules as closely as possible.
2. Data:
   a. Name and plan number.
   b. Equipment service.
   c. Design capacity.
   d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
3. Size: 2-1/2” by 4” for control devices, dampers, and valves; 4-1/2” by 6” for equipment.
4. Letter Size: Minimum 1/4 “ for name of units if viewing distance is less than 24 inches, 1/2“ for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
5. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

B. Access Panel and Door Markers: 1/16” thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8” holes for attachment.

1. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

2.03 Piping Identification Devices

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ANSI/ASME A13.1, unless otherwise indicated.
2. Type and Size of Letters: Comply with ANSI/ASME A13.1, unless otherwise indicated.
3. Legends: Spelled out in full or commonly used and accepted abbreviations.
4. Pipes with OD, Including Insulation, Less Than 6”: Full-band pipe markers extending 360 degrees around pipe at each location.
5. Pipes with OD, Including Insulation, 6“ and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
6. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pretensioned Pipe Markers: Precoiled semi rigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Shaped Pipe Markers: Preformed semi rigid plastic formed to partially cover circumference of pipe and to attach to pipe with Plumbing fasteners that do not penetrate insulation vapor barrier.

PART 3 EXECUTION

3.01 Equipment Identification

A. Install equipment markers on or near each piece of plumbing equipment.

B. All equipment shall be labeled as directed by the owner or as designated on the drawings if the owner has no other preference.

C. Locate equipment markers where accessible and visible. Include markers for the following general categories of equipment:

1. Main control and operating valves including safety devices.
2. Meters, gauges, thermometers and similar units.
3. Pumps.
4. Water Heaters.
5. Strainers, filters, water-treatment systems and similar equipment.

D. Install access panel markers with screws on equipment access panels.

3.02 Piping Identification

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

B. All piping shall be labeled as directed by the owner or as designated on the drawings if the owner has no other preference.

C. Locate pipe markers where accessible and visible.

1. Pipes with OD, Including Insulation, Less Than 6”: Pretensioned pipe markers. Use size to ensure a tight fit.
2. Pipes with OD, Including Insulation, 6” and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.

D. Locate pipe markers where piping is exposed in finished spaces; machine rooms;

accessible maintenance spaces such as shafts, tunnels, and plenums; and locations as follows:

1. Near each valve and control device
2. Near each branch connection. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings and nonaccessible enclosures.
4. At access doors and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25’ along each run.
7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

End of Section 22 05 53

SECTION 22 07 16 - PLUMBING INSULATION

PART 1 GENERAL

1.01 Description of Work

A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct installation of insulation on all piping, fittings, valves, controls and all other items connected into the system as defined in the specifications and on the drawings.

B. All materials specified in this section shall meet UL 723, ASTM E84, and NFPA 255: maximum flame spread index of 25 and maximum smoke developed index of 50.

C. Refer to Part 3 for requirements for insulation thickness and instruction on where insulating materials shall be applied.

1.02 Workmanship

A. Insulation shall be installed by a licensed contractor and applied in accordance with the manufacturer's instructions and recommendations.

1. All work shall comply with all applicable federal, state and local codes and laws. This shall include, but shall not be limited to, the Occupational Safety and Health Act.
2. All work shall conform to accepted industry and trade standards for commercial and industrial insulations.

PART 2 PRODUCTS

2.01 Fiber Glass Pipe Insulation

A. Johns-Manville Micro-Lok, preformed fiber glass pipe insulation, complying with ASTM C 547, Type 1, rigid molded pipe insulation, noncombustible. Factory-applied ASJ vapor retarder jacket: a white, kraft paper, reinforced with a glass fiber yarn and bonded to an aluminum foil, complying with ASTM C1136 Type I, with self-sealing longitudinal closure laps and butt strips. Adhesive materials and tapes shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thermal Conductivity (k-Value): 0.23 at 75°F mean temperature
2. Water vapor transmission: 0.02 perms max
3. Maximum Service Temperature: 850°F

B. All fittings, valves, tees, flanges, connections, etc. shall be insulated and covered with the appropriate PVC insulated fitting covers. Fitting covers shall match PVC Jackets, refer to specification below.

C. The basis for fiber glass pipe insulation and fitting covers is Johns-Manville which shall represent the minimum level of construction. Products manufactured by Owens-Corning and Knauf shall be permitted to bid these specifications.

2.02 Flexible Elastomeric Pipe Insulation

A. Armacell AP/Armaflex SS, fiber-free elastomeric foam insulation with self-sealing seams. Comply with ASTM C534, Type I, ASTM C1338 fungi resistance and ASTM G22 bacterial resistance. Adhesive materials and tapes shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Density: 3.0 – 6.0 pcf
2. Thermal Conductivity (k-Value): 0.25 at 75°F mean temperature
3. Water vapor permeability: 0.05 perm-in
4. Maximum Service Temperature: 180°F (continuous exposure)

B. All fittings, valves, tees, flanges, connections, etc. shall be insulated and covered with the Armacell factory-fabricated insulation fittings. Provide Armafix pre-insulated pipe hanger fittings at all hanger locations.

C. The basis for flexible elastomeric insulation is Armacell which shall represent the minimum level of construction. Products manufactured by Aeroflex shall be permitted to bid these specifications

2.03 Lavatory Piping Covers

A. Handicapped lavatory sink P-traps and hot and cold water lines shall be insulated with Truebro Lav Guard 2, fully molded vinyl insulation system. Color shall be china white and paintable with latex paint.

1. Thickness: 0.125 inches
2. ADA Compliant
3. Burning Characters: Meets ASTM D-635
4. Bacteria/Fungus Resistance: Meets ASTN G21 and G22, result: 0 growth

2.04 PVC Jackets

A. High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C, 30 mils thick, white paintable finish, roll stock ready for shop or field cutting and forming. Provide factory fabricated fitting covers of same material, finish, and thickness as jacket. Adhesive materials and tapes shall be compatible with insulation materials, jackets, and substrates and for bonding jacket to itself and to insulation.

2.05 Insulated Pipe Supports

A. 360° pre-molded insulated pipe supports providing a continuous section of insulation with vapor barrier and galvanized steel shield. The insulation and vapor barrier shall extend beyond the shield for vapor tight joint with the adjoining insulation. Insulation shall be water-repellent treated calcium silicate meeting the requirements of ASTM C533 with vapor barrier jacket.

1. Minimum Compressive Strength:
   a. 100 PSIG for pipe sizes smaller than 6”
   b. 450 PSIG for pipe sizes 6” and larger

2.06 Insulation Shields

A. 180°, 20 gauge, galvanized metal shields pre-formed to fit the insulation.

PART 3 EXECUTION

3.01 Examination

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry and ducts are tightly sealed at all joints and seams.

3.02 Common Insulation Installation Requirements

A. Unless otherwise indicated, all insulation shall be installed in accordance with the "Commercial & Industrial Insulation Standards", published by the Midwest Insulation Contractors Association.

B. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of pipes and fittings.

C. Keep insulation materials dry during application and finishing.

D. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

E. Install insulation with least number of joints practical.

F. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic and/or tape. Install insulation continuously through hangers and attachments.

G. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate.

H. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas.

3.03 Penetrations

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Coordinate requirements in first two paragraphs and associated subparagraphs below with Division 7 Section "Joint Sealants."
2. Seal penetrations with flashing sealant.
3. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
4. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
5. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (that are not fire rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Coordinate insulation installation with the fire stopping material manufacturer’s UL approved installation instructions.

E. Insulation Installation at Floor Penetrations: Install insulation continuously through floor penetrations that are not fire rated. Coordinate insulation installation with the fire stopping material manufacturer’s UL approved installation instructions.

3.04 Fiber Glass Insulation Installation

A. Insulation Installation on Straight Pipes:

1. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
2. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples.
3. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
2. Insulate pipe fittings using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
4. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide an installation that maintains vapor barrier.
5. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
6. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

C. Insulate instrument connections for thermometers, pressure gauges, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

3.05 Flexible Elastomeric Pipe Insulation

A. Seal longitudinal seams and end joints with the manufacturers recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Fittings and Elbows:

1. Insulate pipe fittings using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.06 Lavatory Piping Covers

A. Contractor shall refer to Architectural details to insure all handicapped sinks and lavatories are insulated per ADA requirements.

3.07 PVC Jackets

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with the manufacturer's recommended adhesive.

3.08 Insulated Pipe Supports

A. 360° pre-molded insulation pipe supports shall be installed on piping 1 ½” and larger at hangers. Pipe insert thickness shall be equal to the adjoining insulation thickness. The length of supports shall be as follows:

Pipe Size	**Insulation Insert Length**	**Shield Length**	**Shield Gauge**
1 ½” to 5”	6”	4”	20 ga.
6" to 8"	9"	6”	16 ga.
10” to 12”	9”	6”	14 ga.
14” and larger	12”	10”	12 ga.

3.09 Insulation Shields

A. 6” long insulation shields shall be applied between hangers or supports and the pipe insulation insert for all insulated piping less than 1 ½” in diameter.

3.10 Fiber Glass Pipe Insulation Thickness:

Piping System	**Continuous Vapor Barrier**	**Pipe Size**			
		≤ 1½"	**2” – 4”**	**5” - 6”**	**≥8”**
Cold Water	Yes	1”	1”	1”	1”
Hot Water	No	1”	1”	1”	1”
Hot Water Recirculation	No	1”	1”	1”	1”
Tempered Water	No	1”	1”	1”	1”
Roof Drains	Yes	1”	1”	1”	1”
Purified Water	Yes	1”	1”	1”	1”

3.11 Flexible Elastomeric Pipe Insulation Thickness:

A. The roof drain and overflow drain bowls shall be insulated with 3/4" thick flexible elastomeric pipe insulation.

End of Section 22 07 16

SECTION 22 11 00 – DOMESTIC WATER PIPE AND FITTINGS

PART 1 GENERAL

1.01 Description of Work

A. Provide the pipe and fittings as specified and indicated on the drawings.

1.02 Quality Assurance

A. Welders Qualifications: All welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing.

B. Welding procedures and testing shall comply with ANSI Standard B31.1.0 - Standard Code for Pressure Piping, Power Piping, and The American Welding Society, Welding Handbook.

C. Soldering and Brazing procedures shall conform to ANSI B9.1 Standard Safety Code for Plumbing Refrigeration.

D. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

E. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

PART 2 PRODUCTS

2.01 Above Grade Piping and Fittings

A. The following shall be acceptable piping methods for all discharge pipe from relief valves, sump pumps as well as all non-potable domestic water lines 4" and smaller:

1. Type L hard copper pipe with sweat type fittings and 50/50 solder connections.
2. Type L hard copper pipe with copper and copper alloy fittings shall conforming to ASME B16.18 or B16.22 as well as IAPMO PS117 may be used. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed by fitting manufacturer. Press end shall have smart connect feature. Viega ProPress.

B. The following shall be acceptable piping methods for all potable domestic water lines 4" and smaller:

1. Type L hard copper pipe with sweat type fittings and 95/5 solder or Silfos brazed connections.
2. Type L hard copper pipe with copper and copper alloy fitting shall conforming to ASME B16.18 or B16.22 as well as IAPMO PS117 may be used. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed by fitting manufacturer. Press end shall have smart connect feature. Viega ProPress. (200 psi rated)
3. Type L hard copper with push-to-connect fittings may be used. Fittings shall be wrought copper or cast bronze with EPDM seals and 301 stainless steel internal components. Victaulic PermaLynx (200 psi rated)
4. Copper-tube dimensioned grooved joint fittings conforming to ASME B16.18 or B16.22, with Installation-Ready couplings suitable for direct stab installation without field disassembly. Victaulic Copper-Connection with Style 607 Quick-Vic Couplings. (300 psi rated)

PART 3 EXECUTION

3.01 Domestic Water Lines

A. All runs of pipe shall be installed as shown on drawings, unless some condition should arise which would make it necessary or seem advisable to alter same; in which case, the architect or his representative must be consulted before making any change. No piping shall be buried unless shown as such as the drawings.

B. Air chambers shall be provided on all water supplies near each faucet control valve or flush valve, except hose bibbs. Air chamber shall be equal in length to at least 12 diameters of the pipe.

C. Grooved joints shall be installed in accordance with the manufacturer's latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be of an elastomer grade suitable for the intended service, and shall be molded and produced by the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation. (A distributor's representative is not considered qualified to conduct the training or jobsite visit(s).

3.02 Exposed and Concealed Piping

A. All piping shall be concealed in walls, below floors or above ceilings unless specifically noted or indicated otherwise or shown in areas with exposed structure. All pipe shall be installed parallel or perpendicular to building surfaces.

End of Section 22 11 00

SECTION 22 11 10 – DOMESTIC WATER PEX PIPING SYSTEM

PART 1 GENERAL

1.01 Section Includes

A. Cross-Linked Polyethylene (PEX) Plastic Tubing and Fittings for potable hot and cold water distribution as part of the overall building plumbing systems. **Use of PEX piping shall be limited to piping within the hotel rooms.**

1.02 Related Sections

A. Section 22 05 17 Firestopping for Plumbing Systems

B. Section 22 05 50 Testing and Adjusting

C. Section 22 11 00 Domestic Water Pipe and Fittings

1.03 References

A. Cross-Linked Polyethylene (PEX) plastic tubing and fittings shall conform to the following:

1. ASTM F876 specification for Cross-linked Polyethylene (PEX) Tubing
2. ASTM F877 specification for Cross-linked Polyethylene (PEX) Plastic Hot and Cold Water Distribution Systems
3. ASTM F2023 test method for evaluating the oxidative resistance of Cross-linked (PEX) tubing and systems to hot chlorinated water
4. ASTM F1807 specification for metal insert fittings utilizing a copper crimp ring for SDR9 Cross-linked Polyethylene (PEX) tubing
5. ASTM E84 surface burning characteristics of building materials
6. CSA-B137.5 Cross-Linked Polyethylene (PEX) tubing systems for pressure applications
7. NSF 14 - Plastic Piping Components and Related Materials
8. NSF 61 - Drinking Water System Components - Health Effects
9. AWWA C651 Standard for Disinfecting Water Mains
10. ICC International Plumbing Code and/or IAPMO Uniform Plumbing Code

1.04 Quality Assurance

A. The PEX tubing and fitting manufacturer shall maintain a third party listing of the tubing and fittings. The tubing and fittings shall be certified in accordance with NSF 61 to verify suitability to transport potable water. The tubing and fittings shall have the mark “NSF-pw” or “NSF 61” permanently marked on the product to verify the material listing.

B. The PEX tubing and fitting manufacturer shall maintain a quality control program in accordance with ISO 9001 in the manufacturing plant to assure that the tubing and fittings are continually being produced to the required standard. The tubing and fittings shall be certified as complying with NSF 14.

C. The installer shall be a qualified licensed plumber in the jurisdiction and familiar with the installation of PEX tubing systems.

1.05 Delivery, Storage and Handling

A. Protect PEX tubing, fittings and manifolds during shipping to the job site. Unload with care at the job site and store in a flat, dry, well ventilated location. PEX tubing shall be stored under cover protected from exposure to direct and indirect sunlight exposure.

Care shall be taken in handling to avoid damage to the tubing, fittings and manifolds.

1.06 Warranty

A. The manufacturer shall warrant that the tubing and fittings are free from defects and conform to the designated standards.

PART 2 PRODUCTS

2.01 Manufacturers

A. Viega, LLC

B. Uponor, Inc

2.02 PEX High-Density Cross-linked Polyethylene Tubing

A. PEX tubing shall be manufactured to the requirements of ASTM F876 and meet the standard grade hydrostatic pressure ratings from Plastic Pipe Institute in accordance with TR-4/03. The following three standard grade ratings are required.

1. 200°F at 80 PSIG
2. 180°F at 100 PSIG
3. 73.4°F at 160 PSIG

B. Press fittings shall be manufactured from UNS, C87700, C87710 Bronze, meeting the requirements of ASTM F877 tested as a system with the PEX tubing. The press sleeve shall be manufactured from a 304 grade or better stainless steel. The press sleeve shall have a sight hole to ensure proper insertion.

C. Manifolds shall be copper material having a male or female solder or ProPress inlets. All outlets shall be Press or ProPress fittings. Manifolds shall be provided by the PEX system manufacturer.

D. PEX adapter fittings shall conform to ASTM F877 or CSA CAN3-B137.5. The adapter fittings shall mate to NPT threads, copper tubing, copper fitting or ProPress fittings.

2.03 Accessories

A. Hangers and supports shall be designed for PEX tubing. The hangers and supports shall not have sharp edges or surfaces that can cut the tubing. Acceptable hangers include plastic u-clip tubing fasteners, suspension clip tubing fasteners, nylon clips and u-channel fasteners. Acceptable supports include drop ear bend supports, snap-in bend supports, plastic bend supports, plastic bend supports for slab and other supports specifically designed for PEX plastic tubing.

B. Penetration Protection: Penetrations of fire resistance rated walls, floors, or ceilings by PEX tubing shall be protected in accordance with UL and the requirements of the building code.

PART 3 EXECUTION

3.01 General Installation

A. The installing contractor shall carefully examine the PEX tubing for defects or abuse including; cuts, gouges, kinks, abrasions, cracks, deformations, blemishes or fading color. Fittings and manifolds shall be checked for any signs of defect or abuse. Only install PEX tubing, fittings and manifolds that are free of defects or damage. Defective or damaged tubing, fittings or manifolds shall be rejected.

B. The plans indicate the general location and arrangement of PEX tubing systems. The indicated locations and arrangements are used to size pipe, calculate friction loss and

other design considerations. Install PEX tubing as indicated, except where deviations to layout are approved in advance by the engineer.

C. Install PEX tubing, fittings and manifolds with a pressure rating equal to or greater than the system operating pressure.

D. Install PEX tubing in a workmanlike manner to avoid damage to the tubing and surrounding building surfaces and systems. Protect PEX to avoid abrasion and contact with surrounding building material.

E. Install PEX tubing with provision for expansion and contraction. PEX tubing shall not be installed in tight straight runs. Flexibility in the installation shall be provided to permit free expansion and contraction without damage to the PEX tubing or adjacent surfaces or systems.

F. Protect PEX tubing passing through a wall, floor, ceiling or partition by wrapping with pipe insulation or installing through an appropriately sized sleeve. Penetrations of fire rated assemblies shall maintain the rating of the assembly.

G. Where PEX tubing is indicated to be installed below grade, provide back fill material that is free of large rocks, glass or other sharp objects that could damage the PEX tubing.

H. Install PEX tubing a minimum of 6 inches horizontally and 12 inches vertically from any source of heat such as recessed lights and appliance or heater vents.

I. PEX tubing shall be cut with a PEX tubing cutter specific to this application. The tubing shall be cut square to permit proper joining with fittings.

J. Support PEX tubing shall at 32 inch intervals horizontally. Support PEX tubing at each floor/ceiling penetration and at 48 inch intervals vertically in between.

K. PEX tubing changes in direction shall not exceed eight times the tubing outside diameter (OD) free bend radius or five times the tubing OD supported bend radius with use of the manufacturer's approved bend support. Install fittings for changes in direction where any minimum bend radius is exceeded. Provide branch tubing connections in strict accordance with the manufacturer's recommendations.

L. Install press fittings in accordance with the manufacturer's installation instructions, using only the tools approved by the manufacturer.

M. Threaded joints shall have a potable water listed joint sealant tape applied to the male threads only.

N. Provide approved adapter fittings at connections between PEX tubing and other piping materials. Adapter fittings shall be connected by NPT threads, copper tubing, copper fitting or ProPress fittings. Adapter fittings shall be installed in strict accordance with the manufacturer's installation instructions.

O. Connect PEX tubing to plumbing fixtures directly, with an adapter fitting or with flexible tubing connectors. Each fixture water supply shall have a supply stop to isolate the connection to the fixture.

P. PEX tubing systems shall have identification markings that conform to the ASTM F876 and NSF-pw, ES ER 5944 ES ER 5945 ES ER 5421 requirements.

Q. Manifolds and valves shall be located where easily accessible and not subject to freezing. Provide adequate room around the manifold to permit installation of the cross-linked polyethylene tubing and valves. Provide proper support using the manufacturer provided manifold brackets. Install manifolds in strict accordance with the manufacturer's installation instructions.

3.02 Field Quality Control

A. System Testing:

1. Water Testing: PEX tubing systems shall be pressure tested in accordance with local code after installation or to at least minimum system working pressure, no less than 40 PSI, and for a period of no less than 15 minutes. Water used for this testing shall come from a potable water source. Test should not exceed pressure rating of PEX tubing and shall have no leaks.
2. Air Testing: In lieu of a water test, PEX tubing system shall be air tested in accordance with local code after installation, or at least system working pressure, no less than 40 PSI and no greater than 100 PSI. The test shall be conducted for a period of no less than 15 minutes and no greater than an hour and not leak more than 8 PSI over the test duration. Refer to the manufacturers' installation instructions for safety considerations while conducting air testing.

3.03 Cleaning and Disinfection

A. The PEX water distribution systems shall be disinfected prior to being placed in service. Follow the time limitations and exposure levels listed below:

1. Flush the system with potable water until discolored water does not appear at any of the outlets.
2. Fill the system with a water chlorine solution containing at least 50 parts per million of chlorine. The system shall be isolated and to stand for 24 hours.
3. Alternate: The system shall be filled with water chlorine solution containing at least 200 parts per million of chlorine. The System shall be isolated and allowed to stand for 3 hours.
4. Following the standing time, the system shall be flushed with potable water until the chlorine is purged from the system.

End of Section 22 11 10

SECTION 22 11 15- NATURAL GAS PIPING AND FITTINGS

PART 1 GENERAL

1.01 Description of Work

A. Provide the natural gas pipe and fittings as specified and indicated on the drawings.

1.02 Quality Assurance

A. Welders Qualifications: All welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing. Welders of steam and condensate return piping shall be holders of ASME 'R' and 'PP' or 'S' stamps.

B. Welding procedures and testing shall comply with ANSI Standard B31.1.0 - Standard Code for Pressure Piping, Power Piping, and The American Welding Society, Welding Handbook.

PART 2 PRODUCTS

2.01 Above Grade Piping and Fittings

A. Schedule 40 grade, ASTM A-53, butt weld black steel pipe with either welded or threaded malleable fittings shall be used for above grade low pressure gas piping. Flexible gas piping in maximum 24” lengths will be required at final connections to all gas appliances.

B. Schedule 40 grade, ASTM A-53, butt weld black steel pipe with welded fittings shall be used for above grade elevated pressure gas piping.

C. Flexible gas piping in low pressure connections shall be Gastite corrugated stainless steel tubing, ASTM A240 type 304 – 321, with a minimum wall thickness of .010, complying with ANSI/IAS LC-1 Standard for fuel Gas Piping using Corrugated Stainless Steel Tubing (CSST), CSA International Report No. 1898978-1009875, ICBO Evaluation Report ER-5122, and IAPMO Research Report File No. C-3250. Jacketing shall be Tenite polyethylene meeting the requirements of ASTM E84 for flame spread and smoke density.

2.02 Pressure Reducing Valves

A. Provide Emerson Fisher, or approved equal, Series 912 direct-operated, spring-loaded regulators are Underwriters Laboratory (UL) listed regulators used in a variety of service and industrial applications. These regulators have limited-capacity internal relief across the diaphragm to help minimize overpressure

PART 3 EXECUTION

3.01 Gas Piping

A. Gas piping shall be installed as shown with all exterior buried piping with a minimum of 24" cover.

B. Provide a union, gas valve, and scale pocket at each equipment connection. Final connections to equipment shall be made with a 24” length of flexible gas piping

C. All fittings in flexible gas lines shall be SAE CA360 brass incorporating double wall flare for sealing and Jacket Lock jacket capturing for steel tubing protection. Installation shall be in full accordance with the current edition of Gastite Design and Installation Guide.

End of Section 22 11 15

SECTION 22 11 19 – DOMESTIC WATER SPECIALTIES

PART 1 GENERAL

1.01 Description of Work

A. Provide the domestic water specialties as specified and indicated on the drawings.

1.02 Approved Manufacturers

A. The basis for the backflow prevention devices in this specification is Febco and Watts and shall represent the minimum level of construction. Products manufactured by Stiebel Eltron shall be permitted to bid these specifications.

B. The basis for the tempering valves in this specification is Leonard and shall represent the minimum level of construction. Equipment from Symons or Powers shall be permitted to bid these specifications.

C. The basis for other specialty items in this specification are those manufactures listed. Alternative manufactures of equivalent products will be allowed to bid.

PART 2 PRODUCTS

2.01 Hose Bibbs

A. Provide Woodford, or approved equal Zurn, Prier, Wade, Smith, or Josam hose bibbs as follows:

1. Exterior: Woodford #65C (self-draining with vacuum breaker).
2. Interior: Zurn S-1333 key operated, vandal resistant interior hose bibb with vacuum breaker.

2.02 Shock Stops

A. Provide Precision Plumbing Products, or approved equal, Model SC water hammer arrestors sizes as noted on the plans and required by the plumbing code.

2.03 Tempering Valves - Point of Use Individual Lavatories

A. Tempering valves shall be equal to Leonard, or approved equal, Model 170-LF ASSE 1070 and LF certified thermostatic mixing valve with adjustable and locking high limit stop set for 110°F. Valve shall be provided with integral check valves on the hot and cold inlets.

B. Unit shall be designed for 3/8” hot and cold inlets and 3/8” tempered outlet rated for a maximum of 3 GPM flow with a 20 PSI system pressure drop, and guaranteed stable minimum flow rate of 0.25 GPM

PART 3 EXECUTION

3.01 Tempering Valve Installation

A. All aspects of the installation of the tempering valves, including but not limited to recirculation, shall be in strict accordance with the manufacturer’s instructions. Materials used shall conform with all manufacturers recommendations

B. Piping diagrams indicated on plans are based on Leonard and shall be modified as approved by the engineer via shop drawings for other manufacturers.

End of Section 22 11 19

SECTION 22 11 23 – DOMESTIC WATER PUMPS

PART 1 GENERAL

1.01 Description of Work

A. Provide all domestic water pumps as specified and shown on the drawings.

1.02 Approved Manufacturers

A. The basis for the equipment in this specification is Bell and Gossett and shall represent the minimum level of construction. Equipment from Taco, Thrush, Armstrong, and Patterson shall be permitted to bid these specifications

1.03 Shop Drawings

A. Shop drawings shall be submitted as specified in Division 1.

B. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.

1.04 Quality Assurance – Booster Pumps

A. The pumping package shall be assembled by the pump manufacturer. An assembler of pumping systems not actively engaged in the design and construction of centrifugal pumps shall not be considered a pump manufacturer. The manufacturer shall assume "Unit Responsibility" for the complete pumping package. Unit responsibility shall be defined as responsibility for interface and successful operation of all system components supplied by the pumping system manufacturer.

B. The manufacturer shall have a minimum of 30 years of experience in the design and construction of packaged pumping systems, and over 50 years in active design/ production of centrifugal pumps.

C. The pumping system shall be factory tested to the job specific condition points prior to shipment.

D. The pumping package shall be certified by an approved independent testing and certification organization as being compliant with the requirements of NSF/ANSI 61 & 372 for potable drinking water and low lead content for a wetted area, weighted average lead content < 0.25%. Packages that are not certified shall NOT be considered equal.

E. Manufacturer shall be listed by UL as a manufacturer of packaged pumping systems under UL/cUL category QCZJ.

F. Manufacturer shall be listed by UL as a manufacturer of control panels under UL 508A.

PART 2 PRODUCTS

2.01 In-Line Domestic Water Circulators

A. General Description: Pumps shall be ecocirc XL as manufactured by **Bell & Gossett, a Xylem Company**.

B. The pumps shall be a wet rotor inline pump, in cast iron or lead free bronze body construction specifically designed for quiet operation. Suitable standard operations at

230° F and 175 PSIG working pressure. The pump internals shall be capable of being serviced without disturbing piping connections.

C. The pump internals shall be capable of being serviced without disturbing piping connections.

D. Pump shall be equipped with a water-tight seal to prevent leakage.

E. Pump volute shall be of a cast iron design for heating systems or lead free bronze for domestic water systems. The connection style on the cast iron and bronze pumps shall be flanged.

F. Flange to Flange dimension shall be standard Bell & Gossett booster sizes such as 6-3/8", 8-1/2", 11-1/2", and 12". Flange dimensions shall be HVAC industry standard 2 or 4 bolts sizes.

G. Motor shall be a synchronous, permanent-magnet (PM) motor and tested with the pump as one unit. Conventional induction motors will not be acceptable.

H. Integrated motor protection shall be verified by UL to protect the pump against over/under voltage, over temperature of motor and/or electronics, over current, locked rotor and dry run (no load condition).

I. Pump shall have MODBUS or BACnet connections built into the VFD as standard options.

J. Analog inputs, such as 0-10V and 4-20mA, are standard inputs built into the VFD.

K. Pumps shall be UL 778 listed and bear the UL Listed Mark for USA and Canada with on-board thermal overload protection.

L. Pumps shall be UL 778 listed and bear the UL Listing Mark for USA and Canada with on-board thermal overload protection.

M. Each pump shall be factory performance tested before shipment.

O. Operating mode: T-Constant – This control will use a PI algorithm to vary the speed of the pump in order to maintain a constant temperature of the fluid media.

P. Circulators shall be as scheduled on plans.

2.02 Domestic Water Booster Pumps

A. Furnish and install as shown on the plans a TECHNOFORCE e-HV Variable Speed Booster System as manufactured by Bell & Gossett.

B. Manufacturer shall be listed by Underwriters Laboratories as a manufacturer of packaged pumping systems.

C. The pump logic control system shall include, at a minimum, drive integrated programmable logic station controller with Multi-Pump and Multi-Master Capability, motor mounted/integrated variable frequency drives, manifold mounted 4-20mA pressure transducers, one per pump, and any additional equipment as specified or as required to properly execute the sequence of operation.

D. System shall require only suction, discharge and drain connections and single point power connections from a service entrance disconnect.

E. All components shall be mounted and shipped as a single unit.

F. The discharge of each pump shall be fitted with a control valve appropriate for station operation. Each pump and discharge valve assembly shall also be equipped with isolation valves so that the pump can be serviced while system is still filled.

G. Pressure gauges shall be installed on the suction and discharge headers.

H. System shall require only suction, discharge and drain connections and single point power connections from a service entrance disconnect.

I. All components shall be mounted and shipped as a single unit.

J. Piping shall be sized so that water velocity shall not exceed 10.0 ft/sec in either the branches or manifolds.

K. Pumps shall be protected from thermal accumulation via individual thermal relief mechanisms.

M. Hydrovar® Variable Speed Pump Logic Controller

1. The Hydrovar shall be one completely integrated unit including the variable frequency drive, programmable pump specific control logic (PLC), and include a UL Type 1 / IP55 enclosure. Standard variable frequency drives that do not incorporate pump control logic as the primary control software, programming and features directly applicable to booster pump applications shall NOT be considered equal.
2. Additional control panels, PLCs or other external controls shall NOT be necessary to accomplish complete pump programming and variable speed control of the pump system.
3. The integrated microprocessor shall provide automatic start and stop of up to 8 variable speed controlled pumps, and enable automatic changeover for lead and lag pump sequencing, without the use of external devices (PLC's) or timers.
4. 4 The Hydrovar pump controller shall be listed/recognized by and bear the label of Underwriter's Laboratory, Inc. (UL/cUL).
5. The Hydrovar will be mounted to a standard NEMA, TEFC, Premium Efficient, 2-pole AC induction motor with adjustable clamps/bracket assemblies. The Hydrovar shall NOT require special integrated pump motors.
6. The Hydrovar pump controller will be configured in the Multi-Master configuration to ensure complete control redundancy. Systems utilizing standalone PLC or Master-Slave arrangement shall NOT be considered equal.
7. The Hydrovar pump controller shall function to a proven program that safeguards the pumps/system against damaging hydraulic conditions.
8. The Hydrovar pump controller shall be capable of accepting individual analog inputs from up to 2 zone sensor/transmitters as indicated on the plans. Analog input resolution shall be 12-bit minimum, and the controller shall scan each analog input a minimum of once every 100 milliseconds. All sensor/ transmitter inputs shall be individually wired to the pump logic controller for continuous scan and comparison function. All analog inputs shall be provided with current limit circuitry to provide short circuit protection and safeguard against incorrect wiring of sensors.
9. Hydraulic stabilization program shall utilize a proportional-integral-derivative control function. The proportional, integral and derivative values shall be user adjustable over an infinite range. The scan and compare rate that selects the command set point and process variable signal shall be continuous and automatically set for optimum performance. Each sensor shall be scanned at least once every 100 milliseconds.
10. The Hydrovar pump controller shall provide an LCD display with programming keypad for data entry in plain English or other optional language pumping terms.
11. The system shall utilize the QuickStart feature to simplify programming and startup of the pump control system. The feature shall be specific to pump systems and use suitable pump terminology.

12. The pump controller shall be capable of communicating with the Building Automation System (BAS) by both hard-wired and serial communications.
13. The following communication features shall be provided to the Building Automation System via an onboard RS-485 port utilizing Modbus RTU, Modbus ASCII, or BACnet MS/TP protocol.
14. The Hydrovar shall be rated to operate from 3-phase power at 208-240VAC or 380-460VAC, +15%, 48Hz to 62Hz. The drive shall employ a full wave rectifier to prevent input line notching and operate at a fundamental (displacement) input power factor of 0.98 at all speeds and nominal load. The drive efficiency shall be 98% or better at full speed and load.
15. Built in Total Harmonic Distortion filters (TDHi) shall reduce harmonic interference.
16. The VFD shall be suitable for elevations to 3300. ft above sea level without derating. Maximum operating ambient temperature rating shall not be greater than 104º F. VFD shall be suitable for operation in environments up to 90% non-condensing humidity.
17. The VFD shall have the ability to automatically restart after a motor Overload, Over-Voltage, Under- Voltage, Inverter Overheat, Phase Loss, Communication Loss, Lack of Water, and Failure of Sensor. When enabled, the VFD will allow an automatic restart five (5) times when an error occurs. On the sixth occurrence, the VFD will shut-off and display an error message with the appropriate terminology.
18. Protective Functions
    a. Built-in protection for following conditions:
        - Over/Under voltage
        - Overcurrent/output short
        - Low water (requires low water pressure switch)
        - Sensor failure
        - Motor over-temperature
        - Inverter over-temperature
        - Minimum threshold/conveyer limit.
    b. For each programmed warning and fault protection function, the Drive shall display a message in complete English words or Standard English abbreviations. The three (3) most recent fault messages along with time, current, speed, voltage, frequency and DI Status shall be stored in the Drive's fault history. The last five (5) fault names shall be stored in Drive memory.
    c. The Drive shall include internal MOV's for phase to phase and phase to ground line voltage transient protection.
    d. Output short circuit withstand rating and ground fault protection rated for 100,000 AIC shall be provided without relying on line fuses. Motor phase loss protection shall be provided.
    e. The Drive shall provide electronic motor overload protection.
    f. Protection shall be provided for AC line or DC bus overvoltage at 130% of maximum rated or under voltage at 65% of min. rated and input phase loss.
19. Variable Speed System Sequence of Operation
    a. The system shall consist of a Hydrovar pump logic controller with multi-pump / multi-master parallel operation control, duty-standby pump selection, automatic alternation and automatic transfer to the secondary master control upon pump/VFD failure.

b. The pumping system shall start upon the closure of customer's contact when the pump logic controller Mode of Operation is in REMOTE.
c. When the pump logic controller mode in LOCAL, the pumping system shall operate automatically.
d. Each sensor/transmitter shall send a 4-20mA signal to the Hydrovar pump logic controller, indicative of process variable condition.
e. When the set point is satisfied by the process variable, the pump speed shall remain constant at the optimum energy consumption level.
f. The pump controller shall automatically start the lag pumps as necessary to satisfy system demand.
g. As demand is satisfied, the controller shall automatically stop lag pumps as necessary to conserve energy.
h. In the event of a pump failure or a VFD fault, the pump logic controller automatically initiates a timed sequence of operation to start the redundant pump/VFD set in the variable speed mode.
i. In the event of the failure of a zone sensor/transmitter, its process variable signal shall be removed from the scan/compare program. The redundant zone sensor/transmitters, if available, shall remain in the scan/compare program for control.
j. PUMP or VFD fault shall be continuously scrolled through the display on the operator interface of the pump logic controller until the fault has been corrected and the controller has been manually reset.
k. When the system is satisfied, the pump controller shall shut down the single running lead pump and enter energy saving / no flow shutdown mode.

N. ELECTRICAL

1. Station Panel Enclosure.
   a. The main station disconnect shall have a through-door operator and shall be sized as shown in the technical data sheet. Individual integrated circuit breaker disconnects shall have exterior operators, and shall be sized as shown in the technical data sheet. Station disconnect panel shall be housed in a NEMA 12 enclosure with integral latches.
2. Controls and Enclosure.
   b. The control panel with controls shall be built in accordance with NEC, and shall comply with UL standards. Pump station manufacturer shall be authorized under UL508A to manufacture its own control panels. All equipment and wiring shall be mounted within the enclosure and each device shall be labeled with proper identification. All adjustments and maintenance shall be accessible from the front of the control enclosure. A complete wiring circuit diagram and legend with terminals, components, and wiring completely identified shall be provided. Main disconnect shall be interlocked with door.
3. Pump Disconnects
   a. Individual circuit breaker service disconnects for each pump are provided in the main station panel. The disconnects are approved under UL and CSA for use in systems rated up to 600VAC and are sized accordingly up to 200A. Disconnects are accessible without disengaging the main station disconnect to ensure that operation of the Booster is not interrupted during individual pump service. Stations that do not provide external access to individual pump disconnects without disengaging the main station

disconnect shall NOT be considered equal.

4. Sensor / Transmitters
    a. Pressure transducers shall be utilized for providing all pressure signals for the pump control logic. Pressure transducer shall be a solid-state bonded strain gage type with an accuracy of < ±0.5% BFSL and constructed of 316 stainless steel. Transducer shall be rated for a pressure of 300 psi and shall provide gauge pressure output, rather than an absolute. Pressure transducer constructed of plastic is not acceptable. Pressure transducer shall be 4-20mA analog type with 10-28 VDC supply range shall utilize a packard type connector to prevent moisture intrusion and include surge protection against voltage spikes.
    b. Provide a low pressure switch, with a 6-90 PSI range. The switch shall be mounted to the suction manifold and provide protection against low inlet pressure.
    c. Flowmeter, when specified and shown in the plans
    d. Provide a Bell & Gossett ST-104 field mounted flow sensor transmitter as indicated on the plans. Unit shall transmit an isolated 4-20 mA dc signal indicative of process variable to the pump logic controller via standard two wire 24 VDC system. Unit shall consist of an insertion probe and separately mounted transmitter. The unit shall be accurate to within 1% of flow rate from 1.0 ft/ sec to 30.0 ft/sec and shall withstand a static pressure of 200.0 psi g with negligible change in output.

O. PLUMBING

1. Station Frame
    a. The pump station frame shall be constructed from 304 stainless steel and designed to provide structural support for all attached equipment and provide anchor bolt support. The base shall supply sufficient rigidity to withstand the stresses of reasonable and competent transportation to site, off-loading, installation and operation.
2. Manifolds and Piping
    a. All piping shall be constructed from 304 stainless steel, schedule 10 or heavier pipe as required to maintain a 3 to 1 pressure safety factor (including 0.062 in corrosion allowance).
3. Isolation ball valves
    b. Isolation ball valves shall be certified to NSF-61 for use with potable drinking water.
    c. Isolation ball valves shall be certified as low lead having wetted surface area with a weighted average lead content<0.25%.
    d. Valves shall be rated for 600.0 psi g WOG / 150.0 psi g WSP for valves 0.25 in to 2.0 in and 400.0 psi g WOG / 125.0 psi g WSP for valves 2.5 in to 4.0 in.
    e. Seats and stem packing shall be virgin PTFE. Stem shall be bottom loaded blowout proof design with fluorocarbon elastomer O-ring to prevent stem leaks.
    f. Valves shall be 2-piece full port design.
5. Isolation Grooved Butterfly Valves
    a. Valves shall be certified to NSF-61 for use with potable drinking water.
    b. Valve bodies shall be nylon coated ductile iron conforming to ASTM A536 with integral neck and ISO mounting top.

c. The disc shall be encapsulated with Gr. E EPDM for cold and hot water services.
d. Valves shall be rated for 300.0 psi g CWP

6. Threaded check valves
   a. Body shall be stainless steel
   b. Dome shall be Delrin
   c. Disc shall be Buna-n
   d. Guide shall be Delrin
   e. Screw shall be stainless steel
   f. Spring shall be stainless steel
7. Wafer Style Silent check valves
   a. The valve body shall be constructed of ASTM A126 Class B cast iron for Class 125/250 (Lead free).
   b. The seat and double guided disc shall be ASTM B584, C87600 silicon bronze.
   c. The compression spring shall be ASTM A313 Type 316 Stainless Steel.
   d. Valve shall be NSF/ANSI 61 & 372 certified.
   e. The valve design shall incorporate a center guided, spring loaded disc, guided at opposite ends and having a short linear stroke that generates a flow area equal to the nominal valve size.
   f. The operation of the valve shall not be affected by the position of installation. The valve shall be capable of operating in the horizontal or vertical positions with the flow up or down.
   g. All component parts shall be field replaceable without the need of special tools. A replaceable guide bushing shall be provided and held in position by the spring. The spring shall be designed to withstand 100,000 cycles without failure and provide a cracking pressure of 0.5 psi g.
   h. The valve disc shall be concave to the flow direction providing for disc stabilization, maximum strength, and a minimum flow velocity to open the valve.
   i. The valve disc and seat shall have a seating surface finish of 16 micro-inch or better to ensure positive seating at all pressures. The leakage rate shall not exceed the allowable rate for metal seated valves allowed by AWWA Standard C508 or 1 oz (30 ml) per hour per inch (mm) of valve diameter.
   j. The valve flow way shall be contoured and unrestricted to provide full flow areas at all locations within the valve. Cv flow coefficients shall be equal to or greater than specified below and verified by an independent testing laboratory.
   k. The valves shall be hydrostatically tested at 1.5 times their rated cold working pressure and seat tested at the valve CWP.
8. Pumps
   a. Stainless Steel Vertical Multistage, Goulds Water Technology e-SV
   b. AISI 304 wetted components
   c. Impellers: AISI 304
   d. Diffuser: AISI 304

e. External Sleeve: AISI 304
f. Pump Body: AISI 304
g. Seal Housing: AISI 304
h. Plumbing Seal: Carb-Silcarb-Viton. Access to Plumbing seal shall not require removing the motor.

9. Pressure Gauges
   a. Gauges shall be provided for the suction and discharge manifold.
   b. Accuracy shall be ±1.5%
   c. Bourdon tube and connection shall be constructed of 316SS.
   d. Case, bezel and internals shall be constructed of 316SS.
   e. Gauge shall be filled with glycerin in order to dampen pulsation and vibration and to provide lubrication to the internal parts.
   f. Gauge range shall be selected to cover the largest operating range for the specific conditions and pump selected.
10. Flange Bolts
   a. Bolts shall be zinc plated and shall meet ASTM Grade A193 B7.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install equipment in accordance with manufacturer's instructions.

B. The contractor shall align the pump and motor shafts to within the manufacturer's recommended tolerances prior to system start-up.

C. Power wiring, as required, shall be the responsibility of the electrical contractor. All wiring shall be performed per manufacturer's instructions and applicable state, federal and local codes.

D. Control wiring for remote mounted switches and sensor / transmitters shall be the responsibility of the controls contractor. All wiring shall be performed per manufacturer's instructions and applicable state, federal and local codes.

3.02 DEMONSTRATION

A. The system manufacturer's factory qualified representative shall be capable of providing optional start-up of the packaged pumping system. This start-up shall include verification of proper installation, system initiation, adjustment and fine tuning. Start-up shall not be considered complete until the sequence of operation, including all alarms, has been sufficiently demonstrated to the owner or owner's designated representative. This job site visit shall occur only after all hook-ups, tie-ins, and terminations have been completed and signed-off on the manufacturer's start-up request form.

B. The system manufacturer's factory qualified representative shall be capable of providing on-site training for owner's personnel. This training shall fully cover maintenance and operation of all system components.

C. The system manufacturer must have an optional complete pressure booster training program available for owner's personnel. The training sessions shall take place at the

manufacturer's facility and cover all aspects of pressure booster system design, service and operation.

3.03 WARRANTY

A. The manufacturer shall warrant the water pumping system to be free of defects in material and workmanship for one year (12 months) from date of authorized start-up, not to exceed eighteen (18) months from date of manufacturer's invoice. Complete terms and conditions will be provided upon request.

3.04 START-UP SERVICE

A. Owner start up assistance will be provided by a manufacturer qualified representative and will be limited to one 8-hour day, unless previously negotiated by the factory representative. When

B. discharge piping, electrical connections, and electrical inspection have been completed, the pump station representative shall be contacted for start up. A minimum two-week notice shall be given to manufacturer representative prior to scheduled start up date. During start up, the complete pumping system shall be given a running test of normal start and stop, and fully loaded operating conditions. During this test, each pump shall demonstrate its ability to operate without undue vibration, or overheating, and shall demonstrate its general fitness for service. All defects shall be corrected and adjustments shall be made to the pumping station for satisfactory operation. System problems or concerns will be corrected by the general contractor or site station staff, in conjunction with the appropriate factory representative. Testing shall be repeated until satisfactory results are obtained, as determined by the engineer.

End of Section 22 11 23

PART 1 GENERAL

1.01 Description of Work

A. Provide the pipe and fittings as specified and indicated on the drawings.

1.02 Approved Manufacturers

A. The basis for the equipment in this specification is Charlotte Pipe and shall represent the minimum level of construction. Equipment from ABI and Tyler Pipe shall be permitted to bid these specifications

1.03 Shop Drawings

A. Shop drawings shall be submitted as specified in Division 1.

B. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

C. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the material in accordance with the latest adopted version of CISPI Standard 301 or ASTM A888 or ASTM A74.

PART 2 PRODUCTS

2.01 Above Grade Piping and Fittings

A. Where allowable by Local Codes, Schedule 40 PVC drain waste and vent piping with solvent welded joints shall be used for all soil, waste and vents lines located above grade. All changes in directions shall be made by the use of 45 wyes, half wyes, long sweep 1/4 bends, 1/6, 1/8, or 1/16 bends. Sanitary tees may be used where the changes in direction of flow are from horizontal to vertical. Where space conditions necessitate the use of short radius fitting, approval shall be obtained before installation

B. Service weight centrifugally cast iron soil pipe, ASTM A888 and/or CISPI 301 listed, with "NO-HUB" joints shall be used for soil, waste and vent lines. All changes in direction shall be made by the use of 45 wyes, half wyes, long sweep l/4 bends, 1/6, 1/8, or 1/16 bends. Sanitary tees may be used where the changes in direction of flow is from horizontal to vertical. Where space conditions necessitate the use of short radius fitting, approval shall be obtained before installation.

C. Couplings for joining hubless cast iron pipe and fittings conforming to ASTM Q-888, shall be 3 inches wide for nominal pipe sizes 1 ½ to 4 inches in diameter, 4 inches wide for nominal sizes 5 to 10 inch diameter, and 5 5/8 inches wide for couplings 12 and 15 inches in diameter.

D. Shields shall have a minimum thickness of 0.015 inches, (28 gauge) type 304 stainless steel. Worm drive clamps shall be type 304 stainless steel with a minimum clamp torque of 80 in/lbs.

E. Sealing gasket shall be neoprene conforming to ASTM C-564.

F. Couplings shall conform to FM standard 1680, Class 1, or ASTM C-1540 and shall be manufactured by Clamp-All Products Model Hi-Torq 125 and Hi-Torq 80, or equal Husky Technologies Model SD-4000.

G. Install pipe and fittings per the Cast Iron Soil Pipe Institute Designation 3011. Restrain pipe and fittings 4” and larger, per Code, with engineered products installed as per manufacturer’s recommendations.

H. Galvanized pipe shall be used from the tapped sanitary tee through wall to fountain and sink trap connections.

PART 3 EXECUTION

3.01 Soil, Waste and Vent Lines

A. The arrangement of the systems must be as direct as possible avoiding all unnecessary offsets. All pipe shall run as indicated on the drawings, unless some condition should arise which would make it necessary or seem advisable to alter same; in which case, the Architect or his representative must be consulted before making any change. Horizontal lines shall be graded at 1/8" per foot, unless noted otherwise. Where necessary, lines may pitch at 1/10" per foot when approved or noted.

B. Every vent for traps shall be connected to the waste line by as short a connection as possible, but in no case shall such connections have a length greater than 2' in length, measuring horizontally from the center of the fixture to the vent. Horizontal vents shall connect into the main stack at least 18" above the highest fixture.

C. Each fixture and piece of equipment requiring connection to the sanitary drainage system shall be equipped with a trap. Each trap shall be placed as near the fixture as possible and no fixture shall be double-trapped.

D. All piping shall be installed in strict compliance with all adopted building codes as well as manufacturer’s recommendations.

3.02 Exposed and Concealed Piping

A. All piping shall be concealed in walls, below floors, or above ceilings unless indicated otherwise or shown running through areas with exposed structure.

B. All pipe shall be installed parallel, perpendicular or a 45degree angle to building surfaces.

End of Section 22 13 00

SECTION 22 13 19 - SANITARY SPECIALTIES

PART 1 GENERAL

1.01 Description of Work

A. Provide the sanitary system specialties as specified and indicated on the drawings.

1.02 Approved Manufacturers

A. The basis for the cleanouts and drains in this specification is Zurn and shall represent the minimum level of construction. Products manufactured by Smith, Wade, Josam, Watts Drainage, and Stiebel Eltron shall be permitted to bid these specifications

PART 2 PRODUCTS

2.01 Cleanouts

A. Provide Zurn, or approved equal, cleanouts where shown. Cleanouts shall be the same size pipe for pipe 4" and smaller, and 4" for lines 4" and larger.

B. Cleanouts shall be as follows:

C. Floor and exterior cleanouts shall be Zurn ZN-1400-HD. Set in 24" x 24" x 4" concrete pad for exterior use.

D. Wall cleanouts shall be "NO-HUB" caps behind Zurn ZANB-1460, 10 x 10 nickel bronze with polished top.

E. Provide top material and/or finish(es) as directed by the architect. Cleanouts shall be provided with carpet covers where applicable.

2.02 Floor Drains

A. Floor drains shall be Zurn with deep seal trap and shall be as scheduled on the drawings. Trap material shall match that of system connection.

B. Unless noted otherwise, or specifically excluded by code, provide Sure Seal, or equal, inline floor drain trap seal having ASSE 1072 approved listing. Products not having the ASSE 1072 approved listing will not be accepted.

C. Provide grate material and/or finish(es) as directed by the architect.

2.03 Floor Sinks

A. Floor sinks shall be Zurn with deep seal trap and shall be as scheduled on the plans. Trap material shall match that of system connection.

B. Unless noted otherwise, or specifically excluded by code, provide Sure Seal, or equal, inline floor drain trap seal having ASSE 1072 approved listing. Products not having the ASSE 1072 approved listing will not be accepted.

C. Provide top grate material and/or finish(es) as directed by the architect.

PART 3 EXECUTION

End of Section 22 13 19

SECTION 22 14 00 - STORM WATER PIPE AND FITTINGS

PART 1 GENERAL

1.01 Description of Work

A. Provide the pipe and fittings as specified and indicated on the drawings.

1.02 Approved Manufacturers

A. The basis for the equipment in this specification is Charlotte Pipe and shall represent the minimum level of construction. Equipment from ABI and Tyler Pipe shall be permitted to bid these specifications

1.03 Shop Drawings

A. Shop drawings shall be submitted as specified in Division 1.

B. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the material in accordance with the latest adopted version of CISPI Standard 301 or ASTM A888 or ASTM A74.

PART 2 PRODUCTS

2.01 Above Grade Piping and Fittings

A. Service weight centrifugally cast iron soil pipe, bearing the mark of the Cast Iron Soil Pipe Institute and shall be listed by NSF International, with "NO-HUB" joints shall be used for soil, waste and vent lines. All changes in direction shall be made by the use of 45 wyes, half wyes, long sweep l/4 bends, 1/6, 1/8, or 1/16 bends. Sanitary tees may be used where the changes in direction of flow is from horizontal to vertical. Where space conditions necessitate the use of short radius fitting, approval shall be obtained before installation.

B. Couplings for joining hubless cast iron pipe and fittings conforming to ASTM Q-888, shall be 3 inches wide for nominal pipe sizes 1 ½ to 4 inches in diameter, 4 inches wide for nominal sizes 5 to 10 inch diameter, and 5 5/8 inches wide for couplings 12 and 15 inches in diameter. Shields shall have a minimum thickness of 0.015 inches, (28 gauge) type 304 stainless steel. Worm drive clamps shall be type 304 stainless steel with a minimum clamp torque of 80 in/lbs. Sealing gasket shall be neoprene conforming to ASTM C-564. Couplings shall conform to FM standard 1680, Class 1, or ASTM C-1540 and shall be manufactured by Clamp-All Products Model Hi-Torq 125 and Hi-Torq 80, or equal Husky Technologies Model SD-4000.

C. Where allowable by Local Codes, Schedule 40 PVC drain waste and vent piping with solvent welded joints shall be used for all soil, waste and vents lines located below and outside of the building slab. All changes in directions shall be made by the use of 45 wyes, half wyes, long sweep 1/4 bends, 1/6, 1/8, or 1/16 bends. Sanitary tees may be used where the changes in direction of flow are from horizontal to vertical. Where space conditions necessitate the use of short radius fitting, approval shall be obtained before installation

PART 3 EXECUTION

3.01 Roof Drain Lines

A. The arrangement of the systems must be as direct as possible avoiding all unnecessary

offsets. All pipe shall run as indicated on the drawings, unless some condition should arise which would make it necessary or seem advisable to alter same; in which case, the Architect or his representative must be consulted before making any change. Horizontal lines shall be graded at 1/8" per foot, unless noted otherwise. Where necessary, lines may pitch at 1/10" per foot when approved or noted.

B. All piping shall be installed in strict compliance with all International Plumbing and Building codes as well as all manufacturer's recommendations.

3.02 Exposed and Concealed Piping

A. All piping shall be concealed in walls, below floors, or above ceilings unless indicated otherwise or shown running through areas with exposed structure.

B. All pipe shall be installed parallel or perpendicular to building surfaces.

End of Section 22 14 00

SECTION 22 34 00 – GAS FIRED WATER HEATERS

PART 1 GENERAL

1.01 Description of Work

A. Provide water heating equipment as specified and as indicated on the drawings.

1.02 SUBMITTALS

A. Product Data: Include performance data, operating characteristics, furnished specialties and accessories.

1. Prior to flue vent installation, engineered calculations and drawings must be submitted to Architect/Engineer to thoroughly demonstrate that size and configuration conform to recommended size, length and footprint for each submitted water heater.

B. Pressure Drop Curve: Submit pressure drop curve for flows ranging from 0 GPM to maximum value of water heater.

C. Shop Drawings: For water heaters, water heater trim and accessories, include:

1. Plans, elevations, sections, details and attachments to other work
2. Wiring Diagrams for power, signal and control wiring

D. Source Quality Control Test Reports: Reports shall be included in submittals.

E. Field Quality Control Test Reports: Reports shall be included in submittals.

F. Operation and Maintenance Data: Data to be included in water heater emergency, operation and maintenance manuals.

G. Warranty: Standard warranty specified in this Section.

H. Other Informational Submittals.

1. ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to water heater.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices and Accessories: Condensing water heaters must be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASME Compliance: Condensing water heaters must be constructed in accordance with ASME Water heater and Pressure Vessel Code, Section IV (HLW) Potable Water Heaters.

C. DOE Compliance: Minimum efficiency shall comply with 10 CFR Part 431, Subpart G, Appendix C, "Uniform Test Method for the Measurement of Thermal Efficiency and Standby Loss of Gas-Fired and Oil-Fired Instantaneous Water Heaters and Hot Water Supply Boilers (Other Than Storage-Type Instantaneous Water Heaters)”

D. UL Compliance. Condensing water heaters must be tested for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Condensing water heaters shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

E. NOx Emission Standards. When installed and operated in accordance with manufacturer’s instructions, condensing water heaters hall comply with the NOx emission standards outlined in South Coast Air Quality Management District (SCAQMD), Rule 1146.2; and the Texas Commission on Environmental Quality (TCEQ), Title 30,

Chapter 117, Rule 117.465.

F. Low Lead Compliance: Condensing water heaters must be third party classified to meet the requirements of ANSI/NSF 372, hence that the weighted average of the wetted surface area in contact with potable water must be no greater than 0.25% lead content.

1.04 WARRANTY

A. Standard Warranty: Water heaters shall include manufacturer's standard form in which manufacturer agrees to repair or replace components of water heaters that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Fire-Tube Condensing Water heaters:
   a. The pressure vessel shall carry a 10-year from shipment, non-prorated, limited warranty against any failure due to waterside corrosion, Plumbing defects, or workmanship. The heat exchanger shall carry a 10-year from shipment, prorated, limited warranty against any failure due to condensate corrosion, thermal stress, Plumbing defects, or workmanship.
   b. Manufacturer labeled control panels are conditionally warranted against failure for two (2) years from shipment.
   c. All other components, with the exception of the igniter and flame detector, are conditionally guaranteed against any failure for 18 months from shipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

C. Basis-of-Design Product: Subject to compliance with requirements, provide AERCO INNOVATION, Model INN1350N; or a comparable product by one of the following:

1. AERCO International, Inc.

2.02 CONSTRUCTION

A. General: The water heating plant shall have a total recovery of 5238 GPH, at a 90ºF temperature rise with three of the four heaters operating (N+1). Each water heater shall be UL Listed; ASME Section IV (HLW) coded and stamped and shall incorporate a FM Gas train. System shall consist of a quantity of 4 Water Heaters Model INN1350 each with an input of 1350 MBH, output of 1300 MBH, 1560 GPH, (26 GPM) at 40-140 ºF when fired with natural gas, turndown ratio up to 27:1, NOx emissions of less than 20 ppm.)

B. Description: Water heater shall be direct fired, fully condensing, fire-tube design. Power burner shall have full modulation. The minimum firing rate at 50,000 BTU/HR input shall be possible. Water heaters that have an input greater than 50,000 BTU/Hr at minimum fire will not be considered equal. The water heater shall have the capability of discharging into a positive pressure vent. Water heater thermal efficiency shall increase with decreasing load (output), while maintaining setpoint. Water heater shall have an operational setpoint capability of 50 ºF to 190 ºF and shall maintain the outlet temperature within an accuracy of +/- 4 ºF during load changes of up to 50% rated

capacity. Heater shall operate quietly, less than 55 dba. Water heater shall be factory-fabricated, factory-assembled and factory-tested, fire-tube condensing water heater with heat exchanger sealed pressure-tight, built on a steel base, including a sealed insulated sheet metal enclosure that acts as combustion-air intake plenum, flue-gas vent, water supply, return and condensate drain connections, and controls. Each water heater shall have an ASME approved temperature/pressure relief valve with a setting of 150 psig and 210 ^{o}F.

C. Heat Exchanger: The heat exchanger shall be an AERguard™ stainless steel heat exchanger assembly featuring stainless steel helical fire tubes, combustion chamber and dished tubesheet, with a two-pass combustion gas flow design. The materials of construction shall consist of austenitic and noble metals, and autocatalytic chemical reduction processes to provide superior corrosion resistance and performance in domestic hot water applications. The fire tubes shall be 3/4" OD, with no less than 0.035" wall thickness. The upper and lower stainless steel tubesheet shall be no less than 0.625" thick. The heat exchanger shall be welded and brazed construction. The heat exchanger shall be ASME Sect IV (HLW) stamped for a working pressure not less than 160 psig.

D. Shell Assembly Pressure Vessel: The shell assembly pressure vessel shall have a maximum water volume of 26 gallons. The water heater water pressure drop shall not exceed 2 psig at 30 gpm. The water heater water connections shall be 2-inch NPT male connections. The shell assembly pressure vessel shall be constructed of duplex stainless steel of 0.25-inch wall thickness. Duplex stainless steel, by nature of its grain structure, offers superior protection against salt/chloride attacks compared to 300 series stainless steels. Shell/pressure vessel materials of construction other than duplex stainless steel shall not be permitted. Inspection openings in the pressure vessel shall be in accordance with ASME Section IV pressure vessel code. The shell assembly pressure vessel shall be ASME Sect IV (HLW) stamped for a working pressure not less than 160 psig.

E. Modulating Air/Fuel Valve and Burner: The water heater burner shall be capable of up to 27-to-1 turndown ratio of the firing rate without loss of combustion efficiency or staging of gas valves. The burner shall produce less than 20 ppm of NOx corrected to 3% excess oxygen. The unit shall be certified by the South Coast Air Quality Management District (SCAQMD) as compliant with Rule 1146.2 for water heaters and water heaters less than or equal to 2 MBTUs, and the Texas Commission on Environmental Quality (TCEQ) as being compliant with Section 117.465 for water heaters and water heaters less than or equal to 2 MBTUs. The burner shall be metal-fiber mesh covering a stainless steel body with spark ignition and flame rectification. All burner material exposed to the combustion zone shall be of stainless steel construction. There shall be no moving parts within the burner itself. A modulating air/fuel valve shall meter the air and fuel input. The modulating motor must be linked to both the gas valve body and air valve body with a single linkage. The linkage shall not require any field adjustment. A variable frequency drive (VFD), controlled cast aluminum pre-mix blower shall be used to ensure the optimum mixing of air and fuel between the air/fuel valve and the burner.

F. The exhaust manifold shall be of corrosion resistant cast aluminum with a 6-inch diameter flue connection. The exhaust manifold shall have a collecting reservoir and a gravity drain for the elimination of condensation.

G. Blower. The water heater shall include a variable-speed, DC centrifugal fan to operate during the burner firing sequence and pre-purge the combustion chamber.

1. Motors: Blower motors shall comply with requirements specified in Division 23

Section "Common Motor Requirements for HVAC Equipment."

a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require a motor to operate in the service factor range above 1.0.

H. Ignition: Ignition shall be via spark ignition with 100 percent main-valve shutoff and electronic flame supervision.

2.03 CONTROLS

A. The water heater shall have an integrated water heating control that is capable of operating the unit and associated accessories including but not limited to: its pumps, valves and dampers.

1. The control shall have a 4.5 inch color touch screen display as well as six function buttons that are separate from the display. User shall have the ability to navigate the menus via touchscreen or navigation buttons. Controls not equipped with navigation button options shall not be permitted.
2. The control shall be equipped with a multi-color linear LED light to indicate the level of firing and/or air/fuel valve position.
3. The control shall display two temperatures using two dedicated three-digit seven-segment displays.
4. The control shall offer an Enable/Disable toggle switch as well as two buttons for Testing and Resetting the Low Water Cutoff.

B. The water heater control system shall be segregated into three components: “Edge [i]” Control Panel, Power Box and Input/Output Connection Box. The entire system shall be Underwriters Laboratories recognized.

C. The control panel shall consist of seven individual circuit boards using state-of-the-art surface-mount technology in a single enclosure. These circuit boards shall include:

1. A microcontroller board with integrated 4.5 inch touchscreen color display providing the user interface.
2. A 7-segment display board. This board includes two 3-digit 7-segment displays. These displays shall be used to view a variety of temperature sensor values and operating and startup function status.
3. An Interface board connects the microcontroller board to internal components using ribbon cables.
4. An electric low-water cutoff board connects with microcontroller board for the test and manual reset functions.
5. A power supply board is designed to provide the various DC voltages required by control system boards. It also acts as voltage regulator and reduce power noise.
6. An ignition and combustion board. This board controls the air/fuel valve and Safety Shutoff Valve, flame status and ignition transformer
7. A connector board used to connect all external electrical connection.
8. Each board shall be individually field replaceable.

D. The combustion safeguard/flame monitoring system shall use spark ignition and a rectification-type flame sensor.

E. The control panel hardware shall have native support for both RJ-45 and RS-485 remote communications.

F. The controls shall annunciate water heater and sensor status and include comprehensive self-diagnostic capabilities that incorporate a minimum of eight separate status messages and 52 separate fault messages.

G. Copy and download control settings using USB: To significantly reduce installation time by reducing long repetitive work, during unit startup the control shall have the capability to save units settings to a USB flash drive. Installers shall have the ability to select preconfigured unit settings from USB flash drive and download to a new unit.

H. Software update: The control shall be capable of field software updates without a need for hardware component(s) replacement. This shall be performed either using software on a USB flash drive or via Internet connection. The software update shall not require a trained technician. The software update menus shall be secured using a password level. After the software update, the control shall retain all of its prior field settings.

I. Combustion calibration: The control shall offer at least 6 calibration points. The use of less than 5 calibration points is not permitted to improve overall system efficiency under all firing rates. Each combustion calibration point shall operate with 5% to 7% O2 levels to improve operating efficiency. Deviating away from these values shall not be acceptable.

J. The control panel shall incorporate four self-governing features designed to enhance operation in modes where it receives an external control signal by eliminating nuisance faults due to over-temperature, improper external signal or loss of external signal. These features include:

1. Setpoint High Limit: Setpoint high limit allows for a selectable maximum water heater outlet temperature and acts as temperature limiting governor. Setpoint limit is based on a PID function that automatically limits firing rate to maintain outlet temperature within a 0 to 10 degrees selectable band from the desired maximum water heater outlet temperature.
2. Setpoint Low Limit: Setpoint low limit allows for a selectable minimum operating temperature.
3. Failsafe Mode: Failsafe mode allows the water heater to switch its mode to operate from an internal setpoint if its external control signal is lost, rather than shut off. This is a selectable mode, enabling the control can to shut off the unit upon loss of external signal, if so desired.
4. Freeze Protection: Protection mode that fires the unit and activates pump controls to prevent freezing of water volume within pressure vessel. Control system continually monitors water temperatures within vessel to prevent reaching freezing conditions when unit is enabled.

K. The water heater control system shall incorporate the following additional features for enhanced external system interface:

1. System start temperature feature
2. Pump delay timer
3. Auxiliary start delay timer
4. Auxiliary temperature sensor
5. Analog output feature to enable simple monitoring of temperature setpoint, outlet temperature or fire rate
6. Remote interlock circuit
7. Delayed interlock circuit
8. Fault relay for remote fault alarm

L. Water Heater Management: the water heater control system shall incorporate native sequencing logic that would allow lead-lag functionality & sequencing between multiple water heaters operating in parallel and must have the following capabilities:

1. Efficiently sequence 2 up to 16 units on the same system to meet the load

requirement.

2. Individual unit feed-forward logic will still be enabled for accurate temperature control equal to individual unit's specification.
3. Operate one motorized valve per unit as an element of the load sequencing, Valves shall close with decreased load as heaters turn off, minimum of one (quantity must be selectable) must always stay open for recirculation.
4. Automatically rotate lead/lag amongst the units on the chain and monitor run hours per unit and balance load in an effort to equalize unit run hours.
5. Automatic bump-less transfer of manager function to next unit on the chain in case of designated manager unit failure; manager/client status should be shown on the individual unit displays.
6. Units will default to individual control upon failure of the communications chain.
7. Night temperature setback.
8. Designated manager control, used to display and adjust key system parameters.

M. Unit and Plant Status: The control shall provide a quick view of the unit status and plant status.

1. The unit status screen shall provide temperature setpoint, all water inlet and outlet and supply air and exhaust temperature sensors' values. It shall also provide unit current and target firing rates. Additional screens shall display unit run hours, cycle count and average cycles per hour.
2. The plant status screens shall provide plant temperature setpoint, plant water supply and current temperatures. Additionally, a status screen shall show the water heater status of each plant unit, plant firing rate.
3. Unit and Plant event history: The manager control shall display the last 500 historical events per plant or 200 historical events for single unit installations.

N. Each water heater shall be supplied with a factory packaged and pre-wired motorized ball valve. This valve shall be controlled by the water heater control system as an element of the integrated water heater management.

O. Each water heater shall include an electric, single-seated combination safety shutoff valve/regulator with proof of closure switch in its gas train. Each water heater shall incorporate dual over-temperature protection with manual reset, in accordance with ASME Section IV and CSD-1.

2.04 ELECTRICAL POWER

A. Controllers, Electrical Devices and Wiring: Electrical devices and connections are specified in Division 26 sections.

B. Single-Point Field Power Connection: Factory-installed and factory-wired switches, motor controllers, transformers and other electrical devices shall provide a single-point field power connection to the water heater.

C. Electrical Characteristics:

1. Voltage: 120 V
2. Phase: Single
3. Frequency: 60 Hz
4. Full-Load Current: 11 Amps

2.05 CONDENSATE

A. Low-profile condensate neutralizing tubes. Each tube shall be suitable for no less than 12 months continuous operation at full condensing rate. Tubes shall be refillable;

B. Condensate traps, manufactured from only non-corrosive materials. In order to

guarantee flue gasses cannot leak into the Plumbing room, the traps shall be float-type traps NO EXCEPTIONS.

2.06 VENTING

A. The exhaust vent must be UL Listed for use with Category II, III and IV appliances and compatible with positive pressure, condensing flue gas service. UL- listed vents of PVC, CPVC, PP, or Al 29-4C stainless steel must be used with water heaters.

B. The minimum exhaust vent duct size for each water heater is six-inch diameter.

C. Combustion-Air Intake: Water heaters shall be capable of drawing combustion air from the outdoors via a metal or PVC duct connected between the water heater and the outdoors.

D. The minimum ducted combustion air duct size for each water heater is six-inch diameter.

E. Common Vent and Common Combustion Air must be an available option for water heater installation. Consult manufacturer for common vent and combustion air sizing.

F. Follow guidelines specified in manufacturer's venting guide.

2.07 SOURCE QUALITY CONTROL

A. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions and carbon monoxide in flue gas, and to achieve combustion efficiency. Perform hydrostatic testing.

B. Test and inspect factory-assembled water heaters, before shipping, according to ASME Boiler and Pressure Vessel Code.

1. If water heaters are not factory assembled and fire-tested, the local vendor is responsible for all field assembly and testing.

C. Allow Owner access to source quality-control testing of water heaters. Notify Architect fourteen days in advance of testing.

PART 3 EXECUTION

3.01 EXAMINATION

A. Before water heater installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations. Examine piping and electrical connections to verify actual locations, sizes and other conditions affecting water heater performance, maintenance and operations.

1. Final water heater locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

B. Examine Plumbing spaces for suitable conditions where water heaters will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 WATER HEATER INSTALLATION

A. Install water heaters level on concrete bases. Concrete base is specified in Division 23 Section "Common Work Results for HVAC," and concrete materials and installation requirements are specified in Division 03.

B. Install gas-fired water heaters in accordance with

1. Local, stats provincial, and national codes, laws, regulations, and ordinances.
2. National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition.
3. National Electrical Code, ANSI/NFPA 70 - latest edition.

4. Canada only: CAN/CGA B149 Installation Code and CSA C22.1 CEC Part 1.
5. Manufacturer's installation instructions, including required service clearances and venting guidelines.

C. Assemble and install water heater trim.

D. Install electrical devices furnished with water heater but not specified to be factory mounted.

E. Install control wiring to field-mounted electrical devices.

3.03 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 sections. Drawings indicate general arrangement of piping, fittings and specialties.

B. Install piping adjacent to water heater to permit service and maintenance.

C. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

D. Connect gas piping to water heater gas-train inlet with unions. Piping shall be at least full size of gas train connection. Provide a reducer if required.

E. Connect hot-water piping to supply and return water heater tappings with shutoff valve and union or flange at each connection.

F. Multiple heaters shall be piped in reverse return or provided with balancing valves on hot water outlet. Each water heater shall have individual isolation valves for servicing and a hot water hose connection for start-up and field testing.

G. Install piping from safety relief valves to nearest floor drain.

H. Water heater Venting

1. Install flue venting kit and combustion-air intake.
2. Connect venting full size to water heater connections.

3.04 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections

1. Installation and Startup Test: Perform installation and startup checks according to manufacturer's written instructions.
2. Leak Test: Perform hydrostatic test. Repair leaks and retest until no leaks exist.
3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
4. Controls and Safeties: Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.
   b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

C. Remove and replace malfunctioning units and retest as specified above.

D. Occupancy Adjustments: When requested within 2 months of date of Substantial

Completion, provide on-site assistance adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

End of Section 22 34 00

SECTION 22 42 00 - PLUMBING FIXTURES AND TRIM

PART 1 GENERAL

1.01 Description of Work

A. Provide all fixtures complete as indicated. Fixtures shall be set firm and true, connected to all pipe and ready for use. Fixtures shall be of one manufacturer throughout the entire installation, unless otherwise specified.

B. Quarter Turn Ball Stop valves shall be provided on the hot and cold water connections to all plumbing fixtures.

C. Braided stainless steel flex connections shall be limited to 12” long.

D. Refer to elevation on Architect's drawings for installation height of wall-mounted fixtures.

1.02 Approved Manufacturers

A. The basis for the fixtures in this specification are those named and shall represent the minimum level of construction. Fixtures from Eljer, American-Standard, Crane, Gerber and Kohler shall be permitted to bid these specifications

B. The basis for the fixture carriers in this specification is Zurn and shall represent the minimum level of construction. Products manufactured by Smith, Wade, Josam, Watts Drainage, and Stiebel Eltron shall be permitted to bid these specifications

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with requirements of ANSI Standard A117.1, "Buildings and Facilities -- Providing Accessibility and Useability for Physically Handicapped People," and Public Law 90-480, "Architectural Barriers Act, 1968," with respect to plumbing fixtures for the physically handicapped.

B. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.

1. The terms "listed" and "labeled" shall be as defined in the National Electrical Code, Article 100.
2. SUBPARAGRAPH BELOW IS REQUIRED BY SOME FEDERAL AGENCIES.Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Design Concept: The drawings indicate types of plumbing fixtures and are based on the specific descriptions, manufacturers, models, and numbers indicated. Plumbing fixtures having equal performance characteristics by other manufacturers may be considered provided that deviations in dimensions, operation, color or finish, or other characteristics are minor and do not change the design concept or intended performance as judged by the Architect. Burden of proof for equality of plumbing fixtures is on the proposer.

1.04 EXTRA MATERIALS

A. Deliver extra materials to Owner. Furnish extra materials described below matching products installed, packaged with protective covering for storage, and identified with labels clearly describing contents.

B. Faucet Washers and O-rings: Furnish quantity of identical units not less than 10 percent of amount of each installed.

C. Faucet Cartridges and O-rings: Furnish quantity of identical units not less than 5 percent of amount of each installed.

D. Flushometer Repair Kits: Furnish quantity of identical units not less than 10 percent of amount of each flushometer installed.

E. Provide a hinged-top wood or metal box, or individual metal boxes, having a separate compartment for each type and size of above extra materials.

F. Water Closet Tank Repair Kits: Furnish quantity of identical flush valve units not less than 5 percent of amount of each type installed.

G. Toilet Seats: Furnish quantity of identical units not less than 5 percent of amount of each type toilet seat installed.

H. Filter Cartridges: Furnish quantity of identical filter cartridges not less than 50 percent of amount of each type and size installed.

PART 2 PRODUCTS

2.01 Plumbing Fixtures

A. Fixtures shall be as scheduled on the drawings.

2.02 Manufacturers

A. Manufacturers: Subject to compliance with requirements, provide products in each category, by one of the following listed for that category:

1. Water Closets:
   a. American Standard, Inc.
   b. Crane Plumbing/Fiat Products.
   c. Eljer; A Household International Co.
   d. Gerber Plumbing Fixture Corp.
   e. Kohler Co.
   f. Sloan
   g. Toto
2. Urinals:
   a. American Standard, Inc.
   b. Crane Plumbing/Fiat Products.
   c. Eljer; A Household International Co.
   d. Gerber Plumbing Fixture Corp.
   e. Kohler Co.
   f. Sloan
   g. Toto
3. Lavatories:
   a. Acorn Engineering Co.
   b. American Standard, Inc.
   c. Crane Plumbing/Fiat Products.
   d. Eljer; A Household International Co.
   e. Gerber Plumbing Fixture Corp.
   f. Just Manufacturing Co.
   g. Sloan
   h. Kohler Co.
4. Sinks:
   a. American Standard, Inc.
   b. Crane Plumbing/Fiat Products.
   c. Eljer; A Household International Co.
   d. Elkay Manufacturing Co.
   e. Just Manufacturing Co.

f. Kohler Co.

5. Service Sinks:
   a. Acorn Engineering Co.
   b. American Standard, Inc.
   c. Crane Plumbing/Fiat Products.
   d. Eljer; A Household International Co.
   e. Elkay Manufacturing Co.
   f. Just Manufacturing Co.
   g. Kohler Co.
6. Mop Basins:
   a. Aqua Glass Corp.
   b. Crane Plumbing/Fiat Products.
   c. Florestone Products Co., Inc.
   d. Stern-Williams Co., Inc.
7. Bath Tubs:
   a. American Standard, Inc.
   b. Aqua Glass Corp.
   c. Aquarius Div.; Briggs Industries, Inc.
   d. Crane Plumbing/Fiat Products.
   e. Eljer; A Household International Co.
   f. Florestone Products Co., Inc.
   g. Kohler Co.
8. Water Coolers:
   a. EBCO Manufacturing Co.
   b. Elkay Manufacturing Co.
   c. Filtrine Manufacturing Co.
   d. Halsey Taylor; A Household International Co.
   e. Haws Drinking Faucet Co.
   f. Sunroc Corp.
9. Outlet Boxes:
   a. Guy Gray Manufacturing Co., Inc.
   b. Symmons Industries, Inc.
10. Toilet Seats:
   a. Bemis Mfg. Co.
   b. Beneke Div.; Sanderson Plumbing Products, Inc.
   c. Church Seat Co.
   d. Olsonite Corp.
11. Flushometers:
   a. Cambridge Brass Div.; EMCO Products; Masco Corp.
   b. Gerber Plumbing Fixture Corp.
   c. Sloan Valve Co.
   d. Zurn Industries, Inc.; Flush Valve Operations.
12. Commercial/Industrial Faucets:
   a. American Standard, Inc.
   b. Chicago Faucet Co.
   c. Crane Plumbing/Fiat Products.
   d. Eljer; A Household International Co.
   e. Grohe America, Inc.
   f. Kohler Co.
   g. Royal Brass Mfg. Co.
   h. T & S Brass and Bronze Works, Inc.

13. Pressure Balance Bath/Shower Faucets:
    a. American Standard, Inc.
    b. Bradley Corp.
    c. Chicago Faucet Co.
    d. Crane Plumbing/Fiat Products.
    e. Delta Faucet Co.; Div. of Masco Corp.
    f. Grohe America, Inc.
    g. Powers Process Controls.
    h. Leonard Valve Co.
    i. Symmons Industries, Inc.
14. Thermostatic Mixing Valve Bath/Shower Faucets:
    a. Bradley Corp.
    b. Grohe America, Inc.
    c. Leonard Valve Co.
    d. Powers Process Controls.
    e. Symmons Industries, Inc.
    f. T & S Brass and Bronze Works, Inc.
15. Shower Receptors:
    a. Aqua Glass Corp.
    b. Crane Plumbing/Fiat Products.
    c. Florestone Products Co., Inc.
    d. Stern-Williams Co., Inc.
16. Supports:
    a. Josam Co.
    b. Smith (Jay R.) Mfg. Co.
    c. Wade Div.; Tyler Pipe
    d. Watts Drainage
    e. Zurn Industries, Inc.; Hydromechanics Div.

2.03 Faucets

A. Unless otherwise specified, provide faucets that are cast brass with polished chrome-plated finish.

2.04 Flushometers

A. Provide flushometers compatible with fixtures, with features and of consumption indicated.

B. Cast-brass body, brass or copper pipe or tubing inlet with wall flange and tailpiece with spud, screwdriver check stop, vacuum breaker, and brass lever handle actuation except where other variations are specified. Type shall be diaphragm operation except where other type is specified.

C. Exposed metal parts shall be polished chrome-plated, except components installed in a concealed location may be rough brass or unfinished.

PART 3 EXECUTION

3.01 Plumbing Fixtures

A. Install plumbing fixtures and specified components, in accordance with designations and locations indicated on Drawings and in complete compliance with the manufacturer’s recommendations and instructions.

B. Refer to elevations on the Architect's drawings for installation height of wall-mounted fixtures.

C. Refer to architectural plans to ensure flush valve control handle is mounted for use from the wide side of handicapped toilet stalls.

D. Set shower receptors and mop basins in leveling bed of cement grout.

E. Install stop valve in an accessible location in each water supply to each fixture.

F. Install escutcheons at each wall, floor, and ceiling penetration in exposed finished locations and within cabinets and millwork. Use deep pattern escutcheons where required to conceal protruding pipe fittings.

G. Seal fixtures to walls, floors, and counters using a sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

H. Operate and adjust all plumbing fixtures and equipment. Replace damaged and malfunctioning fixtures, fittings, and controls.

I. Adjust water pressure at drinking fountains, electric water coolers, and faucets, shower valves, and flushometers having controls, to provide proper flow and stream.

J. Clean fixtures, fittings, and spout and drain strainers with manufacturers' recommended cleaning methods and materials.

End of Section 22 42 00

SECTION 23 01 00 - GENERAL HVAC REQUIREMENTS

PART 1 GENERAL

1.01 Related Documents

A. The drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements (Division 1) and Section 26 01 13 - Electrical Connections, apply to the work specified in DIVISION 23 - HVAC

1.02 Description of Work

A. The Mechanical Contract includes all labor, materials and equipment required for the complete mechanical systems as shown and herein specified.

B. Provide all devices and accessories as necessary for complete and working systems.

C. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.

D. The contractors shall become familiar with the work of all other trades and shall fully coordinate their work prior to ordering equipment or installation of systems.

E. The Contractor shall coordinate his work with that of all other trades in order to eliminate interferences. He shall examine the drawings in advance to determine the location of sprinklers, electrical systems, ducts, piping, structures, conduits, alarms, and other equipment and services to be installed, and properly coordinate the installation of his work to avoid interferences. The Engineers have considered existing interferences in making the drawings, but it is the responsibility of the Contractor to include in his bid proposal adequate allowances to modify, offset, or otherwise accommodate all equipment to the structure, utilities, and apparatus.

1.03 Quality Assurance

A. Each major component of equipment shall have the manufacturer's name; address, model number and rating on a nameplate securely affixed.

B. All equipment of one type (such as fans, pumps, valves, etc.) shall be the products of one manufacturer, unless otherwise specified.

C. In the event of discrepancies between the drawings and specifications, the contractor shall advise the engineer before proceeding with the work in order that correct progress is ensued.

D. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel." Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.04 Shop Drawings and Submittals

A. Shop drawings shall be submitted as specified in Division 1. Product data shall be submitted for all materials and equipment specified in DIVISION 23. Shop drawings and submittals must be submitted in PDF format and emailed to the design team.

B. Shop drawings for equipment ‘Packages” shall be complete and include all items to be provided by a manufacturer’s representative or supply house. No partial submittals will be reviewed or approved without a complete and total equipment submittal.

C. Each shop drawing shall include a letter indicating all deviations from the drawings and/or specifications.

D. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Dimensional drawings showing layout, connection points, and detailed layout of components.
4. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.
5. Conspicuously mark on each submittal the exact model, fittings, accessories, and devices to be supplied. When a schedule is shown on the drawings or in the specifications, provide a copy of that schedule with the shop drawing indicating the equipment capacities and characteristics of the actual equipment being proposed.
6. Tags for equipment submitted shall match the tags indicated on the design drawings or specifications. Where equipment is noted on the drawings and not scheduled, refer to plan note and sheet number on the submittal.

E. Contractor shall check all shop drawings to verify that they meet the requirements of the drawings and specifications before forwarding to the architect and engineer. All shop drawings submitted shall bear the stamp of the contractor to show that they have been reviewed in detail.

F. No work shall be fabricated and no equipment ordered until the architect and engineer have returned acceptable reviewed shop drawings.

G. Welder certificates, signed by Contractor, certifying that welders comply with requirements specified under "Quality Assurance" article of this section.

1.05 Project Sequencing

A. The contractor shall refer to the architectural plans and specifications for areas of work and general schedules to determine the scope of work required during each phase of the construction.

B. All temporary valves, dampers, etc. not indicated, but required by phasing, shall be included in the base bid.

1.06 HVAC Design Conditions

A. Winter:

1. Outdoor: -10° F.
2. Indoor: 75° F.

B. Summer:

1. Outdoor: 96° F. DB and 77° F. WB
2. Indoor: 75° F. DB and 64° F. WB

1.07 Substitutions

A. The materials, products, and equipment described in these specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. Listing of these manufacturers shall in no way be construed as a device intended to limit the bidders to those specifically listed.

B. Reference to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number, shall be interpreted as having established a

standard of quality and shall not be construed as limiting competition. Articles, fixtures, etc. of equal quality by manufacturers listed in this specification for the applicable use, shall be acceptable, subject to performance, spatial, structural, and electrical constraints of the project design.

C. No substitution will be considered unless written request for approval has been received by the engineer at least ten working days prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and complete description of the proposed substitute including shop drawings, performance and test data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment, or work that incorporation of the proposed substitute would require, shall be included. The burden of proof of the merit of the proposed substitute is on the proposer. The engineer's approval or disapproval of a proposed substitution shall be final.

D. Approval of a proposed substitution prior to receipt of bids shall be set forth in an Addendum. Approvals made in any other manner shall not be considered binding.

E. The Engineer reserves last opinion as to a product's equality or superiority to that specified.

1.08 Definitions

A. Furnish: The term "furnish" is used to mean "supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."

B. Install: The term "install" is used to describe operations at the project site including the actual "unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations."

C. Provide: The term "provide" means "to furnish and install, complete and ready for the intended use."

D. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including all items incidental to the Work, including all services necessary for proper installation and operation. The Installation shall be included under the guarantee required by this Division.

E. The design engineer, referred to as "engineer" shall mean the engineering firm, HOSS & BROWN ENGINEERS, INC., Contact person: Casey Steiner.

1.09 Record Drawings

A. During the progress of the work of this section, this Contractor shall maintain an accurate record of all changes made in the installation of the system(s). Upon completion of the work, accurately transfer all record information to an unmarked full-size set with neatly handwritten or typed notes. Scan full-size drawings to PDF at 300 dpi.

1.10 Operation and Maintenance Manuals

A. Three (3) Flash Drives containing PDFs of Operation and Maintenance (O&M) Manuals shall be submitted as described below. Files and folder names shall be clearly labeled. Folder structure and names shall be intuitive and clearly labeled.

B. Before project close-out, submit O&M operating, maintenance instructions, and parts lists for equipment provided. Include in the manual a list of emergency service organizations capable of rendering service for each piece of equipment.

C. Keep in a safe place all keys, wrenches, and other specialty tools furnished with equipment. Present to owner at project close-out and receive a receipt showing he has

received the same.

D. At the completion of the project furnish to the Architect for the Owner O&M brochures divided and tabbed, containing all data, diagrams, capacities, spare part numbers, manufacturers service and maintenance data, warranties, guarantees, etc., including local contacts and escalation schedule complete with addresses and telephone numbers, of all equipment, apparatus, and system components furnished and installed under this Division of the specifications.

1.11 Codes and Ordinances

A. All work shall be in accordance with applicable codes, rules, ordinances, and regulations of local, state, and federal governments and other authorities having jurisdiction.

B. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.

C. The contractors shall secure and pay for the necessary permits and certificates of inspection for their trade. Keep record of all permits and inspections and submit two copies to the engineer with request for final inspection.

1.12 Owner Training

A. When training is required by any section of these specifications, all training sessions shall be recorded on a single DVD. Provide two copies of the DVD at the end of construction. The contractor shall prepare a letter of receipt to be signed by the owner when the tapes are delivered.

B. Contractor shall demonstrate to the owner that all mechanical systems installed under this division of the specifications are complete and operating as intended.

C. Any adjustments or other additional work required as a result of failure of any system to comply with the intent of this specification shall be accomplished at no additional cost to the Owner.

1.13 Warranty

A. This contractor shall warrant that the complete systems installed under this contract shall be free of defects in workmanship and materials for a period of one (1) year from the date of substantial completion by the arch/owner.

B. If defects occur during the one year guarantee period, this contractor shall repair or replace such defects at no expense to the owner and to the satisfaction of the owner and engineer.

PART 2 PRODUCTS

2.01 General

A. Where the quality of required material is not specified, the Contractor shall furnish a first class standard item as approved by the Architect/Engineer.

B. Capacities of equipment and materials shall not be less than those indicated.

C. All work performed shall provide a neat and workmanlike appearance when completed, to the satisfaction of the engineer.

D. Provide 3-1/2” concrete base for all floor mounted equipment unless shown or noted otherwise. Provide 6x6 welded wire fabric reinforcing minimum or as required by the structural engineer.

E. Adequately protect equipment from damage after delivery to the jobsite. Cover with heavy polyethylene plastic. Elevate equipment when there is danger of water damage. Equipment damaged will be rejected.

F. Any scratches to factory finishes shall be touched up using factory supplied paint before final acceptance. If extensive damage to factory finishes has occurred, equipment panels shall be replaced to the satisfaction of the engineer. If rust has formed, remove as recommended by the manufacturer prior to touch-up.

2.02 Equal Products of Listed Manufacturers

A. In general, the specifications and drawings identify required materials and equipment by naming first the manufacturer whose product was used for the basis of design. The manufacturer's product, series, model, catalog, and/or identification numbers shall set quality, construction and dimensional requirements for comparing the other manufacturer's products. The capacity and performance of all equipment shall meet or exceed what is indicated on the drawings and/or scheduled.

B. Where other manufacturer's names are listed, they are considered an acceptable manufacturer for the product specified; however, the listing of their names implies no prior approval of any product unless specific model or catalog numbers have been shown.

C. **Where other than first named products are used, it shall be the responsibility of the contractor to determine prior to bid time that his proposed materials and equipment selections do not require adjustments in the mechanical, electrical , structural, or architectural requirements as shown on the drawings. The contractor shall include in his bid all costs associated with any required adjustments.**

PART 3 EXECUTION

3.01 Installation

A. Install all equipment in strict accordance with the manufacturer's recommendations and the shop drawings reviewed by the Engineer.

B. The complete installation shall function as designed and intended with respect to efficiency, capacity, and noise level, etc. Any abnormal noise caused by rattling equipment, piping, ducts, conduit, air devices, or squeaks in rotating equipment will not be acceptable

C. Locations of equipment, piping, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.

D. Any item interfering with proper placement of other work shall be removed and relocated without extra cost if reasonable coordination would have eliminated the interference. Damage to other work caused by this contractor shall be restored as specified for new work.

E. Written dimensions are preferred over scaled dimensions. When written dimensions are not available, the contractor shall be responsible for determining the proper installed location.

F. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus, and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this

specification.

G. Contractor shall perform initial start-up of systems and shall provide necessary supervision and labor to make the first seasonal change-over of systems. Owner's operating personnel shall be present during this operation.

H. It is the contractor's responsibility to provide materials and trim which properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.

I. This contractor shall provide all miscellaneous steel, etc., for the proper installation of the systems specified and/or indicated on the plans.

3.02 Connections to Building Structure

A. Any item connecting to building structure shall be done in a manner accepted by the structural engineer.

B. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.

3.03 Cleaning

A. Periodically during construction and prior to Owner acceptance of the building, Contractor shall remove from the premises and dispose of all packing material and debris.

3.04 Visit to the Site

A. Before submitting his bid, the Contractor shall visit the location of the job and shall fully understand the scope of the work to be done and the conditions under which it is to be performed. In no case shall additional compensation be granted when existing conditions could reasonably be determined.

3.05 Existing Utilities

A. Locate and mark all known utilities prior to proceeding with work. Proceed with caution since unmarked utilities may exist on site.

B. Should any existing utilities be damaged or disrupted, immediately notify Owner and repair to existing conditions.

C. The Contractor shall closely coordinate all utility downtime with the Owner and Architect giving a minimum fourteen (14) day notice prior to downtime.

D. Downtimes are to be held to a minimum duration with the Owner being notified as to the extent of said downtime.

End of Section 23 01 00

SECTION 23 05 13 - ELECTRICAL PROVISIONS OF HVAC WORK

PART 1 GENERAL

1.01 Description of Work

A. The contractors responsible for Division 23 work shall coordinate with the Electrical Contractor to insure motor starters of the proper size are furnished. Further, the Mechanical Contractor shall furnish all electric control items indicated to the Electrical Contractor for installation and connection.

B. Refer to Section 26 01 13 - ELECTRICAL CONNECTIONS for required electrical connections.

PART 2 PRODUCTS

2.01 Motor Starters

A. The Electrical Contractor shall provide all motor starters required for equipment provided in the mechanical contract that is not integral with equipment.

PART 3 EXECUTION

3.01 Motor Starters

A. The Mechanical Contractor shall coordinate all motor starters type and size with the Electrical Contractor to insure compatibility with the motors provided in this contract.

ITEM	Furnished By	Set By	Power Wiring	Control Wiring
Factory furnished motor starters, contactors and disconnects	MC	MC	EC	TC
Loose motor starters, disconnect switches, thermal overloads and heaters.	EC	EC	EC	TC
Control relays and transformers	TC	TC	EC	TC
Thermostats (low voltage)	TC	TC	---	TC
Thermostats (line voltage)	MC	EC	EC	---
Automatic damper operators (low voltage)	TC	TC	---	TC
Automatic damper operators (line voltage)	MC	EC	EC	---
Factory furnished variable frequency drives	MC	MC	EC	TC
Loose variable frequency drives	EC	EC	EC	TC
Motor and solenoid operated valves, low voltage	MC	MC	TC	TC
Motor and solenoid operated valves, line voltage	MC	MC	EC	EC
Smoke dampers and combination fire / smoke dampers	MC	MC	EC	EC
Duct smoke detectors	EC	MC	EC	EC

MC = Mechanical Contractor
TC = Temperature Control Contractor – when there is not a separate TC, all items marked thus shall be performed by the MC.

End of Section 23 05 13

SECTION 23 05 15 - HVAC RELATED WORK

PART 1 GENERAL

1.01 Description of Work

A. The following is the work required by the General Contractor to facilitate the work of the Mechanical Contractor.

1. Openings and chases.

B. The following is the work required by the Mechanical Contractor to facilitate the work of his Contract.

1. Cutting and patching.
2. Excavation and backfilling.
3. Pipe sleeves.

1.02 Related Documents

A. Refer to Division 2 for backfilling requirements.

B. Unless otherwise addressed in the specification, as a minimum, backfill in 6” lifts, compacting to a minimum of 90%. The first 12” of fill above any buried item outside the building shall be sand in order to contrast with other fill material. Provide a yellow warning tape at the top of the sand layer.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 General Contractor's Work

A. The General Contractor shall leave such openings and chases in new construction for pipes, cabinets, access doors, and equipment as may be necessary or directed by the Architect to facilitate the work of the Mechanical Contractor and to refinish around same. The Mechanical Contractor shall properly advise in due time as to the location and sizes of such openings and chases.

3.02 Mechanical Contractor's Work

A. The Mechanical Contractor shall be responsible for locating and setting his own pipe sleeves, and be well aware of the job progress to avoid unnecessary delay for setting of same.

B. The Mechanical Contractor shall be responsible for cutting his own holes in existing construction and for patching and finishing around same, unless noted otherwise, to the satisfaction of the Architect. Any holes left in walls when existing pipe is removed by this Contractor shall be patched and finished by this Contractor.

C. The Mechanical Contractor shall do all excavating and backfilling necessary to complete work under this contract. Lines shall be used to lay out the trenches for underground work. Trenches shall be of sufficient width and shall be cribbed or braced to prevent cave-in or settlement. Trenches close to walls and columns of the building shall not be excavated without the Architect's prior consent. The bottoms of trenches shall be tamped hard and graded to secure the required fall before laying pipe. Bell holes shall be excavated so the pipe will rest on solid ground for its entire length.

D. Hand backfill and tamp backfill into place at sides of pipes, leaving tops and joints exposed until pipe runs have been tested and approved.

E. All sidewalks, streets, or alley surfaces that have to be broken in connection with this contract shall be patched to the satisfaction of the Architect.

End of Section 23 05 15

SECTION 23 05 16 - EXPANSION COMPENSATORS

PART 1 GENERAL

1.01 Description of Work

A. Provide expansion compensators as specified and as indicated on the drawings.

B. Provide flexible pipe expansion compensators with guides as per manufacturer's recommendations. Bellows-type and slip type compensators are not acceptable

1.02 Approved Manufacturers

A. The basis for this specification is Metraflex and shall represent the minimum level of construction.

PART 2 PRODUCTS

2.01 Expansion Joints

A. Provide Metraflex, "Metraloops", or approved equal, flexible loop type compensators constructed of two flexible sections of hose and braid, two 90° elbows and one 180° return bend.

B. Expansion compensators shall impart minimal thrust loads to anchors and shall be installed in a neutral, pre-compressed or pre-extended condition as required by installation temperatures.

C. Compensators shall be guided to direct movement into the Metraloop. One guide will be required within four pipe diameters on either side of the compensator.

D. The compensator shall be supported at the 180° turn bend installed in the horizontal plane. No support is required if installed in the vertical plane.

E. The compensators in copper lines shall be bronze hose and braid with copper sweat ends:

LINES	SERIES
1/2" to 2 1/2"	MLS rated for 4" movement

F. Compensators in steel system shall be stainless steel hose and braid with grooved or flanged ends:

LINES	SERIES
1/2" to 2"	MLT rated for 4" movement
2½" & larger	MLF or MLW rated for 4" movement – MLG may be substituted in grooved s systems

PART 3 EXECUTION

3.01 Installation

A. Each compensator shall be installed in strict compliance with manufacturer's recommendations.

End of Section 23 05 16

SECTION 23 05 17 - FIRE STOPPING FOR HVAC SYSTEMS

PART 1 GENERAL

1.01 Related Documents

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 Definitions

A. Fire stopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 General Description of the Work of this Section

A. Only tested fire stop systems shall be used in specific locations as follows:

1. Penetrations for the passage of duct, piping, and other Mechanical equipment through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
2. Repetitive mechanical penetrations in fire-rated floor assemblies.

1.04 References

A. Test Requirements: ASTM E-814-02, "Standard Method of Fire Tests of Through Penetration Fire Stops"

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 (August 24, 2000) and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually. The UL Fire Resistance Directory includes the following:

1. Fire stop Devices (XHJI)
2. Fire Resistance Ratings (BXUV)
3. Through-Penetration Fire stop Systems (XHEZ)
4. Fill, Voids, or Cavity Material (XHHW)
5. Forming Materials (XHKU)

C. International Fire stop Council Guidelines for Evaluating Fire stop Systems Engineering Judgments

D. Inspection Requirements: ASTM E 2174 – 01, “Standard Practice for On-site Inspection of Installed Fire Stops.”

E. ASTM E-84-01, “Standard Test Method for Surface Burning Characteristics of Building Materials.”

F. All major building codes: ICBO, SBCCI, BOCA, and IBC.

G. NFPA 101 - Life Safety Code

1.05 Quality Assurance

A. A manufacturer's direct representative (not distributor or agent) to be on-site during initial installation of fire stop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Fire stop System installation must meet requirements of ASTM E-814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed fire stop materials and methods shall conform to applicable governing codes

having local jurisdiction.

D. Fire stop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those fire stop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Fire stop Council.

1.06 Submittals

A. Submit Product Data: Manufacturer’s specifications and technical data for each material including the composition and limitations, documentation of UL fire stop systems to be used and manufacturer's UL approved installation instructions.

B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor’s name who will install fire stop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to job-site.

1.07 Installer Qualifications

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the fire stopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A manufacturer’s willingness to sell its fire stopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.08 Delivery, Storage, and Handling

A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.

D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.

E. Do not use damaged or expired materials.

1.09 Project Conditions

A. Do not use materials that contain flammable solvents.

B. Scheduling

1. Schedule installation of CAST IN PLACE fire stop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
2. Schedule installation of other fire stopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of fire stop materials when

temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent fire stopping materials from contaminating any adjacent surfaces.

PART 2 PRODUCTS

2.01 Fire stopping, General

A. Provide fire stopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the fire stopping under conditions of service and application, as demonstrated by the fire stopping manufacturer based on testing and field experience.

B. Provide components for each fire stopping system that are needed to install fill material. Use only components specified by the fire stopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.02 Acceptable Manufacturers

A. Subject to compliance with through penetration fire stop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma, Phone 800-879-8000
2. 3M Fire Barrier Products.

2.03 Materials

A. Use only fire stop products that have been UL 1479, ASTM E-814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place fire stop devices are installed prior to concrete placement for use with non-combustible and combustible plastic pipe penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Fire stop Device: Add Aerator adaptor when used in conjunction with aerator (“solvent”) system.

C. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Fire stop Sealant
2. Hilti CP 604 Self-leveling Fire stop Sealant
3. Hilti CP 620 Fire Foam
4. Hilti CP 606 Flexible Fire stop Sealant
5. Hilti CP 601s Elastomeric Fire stop Sealant

D. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:

1. Hilti CP 601s Elastomeric Fire stop Sealant
2. Hilti CP 606 Flexible Fire stop Sealant
3. Hilti FS-ONE Intumescent Fire stop Sealant

E. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, and plastic pipe, the following products are acceptable:

1. Hilti FS-ONE Intumescent Fire stop Sealant

F. Fire stop collar or wrap devices attached to assembly around combustible plastic pipe, the following products are acceptable:

1. Hilti CP 642 Fire stop Collar
2. Hilti CP 643 Fire stop Collar
3. Hilti CP 645 Wrap Strips

G. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate multiple steel and copper pipes, the following products are acceptable:

1. Hilti FS 657 FIRE BLOCK

H. Provide a fire stop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

PART 3 EXECUTION

3.01 Preparation

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which fire stop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by fire stopping materials.
4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of fire stopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Coordination

A. Coordinate location and proper selection of cast-in-place Fire stop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

B. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place fire stop devices without interferences.

3.03 Installation

A. Regulatory Requirements: Install fire stop materials in accordance with UL Fire Resistance Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration joint materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
2. Consult with Mechanical engineer, project manager, and damper manufacturer prior to installation of UL fire stop systems that might hamper the performance of fire dampers as it pertains to duct work.
3. Protect materials from damage on surfaces subjected to traffic.

3.04 Field Quality Controls

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Inspection of through-penetration fire stopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of fire stopping caused by cutting or penetrating of existing fire stop systems already installed by other trades.

3.05 Adjusting and Cleaning

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess fire stop materials and soiling as work progresses.

End of Section 23 05 17

SECTION 23 05 19 - METERS AND GAUGES

PART 1 GENERAL

1.01 Description of Work

A. Provide meters and gauges as specified and indicated on drawings.

1.02 Approved Manufacturers

A. Provide devices by one of the following manufacturers.

1. Marshalltown
2. Trerice
3. Weiss Instruments
4. Weksler Instruments
5. Earnst Gauge
6. Miljoco
7. US Gauge
8. Crosby

PART 2 PRODUCTS

2.01 Thermometers

A. Accuracy: Plus or minus 1 percent of range span or plus or minus one scale division to maximum of 1.5 percent of range span.

B. Scale range: Temperature ranges for services listed as follows:

1. Heating Hot Water: 30°F to 300°F with 2°F scale divisions.
2. Condensed Water: 0°F to 160°F with 2°F scale divisions.
3. Chilled Water: 0°F to 100°F with 2°F scale divisions.
4. Steam and Condensate: 50°F to 400°F with 2°F scale divisions.

2.02 Thermometers (for use in Pete's Plugs)

A. Furnish two thermometers for each temperature range listed above, complete with stems appropriate for Pet's Plug insertion.

B. Furnish thermometers to the Owner with a signed letter of receipt. Provide copy of same to the Architect.

2.03 Pressure Gauges (for use in Pete's Plugs)

A. Furnish two #500 gauge adapters and two Marshalltown, or equal 4.5" dial pressure gauges, 0 to 60 psi.

B. Furnish pressure gauges to the Owner with a signed letter of receipt. Provide copy of same to the Architect.

2.04 Pressure Gauges

A. Pressure gauges shall be dial type with enameled steel or cast aluminum case, white dial, case relief vent, recalibration device and AISI 316 stainless steel Bourdon tube, tip and socket.

B. The gauges at pumps shall be 4.5" size. All others shall be 6" size.

C. Gauges shall be installed with brass pipe fittings, unions, siphon, gauge cock, and pulsation dampers.

D. Unless indicated otherwise, ranges on gauges shall be as follows:

1. 0-60 psi - All services

PART 3 EXECUTION

3.01 Thermometers Installation

A. Install in the following locations and elsewhere as indicated:

1. At inlet and outlet of each hydronic zone.
2. At inlet and outlet of each hydronic coil in air-handling units and built-up central systems.
3. At inlet and outlet of each hydronic heat recovery unit.

B. Thermometer Wells: Install in piping tee where thermometers are indicated, in vertical position. Fill well with oil or graphite and secure cap.

3.02 Installation of Pressure Gauges

A. Install in the following locations, and elsewhere as indicated:

1. At inlet and discharge of each pressure-reducing valves.

End of Section 23 05 19

SECTION 23 05 23 - PIPING SPECIALTIES AND VALVES

PART 1 GENERAL

1.01 Description of Work

A. Valves shall be installed at locations shown and specified; the locations shall be accessible. All valves shall be installed with their stems or spindles horizontal or above.

B. Provide unions or grooved mechanical couplings where shown at all equipment connections and at other points where disconnection of piping will be required.

C. Strainers shall be provided at locations shown.

1.02 Approved Manufacturers

A. The basis for the valve specification is Nibco, Victaulic, and MEPCO and shall represent the minimum level of construction. Equipment manufactured by Bell & Gossett, NVent, Apollo, Wheatley, and Milwaukee shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Valves

A. Bronze or brass ball valves rated at 150 psi SWP and 600 psi WOG, shall have two or three piece stainless steel, cast bronze, or brass bodies with TFE seats, stainless steel full port ball, separate packing nut with adjustable stem packing, and anti-blowout stem. Valves ends shall have full depth ANSI threads, push-to-connect, Vic-Press™, or extended solder connections, and manufactured to comply with MSS-SP 110, shall be used in 3" and smaller copper and steel lines for HVAC duties. NVent PL-200, Victaulic Series 569, NIBCO T585-70-66, Jomar T/S 100-SS-N in uninsulated applications and NIBCO T585-70-66-EL in insulated lines. Victaulic Series 726 when using grooved end valves.

B. Butterfly valves rated 300 psi working pressure, grooved end or lug style, ductile iron body with 2” extended neck for insulation and 10 position lever shall be used in 4" and larger copper and steel lines for HVAC duties. Valves to have electroless nickel coated ductile iron or aluminum bronze disc with pressure responsive EPDM synthetic rubber seat, 400 series stainless steel stem and shall not have exposed stem to disc fasteners. (Stem shall be offset from the disc centerline to provide full 360-degree circumferential seating.) Valves to be rated at full pressure rating for dead end bi-directional service. Valves to be manufactured in compliance with MSS-SP 67. Provide with isolating flanges when used in copper lines. NIBCO LD2000-3 (4” thru 6”), NIBCO LD 2000-5 (8” thru 12”), and Victaulic Vic-300 MasterSeal™ when using grooved end valves through 12”. Victaulic Series W706 shall be used for grooved end piping systems 14” through 24”. Jomar 600 series for lug type and Jomar 900 series for wafer type.

C. Y-pattern swing-type check valve manufactured in accordance with MSS-SP 80, Class 150 psi B62 cast bronze body shall be used in 2 1/2" and smaller lines for HVAC duties. NIBCO T-433Y, Jomar T/S 511. Victaulic Series 712 when using grooved end valves.

D. Swing-type check valve manufactured in accordance with MSS-SP 71, class 125, grooved ASTM A536 ductile iron or flanged ASTM A126 class B cast iron body with bronze trim or wafer-style with stainless steel spring, bronze disc plates, rubber seat and cast iron body, shall be used in 3" and larger lines for HVAC duties. NIBCO T-433Y, Jomar T/S 501. For vertical line applications use NIBCO T-480. When using grooved end valves, Victaulic Series 712 swing check valve for horizontal installations, Victaulic Series 716, or Victaulic Series W715 for vertical or horizontal installations.

E. Bronze or brass ball valves rated at 150 psi SWP and 600 psi WOG shall have two piece cast bronze or brass bodies with TFE seats, stainless steel full port ball, separate packing nut with adjustable stem packing, and anti-blowout stem. Valves with threaded ends shall be used in 3" and smaller steel lines for all natural gas duty. Valve to be NIBCO T585-70-UL or Jomar T100NE with U.L. listing and CSA listing

F. Victaulic / TA Hydronics Series 787 or 786, MEPCO model MBVT, or engineer approved equal, NIBCO T or S-1710, bronze body, globe style manual valve with flow measuring taps shall be used for all balancing valves 2" and smaller in HVAC duties.

G. Victaulic / TA Hydronics Series 789 or 788, MEPCO model MBVF, HCI Terminator B Venturi or engineer approved equal NIBCO F or G-737, cast iron body, wye patterned globe style manual valve with flow measuring taps shall be used for all balancing valves 2 ½" and larger in HVAC duties.

H. Apollo bronze body ball valves, Series 70 or engineer approved equal, with threaded end, shall be used in 3" and smaller steel lines for steam duty up to 150 psi maximum. Apollo #70-140-64 shall be used in 3" and smaller steel lines for steam duty up to 250 psi maximum. Provide with stem extension as required by line insulation thickness.

2.02 Coil Valve Package

A. At the Contractors Option, Packaged Coil piping systems may be used in lieu of the individual components listed above. The following applies to Coil Valve Packages equivalent to Nexus Coil Pak O2X and O3X or HCI 2B and 3B:

B. Minimum per Coil Component Requirements

1. Manual Flow Control Valve (MFCV).
2. Temperature Control Valve (TCV) provided by the Temperature Control Contractor
3. Union connections at coil and TCV.
4. Air vent on return side.
5. Blowdown/drain valve on supply side.
6. Pressure/temperature test plugs across coil and TCV.
7. Full port, union end ball valves or butterfly valve for shutoff.
8. Full Port, union end ball valves in bypass position on 3-way applications

C. Materials of Construction (1/2” - 12")

1. Brass, bronze or stainless steel metals (2" and smaller).
2. Cast or ductile iron, steel (2 ½” and larger).
3. Teflon seats, Viton seals (2" and smaller).
4. EPDM seats and seals (2 ½” and larger).

D. Shutoff Valves (2" and smaller) shall be full port, forged brass ball valves equal to Nexus Ultra X with:

1. A one-piece body rated at 600 psi WP, 325° F.
2. Interchangeable union ends with Viton o-ring seal (ground joint is not acceptable).
3. Multiple 'A" tapped ports for test plugs, vent, and/or drain.
4. Blowout-proof stem with dual Viton o-ring seals.

E. Shutoff Valves (2 ½”and larger) shall be lug pattern butterfly valves equal to Nexus BV with:

1. A minimum of 200 psi WP, 250° F.
2. 125#/150# Class lug pattern cast or ductile iron body.
3. EPDM cartridge seat, 416 stainless steel one-piece shaft, and aluminum bronze

disc.

4. Top and bottom shaft bushings.
5. 6" and smaller to have lever operator; 8" and larger to have worm gear operator.
6. 6" and smaller to have an infinite position chrome plated top plate for balancing purposes.
7. Epoxy coated body; like Nexus BV

F. Manual Flow Control Valves (2" and smaller) shall be a combination of bi directional metering/balance type of forged brass construction equal to Nexus UltraXB 'Orturi' with:

1. A modified venturi equipped with (2) pressure/temperature ports and an ID tag.
2. A combination shutoff and memory stop device-indicating degree of opening.
3. A rating of 600 WOG, 325° F.
4. An interchangeable union ends with Viton o-ring type seal.
5. Blowout proof stern with dual Viton o-ring seals.
6. Hard chrome plated ball with Teflon seats

G. Manual Flow Control Valves (2 ½" and larger) shall be an instrument and metering station with integral pitot tube, multiple ports for instruments, accessories and drains, a butterfly throttling valve equal to Nexus Nextrol Model NXFB or HCI Terminator B Venturi with:

1. The pitot tube shall be twin tube design, of 316 stainless steel with blowout proof attachment to station body.
2. Ports shall include ¾" port for thermometer, ¼" ports for pressure gauge, air vent, transmitter or other accessories, and a ½" drain port.
3. The instrument station shall be 125# Class flanged (mates to 150# Class flanges) construction.
4. The butterfly valve shall be lug pattern with a rating 200 WP, 250° F.
5. The butterfly valve shall have an infinite position operator with memory stop (6" and smaller), worm gear with memory stop (8" and larger).

H. Blowdown/Drain Valves shall be full port, forged brass ball valve construction equal to Nexus BD or HCI TQ-B1with:

1. A minimum rating of 600 WOG, 325° F.
2. Blowout proof stem with dual o-ring seals.
3. Hard chrome plated ball with Teflon seats.
4. A ¾" hose end and cap with retainer

B. Unions (2" and smaller) shall be full port forged brass equal to Nexus Ultra U or HCI Terminator U with:

1. A minimum of 600 psi WP, 325° F.
2. Multiple ¼" tapped ports for test plugs, vent and/or drain valves.
3. Viton o-ring seal (ground joint are not acceptable)

2.03 Unions

A. Screwed or solder type ground joint unions shall be used on piping 2" and smaller. Flanged connections shall be used on pipe 2½" and larger.

B. Unions are not required in installations using Victaulic grooved mechanical couplings.

C. Unions shall not be installed in walls or partitions or above non-accessible ceilings.

D. Pressure ratings on unions shall be equal to or greater than the lines they are in.

E. Dielectric unions or Victaulic Style 47 dielectric waterway fittings shall be used where copper lines connect to other types of materials.

2.04 Escutcheons

A. Provide nickel-brass or chrome plated escutcheons on exposed pipes where they pass through walls, ceilings, and base cabinet penetrations.

2.05 Test Plugs

A. Test plugs shall be Peterson Engineering, or engineer approved equal, Universal Lancaster, "Pete's Plugs," Model #100. Refer SECTION 23 05 19 - METERS AND GAUGES for gauges and thermometers.

2.06 Water Safety Relief Valves

A. Safety relief valves shall be Watts, Series 740 or engineer approved equal, in sizes and settings as indicated on plans.

B. Valves shall be iron body, ASME rated and tested, featuring anti-fouling seat, non-mechanical seat to disc alignment and isolated spring mechanisms.

2.07 Strainers

A. Provide Victaulic, Watts, Dunham, or engineer approved equal, strainers where shown with pressure ratings equal to or greater than line operating pressure.

B. Provide ball valves in blow off tapping of all strainers.

C. Strainers screens shall be stainless steel with 1/8" perforations for water service.

D. All base mounted centrifugal pumps shall be provided with a Bell and Gossett, or equal, suction diffuser. The angle pattern flow straightening fitting shall combine a diffuser/strainer with full length straightening vane to provide strainer function as well as provide correct flow conditions to the pump suction. Suction diffusers shall be cast iron body, 175 psig rated with stainless steel internal with bronze strainer.

PART 3 EXECUTION

3.01 Coil Valve Package Installation

A. Installation shall conform to basic piping methods specifications and Manufacturers recommendations

B. All components shall be isolated by-shutoff valves.

C. Union tailpieces maybe used to reduce pipe sizes to match coil and TCV valve size(s).

D. Pressure/Temperature test plugs shall be installed across coil.

E. Unions shall be used to isolate the coil, MFCV, and TCV.

End of Section 23 05 23

SECTION 23 05 29 - PIPING SUPPORTS, ANCHORS AND SEALS

PART 1 GENERAL

1.01 Description of Work

A. Provide piping support, anchors, and seals as specified and indicated on drawings.

B. Pipe shall not pass through footings or beams without the consent of the Architect.

1.02 Submittals

A. Shop drawings of the fire-stopping method shall be approved prior to the setting of any sleeves and shall clearly define the UL fire-stopping method and required sleeve clearances.

1.03 Approved Manufacturers

A. The basis for this specification is B-Line Systems Inc. and shall represent the minimum level of construction. Equipment manufactured by Erico and Grinnell shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Hangers and Sleeves

A. All insulated horizontal piping shall be supported from outside the insulation. Provide inserts and saddles as recommended by the insulation manufacturer.

B. Pipe hangers for lines 1/2” to 2” shall be adjustable swivel ring hanger equal to B-Line Figure B-3170NF and B-3170CT for ferrous and copper piping respectively with hanger rods in diameters as required by the hanger swivel rings. Upper ends supported as hereinafter specified with the proper B-Line upper attachments.

C. Pipe hangers for lines 2 1/2” to 4” shall be light duty clevis hanger equal to B-Line Figure B-3104 and B-3104CT for ferrous and copper piping respectively with hanger rods in diameters as required by the hanger rod holes. Upper ends supported as hereinafter specified with the proper B-Line upper attachments.

D. Pipe hangers for lines 6” and larger shall be standard clevis hanger equal to B-Line figure B3100 and B3100C for ferrous and copper piping respectively with hanger rods in diameters as required by the hanger rod holes. Upper ends supported as hereinafter specified with the proper B-Line upper attachments.

E. Provide B-Line Figure B-3373 and B-3373CT riser clamps for ferrous and copper piping, respectively, at each floor and at other locations where vertical support is necessary.

F. Pipe sleeves will be required in all pipe penetrations through new exterior walls, masonry walls, floors and fire rated gyp. board walls. Sleeves shall be either Schedule 5 steel pipe, field fabricated from minimum 16 gauge steel with 2" overlap at the seam, or as required by U.L. listed fire-stopping system.

G. Pipe sleeves will not be required in existing wall penetrations of masonry construction when such openings are made by "core-drilling".

PART 3 EXECUTION

3.01 Pipe Sleeves

A. Space between sleeves and pipes in outside walls shall be filled or tightly caulked with oakum, butyl rubber, link seals or other approved equally effective material to resist the penetration of water. Pipe sleeve shall be sufficient diameter to provide approximately

1/2" clearance around pipe, and in the case of insulated pipe, approximately 1/2" around insulation.

B. Space between sleeves and pipes in other wall construction shall be diameter as required to provide the clearance required by the U.L. listed fire-stopping method chosen by the Contractor.

C. Sleeves shall be set no closer than three pipe diameters center to center, be set 3/4" past all wall surfaces, and securely anchored to the wall.

D. Sleeves in floor construction shall extend 1” above finished floor.

3.02 Pipe Hangers

A. Upper ends of hanger rods shall be supported angle iron laid across top chord of bar joists, or from side beam clamps in steel structure.

B. Upper ends of hanger rods shall be supported as approved by the structural engineer.

C. Hanger and support spacing for horizontal steel and copper piping shall not exceed the values given in the following table:

D.

NOMINAL PIPE SIZE	STEEL PIPE	COPPER PIPE
1/2" - 1-1/4"	7'	5'
1-1/2" - 2"	9'	6'
2-1/2" - 3"	11'	10'
4"	14'	10'
6"	17'	--
8"	19'	--
10" - 12"	22'	--

E. No pipe hanger rod shall be less than 6" in length unless otherwise shown or approved.

F. Spacing of supports and braces for exposed vertical piping shall not exceed the hanger spacing specified for horizontal pipe, unless otherwise indicated.

G. At the contractor’s option, piping runs of multiple parallel lines may be ‘trapezed’ into a single support.

End of Section 23 05 29

SECTION 23 05 48 - VIBRATION ISOLATORS

PART 1 GENERAL

1.01 Description of Work

A. Provide vibration isolators where shown and as specified.

1.02 Approved Manufacturers

A. The basis for the piping isolators is Flexonics and shall represent the minimum level of construction. Equipment manufactured by Twin Cities, Hose, Wheatley, and Mason shall be permitted to bid these specifications.

B. The basis for suspension and pad isolators is Amber/Booth and shall represent the minimum level of construction. Equipment manufactured by Korfund, Vibration Eliminator, and Mason shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Piping Systems

A. Provide Flexonics, type PCS #T321, or approved equal stainless steel flexible connectors for piping system where indicated.

B. Provide Flexonics type PCB, or approved equal, phosphor bronze hose and bronze braid flexible connectors for copper piping systems where indicated.

2.02 Ductwork

A. Provide Ventfabrics, Inc., "Metaledge Ventglass" canvas connections for all duct systems at supply, return, and outside air unit connections to air handling units. External canvas connections are not required on units with integral canvas connections on supply, return, and outside air connections.

2.03 Pad-type Isolators

A. Set the following items located in the basement mechanical room on 3" x 3" x 2" type NRC isolator pads as manufactured by Amber/Booth Company, or equal.

1. Air Handling Unit’s
2. Boilers
3. Base mounted Pumps

2.04 Concrete Inertia Base

A. Provide Amber/Booth Company, type FC1B concrete inertia base. Base shall consist of a concrete pouring frame with a minimum depth of 1/12 the longest span but not less than 6". The equipment to base weight ratio shall not be less than 2 to 1. Base shall be complete with 1/2" rebar on 10" centers, equipment mounting templates and motor side rails as required. Provide with spring isolators designed for stable operation with a minimum of 30% reserve deflection beyond the designed operation conditions.

B. Provide concrete inertia base for following items located in the 3rd floor and 21st floor mechanical spaces:

1. Boilers
2. Water Heaters (WH-Z2)(WH-Z1)
3. Base mounted Pumps

PART 3 EXECUTION

3.01 Piping System

A. Isolators shall be the size of the line they are in, not the pump or unit connection size.

B. Isolator length shall be not less than lengths recommended by manufacturer.

End of Section 23 05 48

SECTION 23 05 50 - TESTING AND ADJUSTING

PART 1 GENERAL

1.01 Description of Work

A. Provide testing, adjusting, and balancing of the systems as specified and indicated on drawings.

B. The mechanical contractor shall procure the services of a balancing and testing agency which will balance in compliance with the National Environmental Balancing Bureau. All work by this agency shall be done under direct field supervision of a qualified testing and balancing engineer employed by them.

C. The test and balance firm shall not be the same company as the installing contractor and shall not be connected to the installing company by like ownership or similar relationship.

D. All instruments used by this agency shall be accurately calibrated and maintained in good working order. If requested, the tests shall be conducted in the presence of the Mechanical Engineer and/or their representative responsible for the project.

E. The air balance agency shall have successfully completed at least ten projects of similar size and scope and shall have been in business for a minimum of five years.

F. The following systems shall be fully tested before covering or concealing.

G. All leaks shall be repaired in a satisfactory manner by the installing contractor.

H. Air balancing shall be performed after ceilings and all duct components are in place. Doors shall be closed when performing the air balance.

I. Verify proper operation of the automatic temperature controls.

J. Piping systems shall be fully tested and/or balanced, before covering or concealing, in the presence of the Owner's representative.

1.02 Acceptable Testing and Balancing Firms:

A. The following companies are approved to provide the testing and balancing as specified:

Doyle Field Services
646 W 58th Street
Kansas City, MO 64113 (816) 444-7103

Environmental System Testing, Inc.
6101 Kansas Ave, P.O. Box 11208
Kansas City, KS 66111 (913) 287-9000

Pro Balance
5411 West 40 Hwy
Blue Springs, Mo 64015 (816) 228-7800

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 Piping Systems, Integrity Test

A. The following piping systems shall be fully tested before covering and concealing in the presence of the Owner's representative. All leaks shall be repaired in a satisfactory manner.

1. The following interior lines shall be hydrostatically tested at 100 psi:
   a. Heat pump water supply and return
   b. Chilled water supply and return
   c. Heating water supply and return
   d. Condenser water supply and return

B. Before final connections to equipment are made, completely flush all debris and foreign material from piping systems by circulating an approved cleaning solution.

C. After circulating water systems are bled of air and are properly circulating, all strainers shall be blown clean with the blow off gate valves.

3.02 Preliminary Procedures for Air System Balancing

A. Before operating the system, perform these steps:

1. Obtain design drawings and specifications and become thoroughly acquainted with the design intent.
2. Obtain copies of approved shop drawings of all air handling equipment, outlets (supply, return, and exhaust) and temperature control diagrams.
3. Compare design to installed equipment and field installations.
4. All medium pressure ductwork shall be tested at a 4" W.G. pressure in the presence of the Inspector.
5. Walk the system from the system air handling equipment to terminal units to determine variations of installation from design.
6. Check filters for cleanliness.
7. Check dampers (both volume and fire) for correct and locked position, and temperature control for completeness of installation before starting fans.
8. Prepare report test sheets for both fans and outlets. Obtain manufacturer's outlet factors and recommended procedures for testing. Prepare a summation of required outlet volumes to permit a crosscheck with required fan volumes.
9. Determine best locations in main and branch ductwork for most accurate duct traverses.
10. Place outlet dampers in the full open position.
11. Prepare schematic diagrams of system "as-built" ductwork and piping layouts to facilitate reporting.
12. Lubricate all motors and bearings.
13. Check fan belt tension.
14. Check fan rotation.

3.03 Preliminary Procedures for Hydronic System Balancing

A. Before operating the system perform these steps:

1. Open valves to full open position. Close coil bypass valves.
2. Remove and clean all strainers, including start-up filters.
3. Examine hydronic systems and determine if water has been treated and cleaned.
4. Check pump rotation.
5. Clean and set automatic fill valves for required system pressure.
6. Check expansion tanks to determine that they are not air bound and that the system is completely full of water.
7. Check air vents at high points of systems and determine if all are installed and operating freely (automatic type) or to bleed air completely (manual type).
8. Set temperature controls so all coils are calling for full flow.
9. Check and set operating temperatures of chillers to design requirements.

10. Lubricate all motors and bearings.

3.04 System Performance Testing and Balancing

A. The Contractor shall procure the services of a balancing and testing agency which will balance in compliance with the National Environmental Balancing Bureau. All work by this agency shall be done under direct supervision of a qualified testing and balancing engineer employed by them. All instruments used by this agency shall be accurately calibrated and maintained in good working order. If requested, the tests shall be conducted in the presence of the Engineer and/or their representative responsible for the project

B. The testing and balancing agency shall include an extended adjustment service of one year after completion of testing and balancing work, during which time the Owner at his discretion may request a recheck or resetting of any outlet, supply air fan or exhaust fan as listed in the test report. The agency shall provide technicians to assist the Owner in making any tests he may require during this period of time.

C. Air and water balancing and testing shall not begin until the mechanical systems for each of the indicated phases have been completed and are in full working order. The Contractor shall coordinate the work of the respective subcontractors and verify that all mechanical systems are in full working order. The Contractor shall maintain all systems in full working order during each working day of testing and balancing.

D. The testing and balancing agency to visit the site periodically during the construction work on the heating, ventilating and air conditioning systems are in order to allow for necessary modifications of the systems to provide a better balance. A field report shall be submitted after each visit to the project. These reports may be brief, but shall list any discrepancies noted or special modifications required.

E. The testing and balancing agency shall include a service for opposite-season checkout to ensure the system is operating as designed for both heating and cooling seasons.

F. The following testing and balancing shall be performed. Air and water flows shall be balanced to within plus or minus 10% of design requirements. Six copies of the final compilation of data shall be submitted to the Engineer for evaluation.

1. Air supply, return and exhaust systems with air quantities for each air outlet or intake, and fan powered VAV box minimum and maximum settings. HVAC units fan data to include CFM, static pressure, RPM, motor running and full load amperage before and after final balancing.
2. Air handling unit, and FP box coils heating/cooling operational data including supply, return, mixed and outdoor temperatures, coil inlet and leaving temperatures and flow quantity.

G. In conjunction with the testing and balancing agency service, the **Mechanical Contractor** shall:

1. Check all piping during installation to make certain water systems are installed free of foreign material (stones, sand, cutting oil, etc.).
2. Clean the water in the piping system, remove strainer covers and clean baskets and place all associated equipment in operation.
3. Provide test plugs and flow measuring devices as indicated on piping diagrams.
4. Clean ductwork, coils, fans, etc. in the air system to remove all construction dust and debris, and provide new air filters.
5. Start, lubricate and balance all fans. Change or adjust pulleys as required to give proper fan RPM.

6. Furnish workmen familiar with this project and of the proper trade to assist the testing and balancing agency in the air and water balancing. Also make available, subject to request by the testing and balancing agency, trained servicemen of the control, boiler and other equipment suppliers to assist as needed during the testing of their portion of the project.
7. Provide complete plans, operating and maintenance manuals and shop drawings of all installed equipment, including temperature controls, to the air and water balancing agency.
8. Provide large-scale, wall mounted and laminated instructions in the mechanical room indicating the proper start-up and shutdown operation of both the heating and cooling modes for the HVAC system.
9. Upon completion of balancing and testing, the Contractor shall make such additional adjustments, at the direction of the testing and balancing agency, necessary for the systems to operate as designed.

3.05 Record and Report Data

A. Record all data obtained during testing, adjusting, and balancing in accordance with, and on the forms recommended by the referenced standards, and as approved on the sample report forms.

B. Prepare report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

End of Section 23 05 50

SECTION 23 05 53 - HVAC IDENTIFICATION

PART 1 GENERAL

1.01 Description of Work

A. Provide HVAC identification as specified and indicated on the drawings.

B. This Section includes the following mechanical identification materials and their installation:

1. Equipment markers
2. Access panel and door markers
3. Pipe markers
4. Duct markers
5. Valve tags
6. Valve schedules

1.02 Submittals

A. Product Data: For each type of product indicated.

B. Valve Schedules: Provide valve numbering scheme and identification type for each piping system. Furnish extra copies (in addition to mounted copies) to include in Operation and Maintenance Manuals.

1.03 Coordination

A. Coordinate installation of identifying devices with completion of insulation and jacketing surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with location of access panels and doors.

PART 2 PRODUCTS

2.01 Manufacturers

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified:

1. Seton
2. Brady
3. Craftmark
4. Brimar Industries, Inc.

2.02 Equipment Identification Devices

A. Equipment Markers: Engraved, color-coded laminated plastic.

1. Terminology: Match schedules as closely as possible.
2. Data:
   a. Name and plan number.
   b. Equipment service.
   c. Design capacity.
   d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
3. Size: 2-1/2” by 4” for control devices, dampers, and valves; 4-1/2” by 6” for equipment.
4. Letter Size: Minimum 1/4 “ for name of units if viewing distance is less than 24 inches, 1/2“ for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to

three-fourths the size of principal lettering.

5. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

B. Access Panel and Door Markers: 1/16" thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8" holes for attachment.

1. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

2.03 Piping Identification Devices

A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.

1. Colors: Comply with ANSI/ASME A13.1, unless otherwise indicated.
2. Type and Size of Letters: Comply with ANSI/ASME A13.1, unless otherwise indicated.
3. Legends: Spelled out in full or commonly used and accepted abbreviations.
4. Pipes with OD, Including Insulation, Less Than 6": Full-band pipe markers extending 360 degrees around pipe at each location.
5. Pipes with OD, Including Insulation, 6" and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
6. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

B. Pretensioned Pipe Markers: Precoiled semi rigid plastic formed to cover full circumference of pipe and to attach to pipe without adhesive.

C. Shaped Pipe Markers: Preformed semi rigid plastic formed to partially cover circumference of pipe and to attach to pipe with mechanical fasteners that do not penetrate insulation vapor barrier.

2.04 Valve Tags

A. Valve Tags: Stamped or engraved with ¼" letters for piping system abbreviation and ½" numbers, with numbering scheme to match existing numbering scheme on temperature control drawings. Provide 5/32" hole for fastener.

1. Material: 3/32" thick laminated plastic with 2 black surfaces and white inner layer.
2. Valve-Tag Fasteners: Brass beaded wire-link chain, beaded chain or S-hook.
3. Valve tag size and shape: 1 ½" round.

2.05 Valve Schedules

A. Valve Schedules: For each piping system, on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on temperature control drawings), location of valve (room or space), normal-operating position (open, closed, or modulating) and variations for identification. Mark valves for emergency shutoff and similar special uses.

B. Valve-Schedule Frames: Glazed display frame for removable mounting on walls for each page of valve schedule. Include mounting screws.

C. Frame: Extruded aluminum.

D. Glazing: ASTM C 1036, Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.

PART 3 EXECUTION

3.01 Equipment Identification

A. Install equipment markers on or near each piece of mechanical equipment.

B. All equipment shall be labeled as directed by the owner or as designated on the drawings if the owner has no other preference.

C. Locate equipment markers where accessible and visible. Include markers for the following general categories of equipment:

1. Main control and operating valves including safety devices.
2. Meters, gauges, thermometers, and similar units.
3. Coils, compressors and similar equipment.
4. Fans, blowers, primary balancing dampers and mixing boxes.
5. Packaged HVAC central-station and zone-type units.
6. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.

D. Install access panel markers with screws on equipment access panels.

3.02 Piping Identification

A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

B. All piping shall be labeled as directed by the owner or as designated on the drawings if the owner has no other preference.

C. Locate pipe markers where accessible and visible.

1. Pipes with OD, Including Insulation, Less Than 6”: Pretensioned pipe markers. Use size to ensure a tight fit.
2. Pipes with OD, Including Insulation, 6” and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.

D. Locate pipe markers where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and locations as follows:

1. Near each valve and control device
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings and nonaccessible enclosures.
4. At access doors and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 25’ along each run.
7. On piping above removable acoustical ceilings. Omit intermediately spaced markers.

3.03 Valve Tags

A. Install tags on valves and control devices in piping systems; valves within factory-fabricated equipment units and HVAC terminal devices. List tagged valves in a valve schedule.

End of Section 23 05 53

SECTION 23 07 13 - DUCT INSULATION

PART 1 GENERAL

1.01 Description of Work

A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct installation of insulation on all ductwork, fittings, valves, controls and all other items connected into the system as defined in the specifications and on the drawings.

B. Where duct systems are to be pressure tested, schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.

C. All materials specified in this section shall meet UL 723, ASTM E84, and NFPA 255: maximum flame spread index of 25 and maximum smoke developed index of 50.

D. Refer to Part 3 for requirements for instruction on where insulating materials shall be applied.

1.02 Workmanship

A. Insulation shall be installed by a licensed contractor and applied in accordance with the manufacturer's instructions and recommendations.

1. All work shall comply with all applicable federal, state and local codes and laws. This shall include, but shall not be limited to, the Occupational Safety and Health Act.
2. All work shall conform to accepted industry and trade standards for commercial and industrial insulations.

PART 2 PRODUCTS

2.01 Glass-Fiber Blanket Insulation – Type 1

A. CertainTeed SoftTouch, type 150, composed of glass fibers bonded with a thermosetting resin. Comply with ASTM C553, Type II and ASTM C1290 and ASTM C1338 fungi resistance. Factory-applied FSK jacket: aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket complying with ASTM C1136 and UL listed. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thickness: 1½"
2. Density: 1.5 pcf
3. Thermal Conductivity (k-Value): 0.24 at 75°F mean temperature
4. Thermal Resistance (R-value): 6.2
5. Water vapor transmission: 0.02 perms max.

B. The basis for glass-fiber blanket insulation is CertainTeed which shall represent the minimum level of construction. Products manufactured by Owens-Corning, Johns-Mansville and Knauf shall be permitted to bid these specifications.

2.02 Glass-Fiber Blanket Insulation – Type 2

A. CertainTeed SoftTouch, type 75, composed of glass fibers bonded with a thermosetting resin. Comply with ASTM C553, Type II and ASTM C1290 and ASTM C1338 fungi resistance. Factory-applied FSK jacket: aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136 Type II. FSK Tape: Foil-face, vapor-

retarder tape matching factory-applied jacket complying with ASTM C1136 and UL listed. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thickness: 3"
2. Density: 0.75 pcf
3. Thermal Conductivity (k-Value): 0.31 at 75°F mean temperature
4. Thermal Resistance (R-value): 9.6
5. Water vapor transmission: 0.02 perms max.

B. The basis for glass-fiber blanket insulation is CertainTeed which shall represent the minimum level of construction. Products manufactured by Owens-Corning, Johns-Mansville and Knauf shall be permitted to bid these specifications.

2.03 Glass-Fiber Board Insulation – Type 3

A. CertainTeed CertaPro type CB 110, composed of glass fibers bonded with a thermosetting resin. Comply with ASTM C612 Type IA and ASTM C1338 fungi resistance. Factory-applied FSK jacket: aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket complying with ASTM C1136 and UL listed. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thickness: 1½"
2. Density: 1.1 pcf
3. Thermal Conductivity (k-Value): 0.25 at 75°F mean temperature
4. Thermal Resistance (R-value): 6.0
5. Water vapor transmission: 0.02 perms max.

B. The basis for glass-fiber board insulation is CertainTeed which shall represent the minimum level of construction. Products manufactured by Owens-Corning, Johns-Mansville and Knauf shall be permitted to bid these specifications.

2.04 Glass-Fiber Board Insulation – Type 4

A. CertainTeed CertaPro type CB 300, composed of glass fibers bonded with a thermosetting resin. Comply with ASTM C612 Type IA and ASTM C1338 fungi resistance. Factory-applied FSK jacket: aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket complying with ASTM C1136 and UL listed. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thickness: 2"
2. Density: 3.0 pcf
3. Thermal Conductivity (k-Value): 0.23 at 75°F mean temperature
4. Thermal Resistance (R-value): 8.7
5. Water vapor transmission: 0.02 perms max.

B. The basis for glass-fiber board insulation is CertainTeed which shall represent the minimum level of construction. Products manufactured by Owens-Corning, Johns-Mansville and Knauf shall be permitted to bid these specifications.

2.05 Glass-Fiber Duct Liner – Type 5

A. CertainTeed ToughGard R Duct Liner type 200, composed of rotary-type glass fibers bonded with a thermosetting resin and overlaid with a durable fire resistant surface on the airside. Comply with ASTM C1071 Type I, ASTM G22 bacteria resistance and ASTM

C1338 fungi resistance. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated. Mechanical fasteners: galvanized steel pins suitable for attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct

1. Thickness: ½”
2. Density: 2.0 pcf
3. Thermal Conductivity (k-Value): 0.24 at 75°F mean temperature
4. Thermal Resistance (R-value): 2.1
5. Noise Reduction Coefficient (NRC): 0.45

B. The basis for glass-fiber duct liner is CertainTeed which shall represent the minimum level of construction. Products manufactured by Owens-Corning, Johns-Mansville and Knauf shall be permitted to bid these specifications.

2.06 Glass-Fiber Duct Liner – Type 6

A. CertainTeed ToughGard R Duct Liner type 150, composed of rotary-type glass fibers bonded with a thermosetting resin and overlaid with a durable fire resistant surface on the airside. Comply with ASTM C1071 Type I, ASTM G22 bacteria resistance and ASTM C1338 fungi resistance. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated. Mechanical fasteners: galvanized steel pins suitable for attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct

1. Thickness: 2”
2. Density: 1.5 pcf
3. Thermal Conductivity (k-Value): 0.23 at 75°F mean temperature
4. Thermal Resistance (R-value): 8.3
5. Noise Reduction Coefficient (NRC): 0.90

B. The basis for glass-fiber duct liner is CertainTeed which shall represent the minimum level of construction. Products manufactured by Owens-Corning, Johns-Mansville and Knauf shall be permitted to bid these specifications.

2.07 Fire-Rated Blanket Insulation – Type 7

A. 3M Fire Barrier Duct Wrap 615+, flexible high-temperature fire-resistant wrap composed of inorganic fibers encapsulated with a scrim-reinforce foil. Comply with ASTM E2336 and ISO 6944-1985. 3M FSK Tape 3320: Foil-face, vapor-retarder tape matching factory-applied jacket. 3M Fire Barrier Sealant compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thickness: 1 ½”
2. Density: 6.0 pcf
3. Thermal Conductivity (k-Value): 0.24 at 75°F mean temperature
4. Thermal Resistance (R-value): 6.3 at ambient temperature

B. The basis fire-rated blanket insulation is 3M which shall represent the minimum level of construction. Products manufactured by Owens-Corning, Johns-Mansville and Fire Master shall be permitted to bid these specifications.

2.08 Flexible Elastomeric Insulation – Type 8

A. Armacell ArmaTuff White is Armaflex closed cell, fiber-free elastomeric foam insulation with an exterior laminated composite layer of polymer and foil for protection against

ultraviolet radiation, weather and chemicals. Comply with ASTM C534, Type II, ASTM C1338 fungi resistance and ASTM G22 bacterial resistance. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thickness: 2"
2. Density: 3.0 – 6.0 pcf
3. Thermal Conductivity (k-Value): 0.27 at 75°F mean temperature
4. Thermal Resistance (R-value): 8.0
5. Water vapor permeability: 0.00 perms

B. The basis for flexible elastomeric insulation is Armacell which shall represent the minimum level of construction. Products manufactured by Aeroflex shall be permitted to bid these specifications

PART 3 EXECUTION

3.01 Examination

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean, dry and tightly sealed at all joints and seams.

3.02 Common Installation Requirements

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install multiple layers of insulation with longitudinal and end seams staggered.

C. Keep insulation materials dry during application and finishing.

D. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

E. Install insulation with least number of joints practical.

F. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic. Install insulation continuously through hangers and attachments.

G. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate.

H. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas.

3.03 Glass-Fiber Insulation Installation

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins according to manufacturer’s instructions and recommendations.

1. Install a continuous unbroken vapor barrier for ducts and plenums with surface temperatures below ambient.
   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
2. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

3. Where duct is noted to be installed tight to structure, insulation shall be laid across top of duct prior to installation.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins according to manufacturer's recommendations.

1. Install a continuous unbroken vapor barrier for ducts and plenums with surface temperatures below ambient.
   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
2. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows.
3. Where duct is noted to be installed tight to structure, insulation shall be laid across top of duct prior to installation.
4. The top of exterior duct insulation shall be sloped to prevent 'ponding' of the water. Provide a minimum of two degrees of slope.

3.04 Fire-Rated Insulation System Installation

A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous UL-listed fire rating per manufacturer's instructions and recommendations.

B. Insulate duct access panels and doors to achieve same fire rating as duct per manufacturer's instructions and recommendations.

3.05 Duct Insulation Schedule (refer to insulation types in section 2 above)

A. Concealed Ducts Located Within the Building Thermal Envelope

1. Round medium pressure supply air – Type 1
2. Round low pressure supply air – Type 1
3. Round low pressure return air – None
4. Round outdoor air – Type 1
5. Round mixed air – Type 1
6. Round low pressure exhaust air – None
7. Rectangular medium pressure supply air – Type 1
8. Rectangular low pressure supply air – Type 1
9. Rectangular low pressure return air – None
10. Rectangular outdoor air – Type 1
11. Rectangular mixed air – Type 1
12. Rectangular low pressure exhaust air – None
13. Kitchen hood grease exhaust – Type 7
    a. Kitchen hood grease exhaust ducts from hood connection to exhaust fan connection, shall receive a two layer wrap of fire rated insulation
14. Outside air Plenum – Type 3
15. Return air Plenum – Type 3

B. Exposed Ducts Located Within the Building Thermal Envelope

1. Round medium pressure supply air – Type 1
2. Round low pressure supply air – Type 1
3. Round low pressure return air – None
4. Round outdoor air – Type 1
5. Round mixed air – Type 1
6. Round low pressure exhaust air – None

7. Rectangular medium pressure supply air – Type 3
8. Rectangular low pressure supply air – Type 1
9. Rectangular low pressure return air – None
10. Rectangular outdoor air – Type 3
11. Rectangular mixed air – Type 3
12. Rectangular low pressure exhaust air – None
13. Kitchen hood grease exhaust – Type 7
    a. Kitchen hood grease exhaust ducts from hood connection to exhaust fan connection, shall receive a two layer wrap of fire rated insulation
14. Outside air Plenum – Type 3
15. Return air Plenum – Type 3

C. Concealed Ducts Located Outside the Building Thermal Envelope (Unconditioned Spaces)

1. Round medium pressure supply air – Type 2
2. Round low pressure supply air – Type 2
3. Round low pressure return air – Type 2
4. Round outdoor air – None
5. Round mixed air – Type 2
6. Round low pressure exhaust air – None
7. Rectangular medium pressure supply air – Type 2
8. Rectangular low pressure supply air – Type 2
9. Rectangular low pressure return air – None
10. Rectangular outdoor air – None
11. Rectangular mixed air – Type 2
12. Rectangular low pressure exhaust air – None
13. Kitchen hood grease exhaust – Type 7
    a. Kitchen hood grease exhaust ducts from hood connection to exhaust fan connection, shall receive a two layer wrap of fire rated insulation
14. Outside air Plenum – None
15. Return air Plenum – Type 4

D. Exposed Ducts Located Outside the Building Thermal Envelope (Unconditioned Spaces)

1. Round medium pressure supply air – Type 2
2. Round low pressure supply air – Type 2
3. Round low pressure return air – Type 2
4. Round outdoor air – None
5. Round mixed air – Type 2
6. Round low pressure exhaust air – None
7. Rectangular medium pressure supply air – Type 4
8. Rectangular low pressure supply air – Type 4
9. Rectangular low pressure return air – Type 4
10. Rectangular outdoor air – None
11. Rectangular mixed air – Type 4
12. Rectangular low pressure exhaust air – None
13. Kitchen hood grease exhaust – Type 7
    a. Kitchen hood grease exhaust ducts from hood connection to exhaust fan connection, shall receive a two layer wrap of fire rated insulation
14. Outside air Plenum – None
15. Return air Plenum – Type 4

E. Ducts Located Outside the Building

1. Round supply air – Type 8
2. Round return air – Type 8
3. Round exhaust air – None
4. Rectangular supply air – Type 8
5. Rectangular return air – Type 8
6. Rectangular exhaust air – None

F. Acoustically Lined Ducts

1. The requirement for acoustical insulation is in addition to the thermal insulation requirement. Provide external thermal insulation and internal acoustical liner as indicated.
2. Rectangular supply air at central units – Type 5
   a. The vertical ductwork from the unit discharge to horizontal and the first 10 feet of horizontal ductwork in all directions (typical for central AHU, RTU, MAU, DOAU, etc.)
3. Rectangular supply air at fan terminal units – Type 5
   a. The first 10 feet of ductwork from the fan terminal outlet
4. Rectangular return air at central units – Type 5
   a. The vertical ductwork from the unit inlet to horizontal and the first 10 feet of horizontal ductwork in all directions (typical for central AHU, RTU, MAU, DOAU, etc.)
5. Rectangular exhaust air – Type 5
   a. The first 10 feet of ductwork from the exhaust fan inlet
6. Rectangular return air boots – Type 5
7. Rectangular transfer air ducts – Type 5.

End of Section 23 07 13

SECTION 23 07 16 - EQUIPMENT INSULATION

PART 1 GENERAL

1.01 Description of Work

A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct installation of insulation on all HVAC equipment and other items connected into the system as defined in the specifications and on the drawings.

B. Where equipment or systems are to be tested, schedule insulation application after testing is complete and satisfactory test results have been achieved.

C. All materials specified in this section shall meet UL 723, ASTM E84, and NFPA 255: maximum flame spread index of 25 and maximum smoke developed index of 50.

D. Refer to Part 3 for requirements for instruction on where insulating materials shall be applied.

1.02 Workmanship

A. Insulation shall be installed by a licensed contractor and applied in accordance with the manufacturer's instructions and recommendations.

1. All work shall comply with all applicable federal, state and local codes and laws. This shall include, but shall not be limited to, the Occupational Safety and Health Act.
2. All work shall conform to accepted industry and trade standards for commercial and industrial insulations.

PART 2 PRODUCTS

2.01 Flexible Elastomeric Insulation – Type 1

A. Armacell AP Armaflex closed cell, fiber-free flexible elastomeric foam insulation with a smooth exterior surface. Comply with ASTM C534, Type II, ASTM C1338 fungi resistance and ASTM G22 bacterial resistance. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thickness: 2"
2. Density: 3.0 – 6.0 pcf
3. Thermal Conductivity (k-Value): 0.25 at 75°F mean temperature
4. Thermal Resistance (R-value): 8.0
5. Water vapor permeability: 0.00 perms

B. The basis for flexible elastomeric insulation is Armacell which shall represent the minimum level of construction. Products manufactured by Aeroflex shall be permitted to bid these specifications

2.02 Glass-Fiber Blanket Insulation – Type 2

A. CertainTeed SoftTouch, type 150, composed of glass fibers bonded with a thermosetting resin. Comply with ASTM C553, Type II and ASTM C1290 and ASTM C1338 fungi resistance. Factory-applied FSK jacket: aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136 Type II. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket complying with ASTM C1136 and UL listed. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thickness: 2"
2. Density: 150 pcf
3. Thermal Conductivity (k-Value): 0.24 at 75°F mean temperature
4. Thermal Resistance (R-value): 8.3
5. Water vapor transmission: 0.02 perms max.

B. The basis for glass-fiber blanket insulation is CertainTeed which shall represent the minimum level of construction. Products manufactured by Owens-Corning, Johns-Mansville and Knauf shall be permitted to bid these specifications.

2.03 Glass-Fiber Board Insulation – Type 3

A. CertainTeed CertaPro type CB 300, composed of glass fibers bonded with a thermosetting resin. Comply with ASTM C612 Type IA and ASTM C1338 fungi resistance. Factory-applied FSK jacket: aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket complying with ASTM C1136 and UL listed. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thickness: 2"
2. Density: 3.0 pcf
3. Thermal Conductivity (k-Value): 0.23 at 75°F mean temperature
4. Thermal Resistance (R-value): 8.7
5. Water vapor transmission: 0.02 perms max.

B. The basis for glass-fiber board insulation is CertainTeed which shall represent the minimum level of construction. Products manufactured by Owens-Corning, Johns-Mansville and Knauf shall be permitted to bid these specifications.

2.04 Exterior Flexible Elastomeric Insulation – Type 4

A. Armacell ArmaTuff White is Armaflex closed cell, fiber-free elastomeric foam insulation with an exterior laminated composite layer of polymer and foil for protection against ultraviolet radiation, weather and chemicals. Comply with ASTM C534, Type II, ASTM C1338 fungi resistance and ASTM G22 bacterial resistance. Adhesive materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thickness: 2"
2. Density: 3.0 – 6.0 pcf
3. Thermal Conductivity (k-Value): 0.27 at 75°F mean temperature
4. Thermal Resistance (R-value): 8.0
5. Water vapor permeability: 0.00 perms

B. The basis for flexible elastomeric insulation is Armacell which shall represent the minimum level of construction. Products manufactured by Aeroflex shall be permitted to bid these specifications

PART 3 EXECUTION

3.01 Examination

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry.

3.02 Common Installation Requirements

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.

B. Install multiple layers of insulation with longitudinal and end seams staggered.

C. Keep insulation materials dry during application and finishing.

D. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

E. Install insulation with least number of joints practical.

F. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic. Install insulation continuously through hangers and attachments.

G. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate.

H. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas.

3.03 Equipment, Tank, and Vessel Insulation Installation

A. Secure insulation with adhesive.

1. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
2. Protect exposed corners with secured corner angles.
3. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.
4. Stagger joints between insulation layers at least 3 inches (75 mm).
5. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.
6. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
7. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation to maintain the vapor barrier.

3.04 Equipment Insulation Schedule (refer to insulation types in section 2 above)

A. Chillers (insulate all cold surfaces) – Type 1

B. Heat Exchangers (steam-to-water heating service) – Type 2

C. Chilled water pumps – Type 1

D. Condenser water pumps – None

E. Heating water pumps – None

F. Chilled water or heating water expansion tanks – None

G. Chilled water or heating water air separators – Type 1

H. Chilled water storage tanks – Type 1

End of Section 23 07 16

SECTION 23 07 19 - HVAC PIPING INSULATION

PART 1 GENERAL

1.01 Description of Work

A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct installation of insulation on all piping, fittings, valves, controls and all other items connected into the system as defined in the specifications and on the drawings.

B. All materials specified in this section shall meet UL 723, ASTM E84, and NFPA 255: maximum flame spread index of 25 and maximum smoke developed index of 50.

C. Refer to Part 3 for requirements for insulation thickness and instruction on where insulating materials shall be applied.

1.02 Workmanship

A. Insulation shall be installed by a licensed contractor and applied in accordance with the manufacturer's instructions and recommendations.

1. All work shall comply with all applicable federal, state and local codes and laws. This shall include, but shall not be limited to, the Occupational Safety and Health Act.
2. All work shall conform to accepted industry and trade standards for commercial and industrial insulations.

PART 2 PRODUCTS

2.01 Fiber Glass Pipe Insulation

A. Johns-Manville Micro-Lok, preformed fiber glass pipe insulation, complying with ASTM C 547, Type 1, rigid molded pipe insulation, noncombustible. Factory-applied ASJ vapor retarder jacket: a white, kraft paper, reinforced with a glass fiber yarn and bonded to an aluminum foil, complying with ASTM C1136 Type I, with self-sealing longitudinal closure laps and butt strips. Adhesive materials and tapes shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Thermal Conductivity (k-Value): 0.23 at 75°F mean temperature
2. Water vapor transmission: 0.02 perms max
3. Maximum Service Temperature: 850°F

B. All fittings, valves, tees, flanges, connections, etc. shall be insulated and covered with the appropriate PVC insulated fitting covers. Fitting covers shall match PVC Jackets, refer to specification below.

C. The basis for fiber glass pipe insulation and fitting covers is Johns-Manville which shall represent the minimum level of construction. Products manufactured by Owens-Corning and Knauf shall be permitted to bid these specifications.

2.02 Flexible Elastomeric Pipe Insulation

A. Armacell AP/Armaflex SS, fiber-free elastomeric foam insulation with self-sealing seams. Comply with ASTM C534, Type 1, ASTM C1338 fungi resistance and ASTM G22 bacterial resistance. Adhesive materials and tapes shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.

1. Density: 3.0 – 6.0 pcf
2. Thermal Conductivity (k-Value): 0.25 at 75°F mean temperature
3. Water vapor permeability: 0.05 perm-in
4. Maximum Service Temperature: 180°F (continuous exposure)

B. All fittings, valves, tees, flanges, connections, etc. shall be insulated and covered with the Armacell factory-fabricated insulation fittings. Provide Armafix pre-insulated pipe hanger fittings at all hanger locations.

C. The basis for flexible elastomeric insulation is Armacell which shall represent the minimum level of construction. Products manufactured by Aeroflex shall be permitted to bid these specifications

2.03 PVC Jackets

A. High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C, 30 mils thick, white paintable finish, roll stock ready for shop or field cutting and forming. Provide factory fabricated fitting covers of same material, finish, and thickness as jacket. Adhesive materials and tapes shall be compatible with insulation materials, jackets, and substrates and for bonding jacket to itself and to insulation.

2.04 Insulated Pipe Supports

A. 360° pre-molded insulated pipe supports providing a continuous section of insulation with vapor barrier and galvanized steel shield. The insulation and vapor barrier shall extend beyond the shield for vapor tight joint with the adjoining insulation. Insulation shall be water-repellent treated calcium silicate meeting the requirements of ASTM C533 with vapor barrier jacket.

1. Minimum Compressive Strength:
   a. 100 psig for pipe sizes smaller than 6”
   b. 450 psig for pipe sizes 6” and larger

2.05 Insulation Shields

A. 180°, 20 gauge, galvanized metal shields pre-formed to fit the insulation.

PART 3 EXECUTION

3.01 Examination

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

1. Verify that systems and equipment to be insulated have been tested and are free of defects.
2. Verify that surfaces to be insulated are clean and dry and ducts are tightly sealed at all joints and seams.

3.02 Common Insulation Installation Requirements

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of pipes and fittings.

B. Keep insulation materials dry during application and finishing.

C. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

D. Install insulation with least number of joints practical.

E. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic and/or tape.

Install insulation continuously through hangers and attachments.

F. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate.

G. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas.

3.03 Penetrations

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.
2. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
4. Seal jacket to wall flashing with flashing sealant.

C. Insulation Installation at Interior Wall and Partition Penetrations (that are not fire rated): Install insulation continuously through walls and partitions.

D. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Coordinate insulation installation with the fire stopping material manufacturer’s UL approved installation instructions.

E. Insulation Installation at Floor Penetrations: Install insulation continuously through floor penetrations that are not fire rated. Coordinate insulation installation with the fire stopping material manufacturer’s UL approved installation instructions.

3.04 Fiber Glass Insulation Installation

A. Insulation Installation on Straight Pipes:

1. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
2. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples.
3. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

2. Insulate pipe fittings using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
4. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a installation that maintains vapor barrier.
5. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
6. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

C. Insulate instrument connections for thermometers, pressure gauges, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant..

3.05 Flexible Elastomeric Pipe Insulation

1. Seal longitudinal seams and end joints with the manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
2. Insulation Installation on Pipe Fittings and Elbows:
   a. Insulate pipe fittings using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
3. Insulation Installation on Valves and Pipe Specialties:
   a. Install preformed valve covers manufactured of same material as pipe insulation when available.
   b. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
   c. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in

insulation that allow passage of air to surface being insulated.

4. Apply UV resistant insulation coating on all exterior flexible elastomeric piping insulation. Apply in accordance with manufacturer's instructions and recommendations.

3.06 PVC Jackets

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with the manufacturer's recommended adhesive.

3.07 Insulated Pipe Supports

A. 360° pre-molded insulation pipe supports shall be installed on piping 1 ½" and larger at hangers. Pipe insert thickness shall be equal to the adjoining insulation thickness. The length of supports shall be as follows:

Pipe Size	**Insulation Insert Length**	**Shield Length**	**Shield Gauge**
1 ½" to 5"	6"	4"	20 ga.
6" to 8"	9"	6"	16 ga.
10" to 12"	9"	6"	14 ga.
14" and larger	12"	10"	12 ga.

3.08 Insulation Shields

A. 6" long insulation shields shall be applied between hangers or supports and the pipe insulation insert for all insulated piping less than 1 ½" in diameter.

3.09 Fiber Glass Pipe Insulation Thickness:

PIPING SYSTEM	Continuous Vapor Barrier	PIPE SIZE			
		< 1½"	1½" – 4"	5" - 6"	≥8"
HWS & HWR	No	1½"	2"	2"	2"
CWS & CWR (ASHRAE 90.1 2010)	Yes	½"	1"	1"	1"
CWS & CWR (IECC requirements)	Yes	½"	1"	1"	1"
TWS & TWR	Yes	1"	1½"	1½"	1½"

3.10 Flexible Elastomeric Pipe Insulation Thickness:

A. Insulate all cooling coil condensate drain lines with ½" flexible elastomeric pipe insulation.

B. Insulate all refrigerant suction lines with ¾" flexible elastomeric pipe insulation.

End of Section 23 07 19

SECTION 23 09 29 - CHILLER PLANT CONTROL SYSTEM

PART 1 GENERAL

1.01 Description of Work

A. General: The control system shall be as indicated on the drawings and described in these specifications.

B. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of mechanical systems on this project.

C. The control system shall accommodate simultaneous multiple user operation. Access to the control system data should be limited only by operator password. Multiple users shall have access to all valid system data. An operator shall be able to log onto any workstation on the control system and have access to all appropriate data.

D. The documentation is schematic in nature. The Contractor shall provide hardware and software necessary to implement the functions and sequences shown.

1.02 Approved Control System Contractor

A. Approved Control System Contractor:

1. The Base Bid temperature control system shall be Trane Tracer Summit system. The system shall be complete in all respects including labor, materials, equipment, and services necessary, as shown on the drawings and specified herein. The system shall be installed by personnel regularly employed by the manufacturer.

1.03 Quality Assurance

A. System Installer Qualifications

1. The Installer shall have an established working relationship with the Control System Manufacturer of not less than three years.
2. The Installer shall have successfully completed Control System Manufacturer's classes on the control system. The Installer shall present for review the certification of completed training, including the hours of instruction and course outlines upon request.
3. The installer shall have an office within 50 miles of the project site and provide 24-hour response in the event of a customer call.
4. The above list of manufacturers applies to operator workstation software, controller software, the custom application programming language, Building Controllers, Custom Application Controllers, and Application Specific Controllers. All other products specified herein (i.e., sensors, valves, dampers, and actuators) need not be manufactured by the above manufacturers.

B. Codes and Standards: Meet requirements of all applicable standards and codes, except when more detailed or stringent requirements are indicated by the Contract Documents, including requirements of this Section.

1. Underwriters Laboratories: Products shall be UL-916-PAZX listed.
2. National Electrical Code -- NFPA 70.
3. Federal Communications Commission -- Part J.
4. ASHRAE/ANSI 135-1995 (BACnet)

C. All products used in this installation shall be new, currently under manufacture, and shall be applied in similar installations for a minimum of 2 years. This installation shall not be used as a test site for any new products unless explicitly approved by the Owner's

representative in writing prior to bid date. Spare parts shall be available for at least 5 years after completion of this contract.

1.04 Submittals

A. Contractor shall provide shop drawings and manufacturers' standard specification data sheets on all hardware and software to be provided. No work may begin on any segment of this project until the Engineer and Owner have reviewed submittals for conformity with the plan and specifications. Six (6) copies are required. All shop drawings shall be provided to the Owner electronically as .dwg or .dxf file formats.

B. Project Record Documents: Upon completion of installation submit three (3) copies of record (as-built) documents. The documents shall be submitted for approval prior to final completion and include:

1. Project Record Drawings - These shall be as-built versions of the submittal shop drawings. One set of electronic media including CAD .DWG or .DXF drawing files shall also be provided.
2. Testing and Commissioning Reports and Checklists.

C. Training Manuals: The Contractor shall provide a course outline and training manuals for all training classes at least six weeks prior to the first class. The Owner reserves the right to modify any or all of the training course outline and training materials. Review and approval by Owner and Engineer and shall be completed at least 3 weeks prior to first class.

1.05 Warranty

A. Warrant all work as follows:

1. Labor & materials for control system specified shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. Control System failures during the warranty period shall be adjusted, repaired, or replaced at no charge or reduction in service to the Owner. The Contractor shall respond to the Owner's request for warranty service within 24 hours during customary business hours.
2. At the end of the final start-up/testing, if equipment and systems are operating satisfactorily to the Owner and Engineer, the Owner shall sign certificates certifying that the control system's operation has been tested and accepted in accordance with the terms of this specification. The date of Owner's acceptance shall be the start of warranty.
3. Operator workstation software, project specific software, graphics, database, and firmware updates shall be provided to the Owner at no charge during the warranty period. Written authorization by Owner must, however, be granted prior to the installation of such changes.
4. The system provider shall provide a web-accessible Users Network to give the Owner access to question/answer forum, graphics library, user tips, upgrades, and training schedules.

1.06 Ownership of Proprietary Material

A. All project developed hardware and software shall become the property of the Owner. These include but are not limited to:

1. Project graphic images,
2. Record drawings,
3. Project database,
4. Job-specific application programming code,

5. All documentation.

PART 2 PRODUCTS

2.01 Acceptable Manufacturers

A. Acceptable Base Bid systems are:

Control System Manufacturer	**Product Line**
Trane Company	Tracer Summit

2.02 Chiller Plant Manager

A. Provide Building Controllers (Chiller Plant Manager) for each of the two chiller plants to provide the performance specified herein and indicated on the plans. Each of these panels shall meet the following requirements.

1. The Building Automation System shall be composed of one or more independent, stand-alone, microprocessor based Building Controllers to manage the global strategies described in System software section.
2. The Building Controller shall have sufficient memory to support its operating system, database, and programming requirements.
3. The operating system of the Controller shall manage the input and output communications signals to allow distributed controllers to share real and virtual point information and allow central monitoring and alarms.
4. Controllers that perform scheduling shall have a real time clock.
5. Data shall be shared between networked Building Controllers.
6. The Building Controller shall continually check the status of its processor and memory circuits. If an abnormal operation is detected, the controller shall:
7. Assume a predetermined failure mode.
8. Generate an alarm notification.
9. BACnet. The Building Controller shall use the Read (Initiate) and Write (Execute) Services as defined in these BIBBS:

DS-RP-A,B
DS-RPM-A,B
DS-WP-A,B
DS-WPM-B

B. Communications. Each Building Controller shall reside on a BACnet inter-network using the ISO 8802-3 (Ethernet) or ARCNET (ASTM 878.1) Physical/Data Link layer protocol.

C. Environment. Controller hardware shall be suitable for the anticipated ambient conditions. Controller used in conditioned ambient shall be mounted in an enclosure, and shall be rated for operation at 0 C to 50 C 32 F to 120 F.

D. Serviceability. Provide diagnostic LEDs for power, communications, and processor. All wiring connections shall be made to field removable, modular terminal strips or to a termination card connected by a ribbon cable.

E. Memory. The Building Controller shall maintain all BIOS and programming information in the event of a power loss for at least 72 hours.

F. Immunity to power and noise. Controller shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shut-down below 80% nominal voltage.

2.03 Communications

A. This project shall comprise a network utilizing BACnet for communications between Chillers.

B. Each BACnet device shall operate on the BACnet physical/data link protocols specified for that device as defined earlier in this section

C. The controls Contractor shall provide all communication media, connectors, repeaters, hubs, and routers necessary for the inter-network.

D. All Building Controllers shall have a communications port for connections with the BACS system. This may be either an RS-232 port for Point to Point connection, a network interface node for connection to the Ethernet or ARCNET network, or a LonTalk communications port which supports FTT-10.

2.04 Input/Output Interface

A. All input points and output points shall be protected such that shorting of the point to itself, another point, or ground will cause no damage to the controller. All input and output points shall be protected from voltage up to 24V of any duration, such that contact with this voltage will cause no damage to the controller.

B. Binary inputs shall allow the monitoring of on/off signals from remote devices. The binary inputs shall provide a wetting current of at least 12 ma to be compatible with commonly available control devices.

C. Pulse accumulation input points. This type of point shall conform to all the requirements of Binary Input points, and also accept up to 2 pulses per second for pulse accumulation, and shall be protected against effects of contact bounce and noise.

D. Analog inputs shall allow the monitoring of low voltage (0-10 VDC), current (4-20 ma), or resistance signals (thermistor, RTD). Analog inputs shall be compatible with, and field configurable to commonly available sensing devices.

E. Binary outputs shall provide for on/off operation, or a pulsed low voltage signal for pulse width modulation control. Binary outputs on custom and building controllers shall have 3-position (on/off/auto) override switches and status lights. Outputs shall be selectable for either normally open or normally closed operation.

F. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0-10 VDC or a 4-20 ma signal as required to provide proper control of the output device. Analog outputs on building or custom programmable controllers shall have status lights, a 2-position (auto/manual) switch, and manually adjustable potentiometer for manual override.

2.05 Auxiliary Control Devices

A. Temperature Sensors

1. Temperature sensors shall be Resistance Temperature Device (RTD) or Thermistor.
2. Duct sensors shall be rigid or averaging as shown. Averaging sensors shall be a minimum of 1.5m 5 feet in length.
3. Immersion sensors shall be provided with a separable stainless steel well. Pressure rating of well is to be consistent with the system pressure in which it is to be installed.

B. Flow Switches

1. Flow-proving switches shall be either paddle or differential pressure type, as shown.
2. Paddle type switches (water service only) shall be UL listed, SPDT snap-acting

with pilot duty rating (125 VA minimum). Adjustable sensitivity with NEMA 3R Type enclosure unless otherwise specified:

3. Differential pressure type switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum), NEMA 1 Type enclosure, with scale range and differential suitable for intended application, or as specified.
4. Current sensing relays may be used for flow sensing or terminal devices.

C. Relays

1. Control relays shall be UL listed plug-in type with dust cover. Contact rating, configuration, and coil voltage suitable for application.
2. Time delay relays shall be UL listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable plus or minus 200% (minimum) from set-point shown on plans. Contact rating, configuration, and coil voltage suitable for application. Provide NEMA 1 Type enclosure when not installed in local control panel.

D. Transformers and Power Supplies

1. Control transformers shall be UL listed, Class 2 current-limiting type, or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service.
2. Unit output shall match the required output current and voltage requirements. Current output shall allow for a 50% safety factor. Output ripple shall be 3.0 mV maximum Peak-to-Peak. Regulation shall be 0.10% line and load combined, with 50 microsecond response time for 50% load changes. Unit shall have built-in over-voltage protection.
3. Unit shall operate between 0 C and 50 C.
4. Unit shall be UL recognized.

E. Local Control Panels

1. All indoor control cabinets shall be fully enclosed NEMA 1 Type construction with hinged door, key-lock latch, and removable sub-panels. A single key shall be common to all field panels and sub-panels.
2. Interconnections between internal and face-mounted devices pre-wired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600-volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.
3. Provide on/off power switch with over-current protection and main air gauge for control power sources to each local panel.

PART 3 EXECUTION

3.01 Examination

A. The project plans shall be thoroughly examined for control device and equipment locations, and any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.

B. The contractor shall inspect the site to verify that equipment is installable as shown, and any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.

3.02 General Workmanship

A. Install equipment, piping, wiring/conduit parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.

C. Install all equipment in readily accessible location as defined by chapter 1 article 100 part A of the NEC. Control panels shall be attached to structural walls unless mounted in equipment enclosure specifically designed for that purpose. Panels shall be mounted to allow for unobstructed access for service.

D. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.

E. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.03 Wiring

A. All control and interlock wiring shall comply with the national and local electrical codes and Division 26 of these specifications. Where the requirements of this section differ with those in Division 26, the requirements of this section shall take precedence.

B. Where Class 2 wires are in concealed and accessible locations including ceiling return air plenums, approved cables not in raceway may be used provided that:

1. Circuits meet NEC Class 2 requirements.
2. All cables shall be UL listed for application, i.e., cables used in ceiling plenums shall be UL listed specifically for that purpose.

C. Do not install Class 2 wiring in conduit containing Class 1 wiring. Boxes and panels containing high voltage may not be used for low voltage wiring except for the purpose of interfacing the two (e.g. relays and transformers).

D. Where class 2 wiring is run exposed, wiring shall be run parallel along a surface or perpendicular to it, and bundled, using approved wire ties at no greater than 3 m 10 ft intervals. Such bundled cable shall be fastened to the structure, using specified fasteners, at 1.5 m 5 ft intervals or more often to achieve a neat and workmanlike result.

E. All wire-to-device connections shall be made at a terminal blocks or terminal strip. All wire-to wire connections shall be at a terminal block, or with a crimped connector. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.

F. Maximum allowable voltage for control wiring shall be 120V. If only higher voltages are available, the Control System Contractor shall provide step down transformers.

G. All wiring shall be installed as continuous lengths, where possible. Any required splices shall be made only within an approved junction box or other approved protective device.

H. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations in accordance with other sections of this specification and local codes.

I. Size of conduit and size and type of wire shall be the design responsibility of the Control System Contractor, in keeping with the manufacturer's recommendation and NEC.

J. Control and status relays are to be located in designated enclosures only. These relays may also be located within packaged equipment control panel enclosures. These relays shall not be located within Class 1 starter enclosures.

K. Follow manufacturer's installation recommendations for all communication and network

cabling. Network or communication cabling shall be run separately from other wiring.

L. Adhere to Division 26 requirements for installation of raceway.

M. This Contractor shall terminate all control and/or interlock wiring and shall maintain updated (as built) wiring diagrams with terminations identified at the job site.

N. Flexible metal conduits and liquid tight, flexible metal conduits shall not exceed 3' in length and shall be supported at each end. Flexible metal conduit less than 1/2" electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid tight, flexible metal conduits shall be used.

3.04 Installation of Sensors

A. Install sensors in accordance with the manufacturer's recommendations.

B. Mount sensors rigidly and adequate for the environment within which the sensor operates.

C. All pipe mounted temperature sensors shall be installed in wells. Install all liquid temperature sensors with heat conducting fluid in thermal wells.

3.05 Flow Switch Installation

A. Install using a thread-o-let in steel pipe. In copper pipe use C x C x F Tee, no pipe extensions or substitutions allowed.

B. Mount a minimum of 5 pipe diameters upstream and 5 pipe diameters downstream or 2 feet whichever is greater, from fittings and other obstructions.

C. Install in accordance with manufacturers' instructions.

D. Assure correct flow direction and alignment.

E. Mount in horizontal piping - flow switch on top of the pipe.

3.06 Programming

A. Provide sufficient internal memory for the specified control sequences and trend logging. There shall be a minimum of 25% of available memory free for future use.

B. Point Naming: System point names shall be modular in design, allowing easy operator interface without the use of a written point index.

C. Software Programming

1. Provide programming for the system as per specifications and adhere to the strategy algorithms provided. All other system programming necessary for the operation of the system but not specified in this document shall also be provided by the Control System Contractor. Imbed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequence of operations.

D. Demonstration: A complete demonstration and readout of the capabilities of the monitoring and control system shall be performed. The contractor shall dedicate a minimum of 16 hours on-site with the Owner and his representatives for a complete functional demonstration of all the system requirements. This demonstration constitutes a joint acceptance inspection, and permits acceptance of the delivered system for on-line operation.

3.07 Protection

A. The Contractor shall protect all work and material from damage by his/her work or workers, and shall be liable for all damage thus caused.

B. The Contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted. The Contractor shall protect his/her work against theft or damage, and shall carefully store material and equipment received on site that is not immediately installed. The Contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.08 Acceptance

A. The control systems will not be accepted as meeting the requirements of Completion until all tests described in this specification have been performed to the satisfaction of both the Engineer and Owner. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Owner's representative. Such tests shall then be performed as part of the warranty.

PART 4 SEQUENCES OF OPERATION

4.01 Chiller Plant Control Sequence of Operation EDIT FOR YOUR PROJECT

A. The chiller plant is disabled when the outside air temperature drops below the ambient lockout setpoint of 50°F (Operator adjustable). It is allowed to run again when the outside air temperature rises above the ambient lockout setpoint plus the ambient lockout deadband (5°F) (operator adjustable).

1. System Scheduling: If the ambient temperature does not have the chiller plant locked out, the chilled water system may be enabled by the Building Management System by the following methods:
   a. A graphic screen override Input to allow the operator to manually override chiller system operation.
   b. A time of day schedule.

   If the system is enabled, the following scenario applies:
   a. Chiller Plant Control shall first enable the system chilled water pumps.
   b. Proof of Flow: The program waits for flow to be confirmed before beginning the chiller start sequence. If flow has not been confirmed within the Control Feedback Delay Time of 60 seconds (operator adjustable), an alarm is generated and BACS system is notified.

2. Temperature Control: The chiller plant control application software shall automatically provide temperature control of the chilled water supply loop. This is done by coordinating the control of the chillers and pumps in the system for scheduling, sequencing, rotating, alarming, and shutdown.
   a. Chiller setpoint calculations - the chiller plant control application shall calculate the setpoint sent to each chiller using the following data:
      - System supply water temperature setpoint
      - System return water temperature
      - Capacity of the chillers enabled
      - Total capacity of the chiller plant

3. Add/Subtract Chillers
   The application software shall be password protected and allow the operator access to adjustable time delays on add/subtract requests to prevent excessive chiller cycling. The criteria for adding and subtracting chillers shall be controlled as follows:

a. Add Control shall be based on the system chilled water setpoint and the system chilled water supply temperature.

The Normal mode add logic in the chiller plant control application shall compare the system supply temp to the system supply temp setpoint of 45°F (operator adjustable) plus the add deadband (2° F) (operator adjustable). If the system supply temp exceeds the setpoint plus deadband, an add request is generated. If an add request exists continuously for the duration of the add delay time (operator adjustable) a chiller is added.

The Soft Start mode add logic in the chiller plant control application shall monitor the system return water temperature. The algorithm shall keep track of how much the return water temperature changes every minute. If the change is not greater than the setpoint (operator adjustable), the add timer begins. The rate of change must be less than this limit for each minute of the add delay timer (operator adjustable) before an add is done. If this temperature is not decreasing at the prescribed rate, an additional add request shall be generated.

If both an add request and a subtract request are present, the add request shall take precedence. Add shall always have priority over subtract.

c. Subtract Control shall be based on either the system chilled water delta T or chilled water flow, as selected by the operator.

The temperature based subtract logic shall look at the actual system chilled water temperature difference. Whenever the system chilled water temperature difference is less than the subtract chilled water temperature difference (calculated value), a subtract request is generated. If the subtract request exists continuously for the duration of the subtract delay time (operator adjustable), a chiller is subtracted. The Subtract chilled water temperature difference is a measure of the remaining chiller system capacity available if the chiller to be subtracted is disabled. The value of the subtract chilled water temperature difference shall be calculated using a factory tested and validated algorithm incorporating the following data:

- Chiller plant design chilled water temperature difference
- Chiller capacity (tons) to be subtracted
- Chiller capacity (tons) that are enabled
- Chiller capacity (tons) in entire plant

d. Forced add or subtract - The application shall allow operator intervention or a communicated value to add or subtract a chiller overriding the control algorithm current status. Add requests shall have priority over subtract requests.

4. Chiller Sequencing

The operator shall be able to designate each chiller in the system as a specific type for sequencing to increase system efficiency and equalize (or offset) chiller run time. Re-designation of chiller types shall be part of the standard application, and not require intervention by the original programmer. The Chiller shall be rotated and sequenced based on building cooling demand and rotation strategy

implemented.

5. Chiller Rotation
   Manual or automatic rotation of the chiller sequence shall be allowed. Rotation time interval shall be operator adjustable, and be of the following methods:
   a. Time and date
   b. Operator intervention
6. System Security
   The chiller plant control system shall allow program security to be designated for each operator with a choice of the following functions:
   a. View chiller plant status
   b. Change chiller plant status
   c. View chiller plant setpoints
   d. Change chiller plant setpoints
7. System status display
   The chiller plant control software shall provide operating status for the system. The display shall include all points indicated in the points list and any others required to achieve the sequence of operation.
8. Diagnostics/Protection-
   The chiller plant control program shall be able to integrate individual chiller diagnostics into control action decisions. This shall also include the ability to designate chillers as being in maintenance mode (hence unavailable for sequencing) to avoid generating sequencing alarms.
9. Chiller Start-up Sequence
   The chiller plant control software will start and stop system water pumps and chillers based upon the loading of the operating chillers. The chiller plant control application shall enable a chiller for the following reasons:
   a. System enabled
   b. Add request
   c. Chiller rotation initiated
   d. Chiller failure
   e. Chiller becoming available
   f. Operator intervention triggering a forced add command

   The following steps occur during the chiller startup sequence, and shall be operator configurable in the event of sequence modifications without the intervention of the original programmer:
   a. The chilled water pump (for the chiller) is started.
   b. The application shall wait up to the control feedback delay time of 30 seconds (operator adjustable) for flow to be confirmed. If flow is not confirmed in that time, the pump is marked as failed, and the BACS system is alarmed.
   c. After flow is confirmed, the chiller is enabled.
   d. The application shall wait up to the control feedback delay time (operator adjustable) for chiller status to be confirmed. If status is not confirmed in that time, the chiller is marked as failed, and the chiller is turned Off and the next chiller shall be started.

End of Section 23 09 29

SECTION 23 21 00 - HVAC PIPING AND FITTINGS

PART 1 GENERAL

1.01 Description of Work

A. Provide the HVAC pipe and fittings as specified and indicated on the drawings.

1.02 Quality Assurance

A. Welders Qualifications: All welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing. Welders of steam and condensate return piping shall be holders of ASME 'R' and 'PP' or 'S' stamps.

B. Welding procedures and testing shall comply with ANSI Standard B31.1.0 - Standard Code for Pressure Piping, Power Piping, and The American Welding Society, Welding Handbook.

C. Soldering and Brazing procedures shall conform to ANSI B9.1 Standard Safety Code for Mechanical Refrigeration.

D. All grooved joint couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

E. All castings used for coupling housings, fittings, valve bodies, etc., shall be date stamped for quality assurance and traceability.

PART 2 PRODUCTS

2.01 Above Grade Piping and Fittings – edit for 250 lb class if needed

A. The following shall be acceptable piping methods for all discharge pipe from relief valves, condensate drain lines, cooling tower water, heat pump water, chilled water, and heating water lines 2 1/2" and smaller:

1. Type L hard copper pipe with sweat type fittings and 50/50 solder connections.
2. Type L hard copper pipe with copper and copper alloy fitting shall conforming to ASME B16.18 or B16.22 as well as IAPMO PS117 may be used. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed by fitting manufacturer. Press end shall have smart connect feature. Viega ProPress. (200 psi rated)
3. Type L hard copper with push-to-connect fittings may be used. Fittings shall be wrought copper or cast bronze with EPDM seals and 301 stainless steel internal components. Victaulic PermaLynx. (200 psi rated)
4. Copper-tube dimensioned grooved joint fittings conforming to ASME B16.18 or B16.22, with Installation-Ready couplings suitable for direct stab installation without field disassembly. Victaulic Copper-Connection with Style 607 Quick-Vic Couplings. (300 psi rated)

B. Schedule 40 grade, ASTM A-53, butt weld black steel pipe shall be used for tower water, heat pump, chilled, and heating water lines, as well as discharge pipe from relief valves 3" and larger.

C. Threaded standard weight malleable fittings shall be used for steel lines 2-1/2" and smaller. Welded fittings shall be used for lines 3" and larger and shall conform to ASTM Spec. A-234-52AT, Schedule 40.

D. Victaulic fittings and couplings with “EHP”, “E” or “T” gaskets may be substituted for

welded fittings in all above listed steel piping lines. All fittings shall be rated for actual line pressures encountered.

1. Couplings shall consist of two ductile iron housing segments, pressure responsive gasket, and zinc electroplated steel bolts and nuts.
   a. 2-1/2” through 12”: Rigid type couplings with housings cast with offsetting, angle-pattern bolt pads to provide rigidity and system support and hanging in accordance with ANSI B31.1 and B31.9, Victaulic Style 07.
   b. 14” through 24”: AGS Series couplings with lead-in chamfer on housing key and wide width FlushSeal gasket. Rigid type coupling housing key shall fill the wedge shaped AGS groove and provide rigidity and system support and hanging in accordance with ANSI B31.1 and B31.9, Victaulic Style W07. Flexible type coupling housing key shall fit into the wedge shaped AGS groove and allow for linear and angular movement. Victaulic Style W77.
   c. Flange Adapter: Flat face, ductile iron housings with elastomer pressure responsive gasket, for direct connection to ANSI Class 125 or 150 flanged components. Victaulic Style 741 / W741.
2. Flexible Type: For use in locations where vibration attenuation and stress relief are required. Three flexible couplings may be used in lieu of a flexible connector. The couplings shall be placed in close proximity to the source of the vibration. Victaulic Installation-Ready Style 177 or Style 77.

E. Type L soft copper pipe in approximately 3- to 4- foot lengths shall be used for final heat pump and terminal unit piping connections.

PART 3 EXECUTION

3.01 Heat Pump, Tower Water, Chilled, and Heating Water Supply and Return Lines

A. All piping shall be cut accurately to measurements taken at the job. Install offset connections for alignment of vertical to horizontal piping and where required to make a true connection. Bent or sprung pipe will not be accepted. Make branch connections with offsets to provide for expansion. Vertical piping shall be installed plumb. Horizontal piping shall be installed parallel to building walls and partitions.

B. Cutting or other weakening of the building structure to facilitate pipe installation will not be permitted. All pipes shall have burrs removed by reaming and shall be installed so as to permit free expansion and contraction without damage to joints or hangers. Cap or plug all open ends of pipes during installation to keep out dirt or foreign material.

C. All supply and return mains shall be evenly graded and shall pitch upward at least 1" in 40' in the direction of flow where possible and not less than 1" in 100'. Eccentric reducers shall be used for all reductions in pipe size on supply and return mains. All connections shall be carefully made to insure the unrestricted circulation, elimination of air pockets, and permit the complete drainage of the system. Install eccentric reducers in a manner such that the tops of the pipe are kept in line in order to permit the free passage of air along the pipe.

D. Provide Watts BD-1 manual air vents at highest points in supply and return system and elsewhere as required where air may be trapped.

E. Grooved joints shall be installed in accordance with the manufacturer’s latest published installation instructions. Grooved ends shall be clean and free from indentations, projections, and roll marks in the area from pipe end to groove. Gaskets shall be of an elastomer grade suitable for the intended service, and shall be molded and produced by

the coupling manufacturer. The grooved coupling manufacturer's factory trained representative shall provide on-site training for contractor's field personnel in the use of grooving tools and installation of grooved joint products. The representative shall periodically visit the jobsite and review contractor is following best recommended practices in grooved product installation. (A distributor's representative is not considered qualified to conduct the training or jobsite visit(s).)

3.02 Condensate Drain Lines

A. Condensate drain lines shall be graded at 1/8" per foot.

B. Drains shall be sized in accordance with the following schedule:

Tons	Drain Size
0-3	¾"
4-20	1"
21-90	1-1/4"
91-125	1-1/2"
126-250	2"

C. All drains shall be provided with a trap of proper depth in accordance with prevailing system static pressures.

3.03 Exposed and Concealed Piping

A. All piping shall be concealed in walls, below floors, or above ceilings unless indicated otherwise or shown running through areas with exposed structure. All pipe shall be installed parallel or perpendicular to building surfaces.

End of Section 23 21 00

SECTION 23 21 15- HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 Description of Work

A. Provide the hydronic specialty equipment as specified and as shown on the drawings.

1.02 Approved Manufacturers

A. The basis for the fixtures in this specification are those named and shall represent the minimum level of construction. Equipment manufactured by Bell and Gossett, Armstrong, Patterson, Wheatley, and Neptune shall be permitted to bid these specifications

PART 2 PRODUCTS

2.01 Expansion Tank

A. Provide Amtrol, or approved equal, pneumatic pre-pressurized diaphragm type expansion tanks in sizes as listed. Shop drawing submittal shall include a listing of calculation pertaining to charge rates for each individual tank.

B. Tanks shall be as follows:

1. Chilled Water Tank #1: Amtrol AX-60V rated for 33.6 gallon volume and 11.1 gallon acceptance volume.
2. Chilled Water Tank #2: Amtrol AX-60V rated for 33.6 gallon volume and 11.1 gallon acceptance volume.
3. Heating Water Tank #1: Amtrol AX-60V rated for 33.6 gallon volume and 11.1 gallon acceptance volume.
4. Heating Water Tank #2: Amtrol AX-60V rated for 33.6 gallon volume and 11.1 gallon acceptance volume.
5. Heat Pump Water Tank: Amtrol AX-60V rated for 33.6 gallon volume and 11.1 gallon acceptance volume.

2.02 Air Elimination Fitting

A. Provide Thrush-Amtrol #720 automatic air elimination fittings in all locations shown.

2.03 Systems Feed Valve

A. Provide Amtrol #20S pressure reducing valve complete with integral strainer with pressure set as indicated on the plans.

2.04 Tangential Air Separator

A. Provide Amtrol tangential separators without strainers. Provide with ball valve in blow off tapping.

B. Separators shall be as follows:

1. Chilled Water Air Separator #1: Amtrol 5-AS-L: 538 gpm @ 1.5 ft PD
2. Chilled Water Air Separator #2: Amtrol 5-AS-L: 538 gpm @ 1.5 ft PD
3. Heating Water Air Separator #1: Amtrol 3-AS-L: 111 gpm @ 1.0 ft PD
4. Heating Water Air Separator #2: Amtrol 3-AS-L: 111 gpm @ 1.0 ft PD
5. Heat Pump Water Air Separator: Amtrol 4-AS-L: 195 gpm @ 1.0 ft PD

2.05 Air Eliminator and Dirt Separator

A. Furnish and install as shown on the drawings and schedule a full flow coalescing combination air eliminator and dirt separator for the condenser water systems. Selection

shall be based upon system flow with the pipe size as a minimum in accordance with the basis of design. In no case shall entering velocity exceed 10 feet per second.

B. Separator shall be fabricated steel, rated for 150 psig working pressure, stamped and registered in accordance with ASME Section VIII, Division 1 for unfired pressure vessels, and include two equal chambers above and below the inlet / outlet nozzles. The vessel diameter and height above and below the inlet / outlet connections must be equal to the basis of design.

C. Unit shall include internal Spirotube® elements filling the entire vessel to suppress turbulence and provide air elimination efficiency of 100% free air, 100% entrained air, and 99.6% dissolved air at the installed location. Dirt Separation efficiency shall be a minimum of 80% of all particles 30 micron and larger within 100 passes. The elements must consist of a copper core tube with continuous wound copper wire medium permanently attached and followed by a separate continuous wound copper wire permanently affixed.

D. Each unit shall have a separate venting chamber to prevent system contaminants from harming the float and venting valve operation. At the top of the venting chamber shall be an integral full port float actuated brass venting mechanism. Units shall include a valved side tap to flush floating dirt or liquids and for quick bleeding of large amounts of air during system fill or refill.

E. Basis of design for the air eliminator / dirt separator shall be the Spirovent® Series VDT or VHT as manufactured by Spirotherm, Inc., Glendale Heights, Illinois. Optional Series VDN or VHN by Spirotherm, Inc. shall include removable lower head for internal inspection if so noted on the drawings and schedule.

F. Separators shall be as follows:

1. Air Eliminator #1: Spirotherm VDT300 rated for 86 gpm flow at less than 1.0 ft WPD

2.06 Glycol Make-Up Package – edit if this is in our project

A. Glycol make-up package shall be Patterson model GMP-13050 with discharge pressure factory preset at 12 psi, and field adjustable as The contractor shall supply and install, as indicated on the plans and in the specifications, a prefabricated, automatic and autonomous make-up package for (the) (each) glycol system.

B. The package shall be designed to occupy a minimum amount floor space to operate on a standard 110V, 60 Hz electrical circuit, and to maintain a fill pressure in the glycol system of psi. The pumping assembly shall be mounted in a sturdy steel frame with legs to keep it off the floor.

C. The system shall include a 1/3 HP, 1.8 gpm, 50 psi pump with magnetic starter, pressure tank with pressure control, priming valve, pressure reducing valve, shut-off valve, and a pressure gauge. It shall be connected to the system with a 3/4"NTP connection.

D. The system shall feature a cut-off and alarm arrangement, which will stop the pump in case of excessive pressure, or a low solution level, and activate an audible (which can be silenced) and a visual alarm. An 110V dry contact shall also be available for a remote alarm.

E. A translucent polyethylene 50 gallon solution reservoir, complete with lid, shall be mounted on the pumping assembly and shall include a strainer and a shut off valve. A 1 ¼" NTP glycol solution recovery line shall be piped in from the system relief valve out let to the solution container, through its lid in such a way that the lid can be removed for

filling and mixing.

PART 3 EXECUTION

End of Section 23 21 15

SECTION 23 21 19 - HVAC PUMPS

PART 1 GENERAL

1.01 Description of Work

A. Provide all HVAC pumps as specified and shown on the drawings.

B. All Variable Speed Drives associated with pumps shall be provided by the Electrical Contractor. This contractor shall coordinate with the Electrical Contractor to insure compatibility between motors and drives.

1.02 Approved Manufacturers

A. The basis for the pumps in this specification is Bell and Gossett and shall represent the minimum level of construction. Products by alternative manufacturers listed below shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Manufacturers EDIT PER PROJECT

A. Products: Subject to compliance with requirements, provide one of the following:

1. Inline Booster Pumps:
   a. "GT/M200," Amtrol, Inc.
   b. "Series S, Standard In-the-Line," Armstrong Pumps, Inc.
   c. "Series Booster," Bell & Gossett, ITT.
   d. "110 Series, Red Baron," Taco, Inc.
2. Inline Circulators:
   a. "GT/M200," Amtrol, Inc.
   b. "Series 1000," Armstrong Pumps, Inc.
   c. "Series 60," Bell & Gossett, ITT.
   d. "1600 Series," Taco, Inc.
3. Vertical Inline Pumps:
   a. "1500 Series," Allis-Chalmers Pump, Inc.
   b. "TV2g," Amtrol, Inc
   c. "Series 4360," Armstrong Pumps, Inc.
   d. "380 Series, APCO-LIGN," Aurora Pumps.
   e. "Series 80," Bell & Gossett, ITT.
   f. "Type PV," Peerless Pump.
   g. "VL Series," Taco, Inc.
   h. "Type CV," Weinman, Mueller Pump.
4. Base-Mounted, Close-Coupled, End-Suction Pumps:
   a. "Series 2,000, Model 600," Allis-Chalmers Pump, Inc.
   b. "PC2g," Amtrol, Inc.
   c. "Series 4280," Armstrong Pumps, Inc.
   d. "360 Series," Aurora Pumps.
   e. "Series 1531," Bell & Gossett ITT.
   f. "Series C," Peerless Pump.
   g. "CM Series," Taco, Inc.
5. Base-Mounted, Separately-Coupled, End-Suction Pumps:
   a. "Series 2,000, Model 150," Allis-Chalmers Pump, Inc.
   b. "PF2g," Amtrol, Inc.
   c. "Series 4030," Armstrong Pumps, Inc.
   d. "360 Series," Aurora Pumps.

e. "Series 1510," Bell & Gossett, ITT.
f. "Series F," Peerless Pump.
g. "FM Series," Taco, Inc.

6. Base-Mounted, Separately-Coupled, Double-Suction Pumps:
   a. "Series 8,000, Models 100 and 150," Allis-Chalmers Pump, Inc.
   b. "SC2g," Amtrol, Inc.
   c. "410 Series, Model 411," Aurora Pumps.
   d. "VSC & VSCS," Bell & Gossett, ITT.
   e. "Series 5100, Type AD," Peerless Pump.
   f. "TA Series," Taco, Inc.
   g. "Series 3500, Type A," Weil Pump Company.

2.02 Pumps General

A. Pumps and Circulators: Factory-assembled and factory-tested. Fabricate casings to allow removal and replacement of impellers without necessity of disconnecting piping. Type, sizes, and capacities shall be as indicated.

B. Preparation for Shipping: After assembly and testing, clean flanges and exposed machined metal surfaces and treat with an anticorrosion compound. Protect flanges, pipe openings, and nozzles.

C. Motors: Conform to NEMA Standard MG-1, general purpose, continuous duty, Design B, except Design C where required for high starting torque; single, multiple, or variable speed with type of enclosure and electrical characteristics as indicated; have built-in thermal-overload protection, and grease-lubricated ball bearings. Select motors that are non-overloading within the full range of the pump performance curve.

D. Efficiency: "Energy Efficient" motors shall have a minimum efficiency as indicated in accordance with IEEE Standard 112, Test Method B. If efficiency is not specified, motor shall have a higher efficiency than the "average standard industry motors," in accordance with IEEE Standard 112, Test Method B.

   1. Motor Frame: NEMA Standard 48 or 54; use pump manufacturer's standard.

E. Apply factory finish paint to assembled, tested units prior to shipping.

2.03 Inline Booster Pumps

A. General Description: Circulators shall be horizontal inline, centrifugal, separately-coupled, single-stage, bronze fitted, radially split case design, with mechanical seals, and rated for 125 psig working pressure and 225 deg F continuous water temperature.

B. Casings Construction: Cast iron, with threaded companion flanges for piping connections smaller than 2-1/2 inches, and threaded gauge tappings at inlet and outlet connections.

C. Impeller Construction: Statically and dynamically balanced, closed, overhung single-suction, fabricated from cast bronze conforming to ASTM B 584, and keyed to shaft.

D. Impeller Construction: Statically and dynamically balanced, closed, overhung single-suction, fabricated from Rolled Temper brass conforming to ASTM B 36, and keyed to shaft.

E. Pump Shaft and Sleeve: Steel shaft, with oil-lubricated copper sleeve.

F. Mechanical Seals: Carbon steel rotating ring, stainless steel spring, ceramic seat, and flexible bellows and gasket.

G. Pump Bearings: Oil-lubricated, bronze journal and thrust bearings.

H. Motor Bearings: Oil-lubricated, sleeve bearings.

I. Shaft Couplings: Flexible, capable of absorbing torsional vibration and shaft misalignment.

J. Motors: Resiliently mounted to the pump casing.

2.04 Inline Circulators

A. General Description: Circulators shall be horizontal inline, centrifugal, separately-coupled, single-stage, bronze-fitted, radially split case design, with mechanical seals, and rated for 125 psig working pressure and 225 deg F continuous water temperature.

B. Casings Construction: Cast iron, with threaded companion flanges for piping connections smaller than 2-1/2 inches, and threaded gauge tappings at inlet and outlet connections.

C. Impeller Construction: Statically and dynamically balanced, closed, overhung single-suction, fabricated from cast bronze conforming to ASTM B 584, and keyed to shaft.

D. Impeller Construction: Statically and dynamically balanced, closed, overhung, single-suction, fabricated from Rolled Temper brass conforming to ASTM B 36, and keyed to shaft.

E. Pump Shaft and Sleeve: Steel shaft, with copper sleeve. Provide flinger on motor shaft between motor and seals to prevent liquid that leaks past pump seals from entering the motor bearings.

F. Mechanical Seals: Carbon steel rotating ring, stainless steel spring, ceramic seat, and flexible bellows and gasket.

G. Pump Shaft Bearings: Oil-lubricated, bronze journal and thrust bearings.

H. Pump Couplings: Flexible, capable of absorbing torsional vibration and shaft misalignment.

I. Motors: Resiliently mounted to the pump casing.

2.05 Vertical Inline Pumps

A. General Description: Pumps shall be centrifugal, close-coupled, single-stage, bronze-fitted, radially split case design, with mechanical seals, and rated for 175 psig working pressure and 225 deg F continuous water temperature.

B. Casings Construction: Cast iron, with threaded companion flanges for piping connections smaller than 2-1/2 inches, and threaded gauge tappings at inlet and outlet connections.

C. Impeller Construction: Statically and dynamically balanced, closed, overhung, single-suction, cast bronze, conforming to ASTM B 584, and keyed to shaft.

D. Wear Rings: Removable, bronze.

E. Pump Shaft and Sleeve: Ground and polished steel shaft, with bronze sleeve and integral thrust bearing. Provide flinger on motor shaft between motor and seals to

prevent liquid that leaks past pump seals from entering the motor bearings.

F. Seals: Mechanical Seals consisting of carbon steel rotating ring, stainless steel spring, ceramic seat, and flexible bellows and gasket.

G. Seals: Stuffing box having a minimum of 4 rings of graphite impregnated braided yarn with a bronze lantern ring between center 2 graphite rings and a bronze packing gland.

H. Motor: Direct-mounted to pump casing; with lifting and supporting lugs in top of motor enclosure.

2.06 Base-Mounted, Close-Coupled, End-Suction Pumps

A. General Description: Pumps shall be base-mounted, centrifugal, close-coupled, end-suction, single-stage, bronze-fitted, radially split case design, and rated for 175 psig working pressure and 225 deg F continuous water temperature.

B. Casings Construction: Cast iron, with flanged piping connections, and threaded gauge tappings at inlet and outlet flange connections.

C. Impeller Construction: Statically and dynamically balanced, closed, overhung, single-suction, fabricated from cast bronze conforming to ASTM B 584, keyed to shaft and secured by a locking capscrew.

D. Wear Rings: Replaceable, bronze.

E. Pump Shaft and Sleeve Bearings: Steel shaft, with bronze sleeve. Provide flinger on motor shaft between motor and seals to prevent liquid that leaks past pump seals from entering the motor bearings.

F. Seals: Mechanical seals consisting of flushed seals consisting of carbon steel rotating ring, stainless steel spring, ceramic seat, and flexible bellows and gasket.

G. Seals: Stuffing box consisting of flushed, double seals have a minimum of 4 rings of graphite impregnated braided yarn with a bronze lantern ring between center 2 graphite rings, and having a bronze packing gland.

H. Motor: Direct-mounted to the pump casing with supporting legs as an integral part of motor enclosure.

2.07 Base-Mounted, Separately-Coupled, End-Suction Pumps

A. General Description: Pumps shall be base-mounted, centrifugal, separately-coupled, end-suction, single-stage, bronze-fitted, radially split case design, and rated for 175 psig working pressure and 225 deg F continuous water temperature.

B. Casings Construction: Cast iron, with flanged piping connections, and threaded gauge tappings at inlet and outlet flange connections.

C. Impeller Construction: Statically and dynamically balanced, closed, overhung, single-suction, fabricated from cast bronze conforming to ASTM B 584, keyed to shaft and secured by a locking capscrew.

D. Wear Rings: Replaceable, bronze.

E. Pump Shaft and Sleeve Bearings: Steel shaft, with bronze sleeve.

F. Seals: Mechanical seals consisting of carbon steel rotating ring, stainless steel spring,

ceramic seat, and flexible bellows and gasket.

G. Seals: Stuffing box consisting of a minimum of 4 rings of graphite impregnated braided yarn with a bronze lantern ring between center 2 graphite rings, and a bronze packing gland.

H. Pump Couplings: Flexible, capable of absorbing torsional vibration and shaft misalignment; complete with metal coupling guard.

I. Mounting Frame: Factory-welded frame and cross members, fabricated of steel channels and angles conforming to ASTM B 36. Fabricate for mounting pump casing, coupler guard, and motor. Grind welds smooth prior to application of factory finish. Motor mounting holes for field-installed motors shall be field-drilled.

J. Motor: Secured to mounting frame with adjustable alignment on mounting frame.

2.08 Base-Mounted, Separately-Coupled, Double-Suction Pumps

A. General Description: Pumps shall be base-mounted, centrifugal, separately-coupled, double-suction, single-stage, bronze-fitted, axially split case design, and having an impeller mounted between bearings. Temperature and pressure ratings: 175 psig working pressure and 250 deg F continuous water temperature.

B. Casings Construction: Cast iron, with ANSI B16.1, Class 125 flanged piping connections, threaded gauge tappings at inlet and outlet flange connections, and threaded drain plug at the bottom of the volute.

-- OR --

C. Casings Construction: Cast iron, with ANSI B16.1, Class 250 flanged piping connections, threaded gauge tappings at inlet and outlet flange connections, and threaded drain plug at the bottom of the volute.

D. Impeller Construction: Statically, and dynamically balanced, closed, double-suction, fabricated from cast bronze conforming to ASTM B 584, keyed to shaft.

E. Wear Rings: Replaceable, bronze.

F. Pump Shaft and Sleeve: Steel shaft, with bronze sleeve.

G. Pump Shaft Bearings: Grease-lubricated ball bearings contained in cast iron housing.

H. Seals: Mechanical seals consisting of carbon steel rotating ring, stainless steel spring, ceramic seat, and flexible bellows and gasket.

I. Seals: Stuffing box consisting of a minimum of 4 rings of graphite impregnated braided yarn with a bronze lantern ring between center 2 graphite rings, and a bronze packing gland.

J. Pump Couplings: Flexible, capable of absorbing torsional vibration and shaft misalignment; complete with metal coupling guard.

K. Mounting Frame: Factory-welded frame and cross members, fabricated of steel

channels and angles conforming to ASTM B 36. Fabricate for mounting pump casing, coupler guard, and motor. Grind welds smooth prior to application of factory finish. Motor mounting holes for field-installed motors shall be field-drilled.

L. Motor: Flexible-coupled to pump, with adjustable alignment on mounting frame.

PART 3 EXECUTION

3.01 Installation

A. General: Comply with the manufacturer's written installation and alignment instructions.

B. Install pumps in locations and arranged to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.

C. Support pumps and piping separately so that the weight of the piping system does not rest on the pump.

D. Suspend horizontal inline pumps using all-thread hanger rod and vibration isolation hangers of sufficient size to support the weight of the pump independent from the piping system.

E. Set base-mounted pumps on concrete housekeeping pads.

3.02 Connections

A. General: Install valves that are same size as the piping connecting the pump.

B. Install suction and discharge pipe sizes as indicated in piping schematics.

C. Install a non-slam check valve and balance valve on the discharge side of inline pumps.

D. Install a triple-duty valve on the discharge side of base-mounted, end-suction pumps.

E. Install a pump suction diffuser and isolation valve on the suction side of base-mounted, end-suction pumps.

F. Install flexible connectors on the suction and discharge side of each base-mounted pump.

G. Install pressure gauges on the suction and discharge of each pump at the integral pressure gauge tappings provided.

H. Install temperature and pressure gauge connector plugs in suction and discharge piping around pump. Temperature and pressure gauge connector plugs are specified in Division 23 Section "Meters and Gauges."

End of Section 23 21 19

SECTION 23 31 13 - METAL DUCTS

PART 1 GENERAL

1.01 Description of Work

A. Provide all sheet metal work for supply, return, outside air, pressure relief and exhaust air systems as specified, indicated on the drawings and as required by applicable codes.

1.02 Performance Requirements

A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" - Third Edition 2005 and performance requirements and design criteria indicated on the drawings and in these specifications.

B. Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

1.03 Submittals

A. Product Data: For each type of the following products:

1. Liners and adhesives
2. Sealants and gaskets
3. Seismic-restraint devices

B. Shop Drawings:

1. Materials, fabrication, assembly and installation; including plans, elevations, sections, details, components and attachments to other work
2. Factory and shop-fabricated ducts and fittings
3. Duct layout indicating sizes, configuration, dimensions from building lines, elevation of top of duct, liner material and static-pressure classes
4. Sheet metal thicknesses
5. Reinforcement details and spacing
6. Joint and seam construction and sealing
7. Penetrations through fire-rated and other partitions
8. Equipment installation details specific to this project
9. Location of duct accessories including dampers, turning vanes and access doors/panels
10. Hangers and supports; including, spacing, methods for duct and building attachment, and vibration isolation

1.04 Quality Assurance

A. Welding Qualifications: Qualify procedures and personnel according to AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding

C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

D. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 PRODUCTS

2.01 Single Wall Rectangular Ducts and Fittings

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible", Chapter 2, Rectangular Duct Construction.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricated joint systems as manufactured by:
   a. Duct Mate
   b. Quickduc
   c. Nexus
   d. Ward
2. Shop constructed joints:
   a. Engle TDF
   b. Lockformer TDC
3. Transverse Joints in Ducts Larger than 60 Inches in Diameter shall be flanged.

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Grooved seam
2. Pittsburg lock seam.

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Rectangular branch take-offs shall be of the 45º entry design. Provide manual dampers in take-offs in low pressure ductwork.

E. Provide additional reinforcing where necessary to eliminate excessive movement and/or vibration.

2.02 Single-Wall Round and Flat-Oval Ducts and Fittings

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible", Chapter 3 Round, Oval and Flexible Duct.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Lindab Inc.
2. McGill Airflow LLC.
3. Semco Incorporated
4. Sheet Metal Connectors, Inc.
5. Wesco

C. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

D. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, " Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Medium pressure systems positive/negative 4” W.G. shall be spiral lock seam duct.
2. Low pressure systems positive/negative 2” W.G. may use snap lock duct.

E. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, " Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Low pressure systems (positive/negative 2” W.G.) and 10 inch diameter and smaller may use snaplock seams.
2. Low pressure systems (positive/negative 2” W.G.) and 12 inch diameter and larger shall be spiral lock seam.
3. Medium pressure systems (positive/negative 4” W.G.) shall be spiral lock seam.
4. Fabricate round ducts larger than 90 inches in diameter with butt-welded longitudinal seams.
5. Fabricate flat-oval ducts larger than 72 inches in width (major dimension) with butt-welded longitudinal seams.

F. Tees and Laterals: Fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Round branch take-offs or taps shall be of the conical or 45 degree ‘wye’ design with sealer and mechanical fasteners used at tap connection.

2.03 Sheet Metal Materials

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M

1. Galvanized Coating Designation: G90
2. Finishes for Surfaces Exposed to View: Mill phosphatized

C. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.04 Duct Liner

A. Fibrous-Glass Duct Liner – Type 1: Comply with ASTM C 1071, NFPA 90A or NFPA

90B, ASTM G22 bacteria resistance, ASTM C1338 fungi resistance and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Basis-of-Design Product: Subject to compliance with requirements, provide CertainTeed ToughGuard R Duct Liner Type 200 or comparable product by one of the following:
   a. Johns Manville
   b. Knauf Insulation
   c. Owens Corning
2. Thickness: ½”
3. Density: 2.0 pcf
4. Maximum Thermal Conductivity: 0.24 at 75 degrees F mean temperature
5. Thermal Resistance (R-value): 2.1
6. Noise Reduction Coefficient (NRC): 0.45

2.05 Sealant and Gaskets

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Two-Part Tape Sealing System:

1. Tape: Woven fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
2. Tape Width: 3 inches or 4 inches
3. Sealant: Modified styrene acrylic
4. Water, mold and mildew resistant
5. Maximum Static-Pressure Class: 10-inch wg, positive and negative
6. Service: Indoor and outdoor
7. Service Temperature: 0 to 200 degree F
8. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum

C. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on
2. Solids Content: Minimum 65 percent
3. Shore A Hardness: Minimum 20
4. Water, mold and mildew resistant
5. VOC: Maximum 75 g/L (less water)
6. Maximum Static-Pressure Class: 10 inch W.G., positive and negative
7. Service: Indoor or outdoor
8. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel or aluminum.

D. Flange Gaskets: Butyl rubber, neoprene or EPDM polymer with polyisobutylene plasticizer.

E. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for 10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.06 Hangers and Supports

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Cables for Galvanized-Steel and Aluminum Ducts: Galvanized steel complying with ASTM A 603.

E. Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:

1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates
2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates
3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate

PART 3 EXECUTION

3.01 Ductwork Installation

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Coordinate duct system installation with all other trades. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated. This Contractor shall keep on the project at all times a set of SMACNA Standards. Before starting any construction of sheet metal work, the Contractor shall review applicable sections.

C. Install round and flat-oval ducts in maximum practical lengths. Install all ducts with the fewest possible joints.

D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally and parallel/perpendicular to building lines.

F. Protect duct interiors from moisture, construction debris, dust and other foreign materials. Comply with the “Advanced Level” of duct cleanliness as defined in SMACNA's "Duct Cleanliness for New Construction Guidelines."

3.02 Installation of Exposed Ductwork

A. Protect ducts exposed in finished spaces from being dented, scratched or damaged.

B. Provide ducts exposed in finished spaces with a paintable finish where it is indicated to

be painted on the architectural plans.

C. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead.

D. Grind welds to provide smooth surface free of burrs, sharp edges and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds and treat the welds to remove discoloration caused by welding.

E. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

F. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.03 Duct Sealing

A. Seal ducts for duct static-pressure, seal classes and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

3.04 Hanger and Support Installation

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports. Provide paintable finish for hangers of ducts noted to be painted.

E. Support vertical ducts with steel angles or channels secured to the sides of the duct with welds, bolts, sheet metal screws or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension and shear capacities appropriate for supported loads and building materials where used.

3.05 Connections

A. Make connections to equipment with flexible connectors complying with Division 23 Section "Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.06 Painting

A. Provide ductwork, hangers and accessories with a paintable finish where it is indicated

to be exposed and painted on the architectural plans.

B. All scratches or marks occurring in PVC coated ductwork shall be coated with two coats of PVC touch-up paint.

3.07 Duct Schedule.

A. Supply Ducts

1. Ducts Connected to Blower Coil Units and Heat Pumps
   a. Galvanized sheet steel
   b. Pressure Class: Positive 1-inch wg
   c. Minimum SMACNA Seal Class: C
   d. SMACNA Leakage Class for Rectangular: 24
   e. SMACNA Leakage Class for Round and Flat Oval: 12

B. Return Ducts

1. Ducts Connected to Blower Coil Units and Heat Pumps
   a. Galvanized sheet steel
   b. Pressure Class: Negative 1-inch wg
   c. Minimum SMACNA Seal Class: C
   d. SMACNA Leakage Class for Rectangular: 24
   e. SMACNA Leakage Class for Round and Flat Oval: 12

C. Exhaust Ducts

1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
   a. Galvanized sheet steel
   b. Pressure Class: Negative 1-inch wg
   c. Minimum SMACNA Seal Class: C
   d. SMACNA Leakage Class for Rectangular: 24
   e. SMACNA Leakage Class for Round and Flat Oval: 12

D. Outdoor-Air (Not Filtered, Heated or Cooled) Ducts:

1. Ducts Connected to Blower Coil Units
   a. Galvanized sheet steel
   b. Pressure Class: Positive or negative 1-inch wg
   c. Minimum SMACNA Seal Class: C
   d. SMACNA Leakage Class for Rectangular: 24
   e. SMACNA Leakage Class for Round and Flat Oval: 12

E. Intermediate Reinforcement:

1. Galvanized-Steel Ducts:
   a. Exposed to Airstream: Match duct material
   b. Not Exposed to Airstream: Galvanized

F. Liner

1. Supply Air Ducts: Fibrous glass, Type I, Flexible elastomeric or Natural fiber, 1/2 Inch thick.
2. Return Air Ducts: Fibrous glass, Type I, Flexible elastomeric or Natural fiber, 1/2 Inch thick.
3. Transfer Ducts: Fibrous glass, Type I, Flexible elastomeric or Natural fiber, 1/2 Inch, thick.

G. Elbow Configuration

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

a. Radius Type RE 1: Minimum centerline radius equal 1.5 times the duct width
b. Mitered Type RE 2: With vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3 - "Vanes and Vane Runners," and Figure 2-4 - "Vane Support in Elbows."

2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-3, "Round Duct Elbows."
   a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.
      - Radius-to Diameter Ratio: 1.5
   b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped
   c. Round Elbows, 14 Inches and Larger in Diameter: Segmented Standing seam or Welded

H. Branch Configuration

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
   a. Rectangular Main to Rectangular Branch: 45-degree entry
   b. Rectangular Main to Round Branch: 45-degree entry (HETO High Efficiency Take Off)
2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees."
   a. 45-degree lateral tap
   b. 90-degree tee with oval to round tap
   c. Saddle taps are permitted only in existing duct

I. Offsets and Transitions

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-7, "Offsets and Transitions."
   a. Change in size: Not more than 15 degrees

End of Section 23 31 13

SECTION 23 33 00 - DUCT ACCESSORIES

PART 1 GENERAL

1.01 Description of Work

A. Provide duct accessories as specified and as indicated on the drawings.

1.02 Approved Manufacturers

A. The basis for this specification are those listed and shall represent the minimum level of construction. Equipment manufactured by Greenheck, Ruskin, Prefco, Penn, Cesco, and Ventlok shall be permitted to bid these specification.

PART 2 PRODUCTS

2.01 Turning Vanes

A. Provide double vane style turning vanes in all elbows of rectangular ducts.

B. Vanes shall conform to SMACNA low velocity duct standards for small double vane construction. Vanes shall be held in place by manufactured vane rails yielding maximum 2-1/8" vane spacing.

2.02 Balancing Dampers

A. Provide manual balancing damper where indicated on the plans and as required by the test and balance contractor.

B. Manual balancing dampers shall be Ruskin MD35 or approved equal, with 5" x 1" x 16 gauge galvanized steel channel frame, 16 gauge galvanized steel blades, steel shafts and molded synthetic shaft bearings. Linkage shall be arranged for opposed blade operation and shall be furnished with locking hand quadrant.

C. Dampers in round ducts shall be Ruskin MDRS25 single blade with 20 gauge frame and 20 gauge blade.

D. Dampers at takeoffs from rectangular trunk duct shall be as specified in the sheet metal section.

2.03 Control Dampers

A. Provide automatic control dampers where indicated on the plans.

B. Provide all automatic control dampers, except for any specified to be provided under the individual HVAC unit specifications, or under the TEMPERATURE CONTROL SECTION.

1. Dampers shall be Ruskin CD-35 or approved equal, with 2" x 1" x 18" steel channel frame, 16 gauge steel blades, Oilite bronze bearings, cadmium plated shafts and blade and jamb seals.
2. Outside air dampers and relief air dampers shall be Ruskin CD-50 extruded aluminum, low leakage damper, opposed blade design, with nylon bearings and blade and frame seals on all mating surfaces; damper leakage shall not exceed 6 CFM per square foot at 4.0" water column, tested in accordance with AMCA Standard 500.

C. Install dampers specified to be furnished under the Temperature Control Section of the Specifications as directed by the Controls Company.

2.04 Gravity Relief Dampers

A. Gravity relief dampers shall be Ruskin CBD6 or approved equal, with 2-1/4" x 7/8" x 1/8"

aluminum channel frame and 0.070" aluminum blades with extruded vinyl edge seals and Oilite shaft bearings. Blades shall incorporate an adjustable counterbalance and shall be suitable for horizontal or vertical mounting.

B. Backdraft dampers shall be Ruskin BD6 or approved equal, with 2-1/4" x 7/8" x 1/8" aluminum channel frame and 0.070" aluminum blades with extruded vinyl edge seals and Oilite shaft bearings.

2.05 Fire Dampers

A. Fire dampers installed in construction rated 2 hours or less shall be Ruskin IBD, UL listed, folding blade type horizontal and vertical mount, with integral 14 gauge sleeve, 18 gauge steel damper blades, stainless steel spring operator (horizontal mount) and UL fusible link.

B. Mount all dampers in accordance with their listing, with the SMACNA Fire Damper and Heat Stop Guide and where required by governing fire codes.

C. Fire dampers in medium and high pressure ductwork shall have the folded blades completely out of the airstream. Fire dampers in low pressure ductwork may have the folded blades in the airstream.

D. Fire dampers installed in construction rated 3 hours or more shall be equal to a Ruskin IBD-23, UL labeled, folding blade type, vertical mount, with integral 4-1/2" channel frame, and UL listed fusible doors where indicated and/or required by governing fire codes or regulations.

2.06 Combination Fire/Smoke Dampers

A. Combination square or rectangular smoke and fire dampers shall be equal to Ruskin FSD60 or FSD60-LP (where applicable), UL 555S classified smoke damper of leakage Class I at 350ºF, and UL classified multi-blade fire damper with auxiliary operating shaft. Motor operators shall be 120 volt stall type for operation as coordinated with the fire alarm manufacturer and furnished by the damper manufacturer. Dampers shall be UL classified static multi-blade fire damper and shall be rated for 3000 fpm velocity level and 4 in water gauge pressure level as required by UL classification specific to this application. Provide dampers with factory mounted test switch.

B. Combination round smoke and fire dampers shall be equal to Ruskin FSDR25, or approved equal, UL 555S classified smoke damper of leakage Class I at 350ºF, and UL classified multi-blade fire damper with auxiliary operating shaft. Motor operators shall be 120 volt stall type for operation as coordinated with the fire alarm manufacturer and furnished by the damper manufacturer. Dampers shall be UL classified static multi-blade fire damper and shall be rated for 3000 fpm velocity level and 4 in water gauge pressure level as required by UL classification specific to this application. Provide dampers with factory mounted test switch.

2.07 Smoke Dampers

A. Square or rectangular smoke dampers shall be equal to Ruskin SD 60 UL 555S classified damper. Damper shall meet the UL 555S requirements of leakage Class I at 250ºF. Motor operator actuated by smoke detectors and/or fire alarm system, as indicated. Motor operators shall be 120 volt stall type for operation as coordinated with the fire alarm manufacturer and furnished by the damper manufacturer. Dampers shall be UL classified static multi-blade fire damper and shall be rated for 3000 fpm velocity level and 4 in water gauge pressure level as required by UL classification specific to this application. Provide dampers with factory mounted test switch.

B. Round smoke dampers shall be equal to Ruskin SDRS25 UL 555S classified

damper. Damper shall meet the UL 555S requirements of leakage Class I at 250ºF. Motor operator actuated by smoke detectors and/or fire alarm system, as indicated. Motor operators shall be 120 volt stall type for operation as coordinated with the fire alarm manufacturer and furnished by the damper manufacturer. Dampers shall be UL classified static multi-blade fire damper and shall be rated for 3000 fpm velocity level and 4 in water gauge pressure level as required by UL classification specific to this application. Provide dampers with factory mounted test switch.

2.08 Access Doors

A. Hinged access doors shall be installed in housings where shown and where required for access to equipment. Insulated doors shall be installed in insulated or lined housings. Access doors construction, hardware, etc. shall be as detailed in SMACNA, HVAC Duct Construction Standards, 1985, Figure 6-12.

B. Access doors shall be installed in ductwork where shown and where required for access to fire dampers, smoke damper, etc. Insulated access doors shall be used where installed in insulated or lined ductwork. Ductwork access doors shall be constructed to the pressure rating of the ductwork in which the access door is installed. Access doors shall be constructed per SMACNA Duct Construction Standards, 1985, Figure 2-12 using type 1 or type 2 locks only. Screwed access panels are not acceptable.

2.09 Concealed Damper and Operators

A. Where noted and/or scheduled, provide Ruskin model ZPD-25 electronic pulse balancing damper. Installation shall include damper, optional diffuser mounted control cable with RJ11 connector and 20 feet of connector cable.

B. Provide one Ruskin ZRC020 hand held remote damper controller for the building. This controller is used to power the damper, adjust the damper and is not required to remain in place upon completion of test and balance work.

PART 3 EXECUTION

3.01 Installation

A. All fire dampers, smoke dampers and combination fire/smoke dampers shall be installed in accordance with the manufacturer's installation instructions and in compliance with UL listing information.

B. Grease duct access doors shall be installed in accordance with the manufacturer's installation instructions and in compliance with UL listing information. Where installed in fire wrapped ductwork, the fire wrap shall be installed at the access door per the access door manufacturer's instructions so that access is not interfered with and the fire rating of the duct is maintained.

C. Access doors for fire and or smoke dampers shall be permanently identified on the exterior by a label having letters not less than 0.5 inch in height reading:

FIRE/SMOKE DAMPER, SMOKE DAMPER or FIRE DAMPER

End of Section 23 33 00

SECTION 23 34 16- AIR DISTRIBUTION EQUIPMENT

PART 1 GENERAL

1.01 Description of Work

A. Provide air distribution equipment as specified and as indicated on the drawings.

1.02 Quality Assurance

A. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

B. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

C. Sound Power Level Ratings: Comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans in accordance with AMCA Standard 300 "Test Code for Sound Rating." Fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.

D. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.

1.03 Approved Manufacturers

A. The basis for this specification are those scheduled and shall represent the minimum level of construction. Equipment manufactured by Loren Cook, Greenheck, and Jenn Aire shall be permitted to bid these specification.

PART 2 PRODUCTS

2.01 General

A. General: Provide fans that are factory fabricated and assembled, factory tested, and factory finished, with indicated capacities and characteristics.

B. Belt Tensioner: All fans shall be furnished with a factory installed automatic belt tensioner to provide proper belt tension at all times.

C. Fans and Shafts: Statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.

1. The fan class shall be based on 115% of the fan rotational velocity at design conditions.
2. Fan Shaft: Turned, ground, and polished steel, designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fan's class.

D. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.

1. Service Factor: 1.4.

E. Belts: Oil-resistant, non-sparking, and non-static.

F. Motors: Motors shall be selected for at least 115% of the brake horsepower at design conditions without extending into the service factor.

G. Fan Wheel Pulleys: Adjustable pitch for use with motors through 15 HP; fixed pitch for use with motors larger than 15 HP. Select pulley so that pitch adjustment is at the middle of the adjustment range at fan design conditions.

1. Belt Guards: Provide steel belt guards for motors mounted on the outside of the fan cabinet.

H. Shaft Bearings: Provide type indicated, having a median life "Rating Life" (AFBMA L50) of 200,000, calculated in accordance with AFBMA Standard 9 for ball bearings and AFBMA Standard 11 for roller bearings.

I. Roof Curbs: Prefabricated, heavy-gauge, galvanized steel; mitered and welded corners; 2-inch-thick, rigid, fiberglass insulation adhered to inside walls; built-in cant and mounting flange for flat roof decks; and 2-inch wood nailer. Size as required to suit roof opening and fan base.

J. Accessories: The following items are required as indicated in the schedule:

1. Disconnect Switch: Non-fusible type, with thermal overload protection mounted inside fan housing, factory-wired through an internal aluminum conduit.
2. Bird Screens: Removable, 1/2-inch mesh, 16-gauge aluminum or brass wire.
3. Dampers: Counter-balanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.

2.02 Ceiling-Mounted Exhaust Fans

A. General Description: Centrifugal fan designed for installation in ceiling, wall, or concealed inline applications.

B. Housing: Galvanized steel lined with acoustical insulation.

C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft Fan shrouds, motor, and fan wheel shall be removable for service.

D. Grille: Aluminum louvered grille with flange on intake and thumbscrew attachment to fan housing.

E. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.

F. Fan Speed Control: Solid state, capable of controlling fan speed from full speed to approximately half speed. Mount on fan housing, unless show otherwise

G. Accessories: Manufacturer's standard roof jack, wall cap, eave vent, brick vent, and transition fittings as indicated and scheduled.

2.03 Centrifugal Roof / Wall Exhaust Fans

A. General Description: Belt-driven or direct-drive as indicated, centrifugal consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

B. Housing: Heavy-gauge, removable, spun-aluminum, dome top and outlet baffle; square, one-piece, hinged aluminum base with venturi inlet cone.

1. Up-blast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains. When used for kitchen hood, provide grease separator and collector.

C. Fan Wheel: Aluminum hub and wheel with backward-inclined blades.

D. Belt-Driven Drive Assembly: Resiliently mounted to the housing, with the following features:

1. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
2. Fan and motor isolated from exhaust air stream.
3. Auto belt tensioners.

2.04 In-Line Fans

A. General Description: Fan shall be duct mounted, belt-driven or direct-drive as indicated, centrifugal square inline. Fan shall bear the AMCA certified ratings seal for sound and air performance.

B. Construction: The fan shall be of bolted construction utilizing corrosion resistant fasteners. Housing shall be minimum 18 gauge galvanized steel with integral duct collars. Bolted access doors shall be provided on three sides, sealed with closed cell neoprene gasketing. Pivoting motor plate shall utilize threaded L-bolt design for positive belt tensioning. Housing shall be pre-drilled to accommodate universal mounting feet for vertical or horizontal installation. Unit shall bear an engraved aluminum nameplate. Nameplate shall indicate design CFM, static pressure, and maximum fan RPM.

C. Fan Wheel: Wheel shall be centrifugal backward inclined, constructed of 100% aluminum, including a precision machined cast aluminum hub. Wheel inlet shall overlap an aerodynamic aluminum inlet cone to provide maximum performance and efficiency. Wheel shall be balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.

D. Bearings: Bearings shall be designed and individually tested specifically for use in air handling applications. Construction shall be heavy duty regreasable ball type in a pillow block cast iron housing selected for a minimumL50 life in excess of 200,000 hours at maximum cataloged operating speed.

E. Belts and Drives: Belts shall be oil and heat resistant, non-static type. Drives shall be precision machined cast iron type, keyed and securely attached to the wheel and motor shafts. Drives shall be sized for 150% of the installed motor horsepower. The variable pitch motor drive must be factory set to the specified fan RPM.

F. Accessories: The following accessories are required as scheduled:

1. Factory installed and wired disconnect switch
2. Belt guard
3. Vibration isolation spring hangers

2.05 Roof Mounted Propeller Ventilators

A. General Description: Belt-driven or direct-drive as indicated, axial fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

B. Housing: Heavy-gauge, removable, spun-aluminum, dome top and outlet baffle; and square, one-piece, hinged, aluminum base.

C. Fan Wheel: Aluminum hub and blades.

D. Fan Wheel: Steel hub and blades.

E. Belt-Driven Drive Assembly: Resiliently mounted to the housing, with the following features:

1. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.

2.06 Up-Blast Propeller Roof Fans

A. General Description: Belt-driven or direct-drive as indicated, propeller fans consisting of housing, wheel, butterfly-type discharge damper with magnetic latches, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

B. Wind Band, Fan Housing, and Base: Reinforced and braced galvanized steel,

containing galvanized steel butterfly dampers and rain trough, motor and drive assembly, and fan wheel.

C. Wind Band, Fan Housing, and Base: Reinforced and braced aluminum, containing aluminum butterfly dampers and rain trough, motor and drive assembly, and fan wheel.

1. Dampers Rods: Steel with bronze bearings.

D. Fan Wheel: Dynamically and statically balanced, replaceable, cast-aluminum blades fastened to cast or extruded aluminum hub with factory-set pitch angle of blades.

E. Shaft Bearings: Prelubricated and sealed, self-aligning, pillow-block-type ball bearings.

F. Motor Mounts: Outside of the fan cabinet with adjustable base for belt tensioning, drive assembly and belts enclosure, and weatherproof housing of same material as fan housing.

2.07 Centrifugal Fans

A. General Description: Belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and support structure.

B. Housings: Fabricated from formed and reinforced galvanized steel panels to form curved scroll housings with continuously welded or deep-locked seams and access doors or panels to allow access to internal parts and components.

1. Inlet Cones: Spun metal.
2. Duct Connections: Flanged.
3. Panel Bracing: Steel angle-or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.

C. Fan Wheels: Single-width single-inlet or double-width double-inlet as scheduled, welded to cast-iron or cast-steel hub and spun steel inlet cone, with hub keyed to the shaft. Blade materials and type shall be as scheduled.

D. Shaft Bearings: Grease-lubricated, self-aligning, pillow-block type; tapered roller bearings with double-locking collars and two-piece, cast-iron housing.

E. Accessories: The following accessories are required as scheduled:

1. Drain Connections: Threaded, 3/4-inch NPS, capped nipple installed at lowest point of housing.
2. Shaft Cooler: Metal disc between bearings and fan wheel, designed to dissipate heat from shaft.
3. Shaft Seals: Air-tight seals installed around shaft on drive side of single-width fans.

2.08 Motors

A. Torque Characteristics: Sufficient to accelerate the driven loads satisfactorily.

B. Motor Sizes: Minimum sizes and characteristics as indicated. If not indicated, large enough so that the driven load will not require the motor to operate in the service factor range.

C. Temperature Rating: 50 deg C maximum temperature rise at 40 deg C ambient for continuous duty at full load (Class A Insulation).

D. Service Factor: 1.15 for polyphase motors and 1.35 for single-phase motors. Provide permanent-split capacitor classification motors for shaft-mounted fans and capacitor start classification for belted fans.

E. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, Design B.

1. Bases: Adjustable.
2. Bearings: The following features are required:
   a. Ball or roller bearings with inner and outer shaft seals.
   b. Grease lubricated.
   c. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.
3. Enclosure Type: The following features are required:
   a. Open drip-proof motors where satisfactorily housed or remotely located during operation.
   b. Guarded drip-proof motors where exposed to contact by employees or building occupants.
4. Overload protection: Built-in, automatic reset, thermal overload protection.
5. Noise rating: Quiet.
6. Efficiency: Energy-efficient motors shall have a minimum efficiency as scheduled in accordance with IEEE Standard 112, Test Method B. If efficiency not specified, motors shall have a higher efficiency than "average standard industry motors" in accordance with IEEE Standard 112, Test Method B.
7. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, and special features.

F. Starters, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26.

PART 3 EXECUTION

3.01 Installation, General

A. Support floor-mounted units on concrete equipment bases using housed spring isolators as scheduled. Secure units to anchor bolts installed in concrete equipment base.

B. Suspended Units: Suspend units from structural steel support frame using threaded steel rods and vibration isolation springs or rubber snubbers as scheduled.

C. Arrange installation of units to provide access space around units for service and maintenance.

End of Section 23 34 16

SECTION 23 36 13 –AIR TERMINAL UNITS

PART 1 GENERAL

1.01 Description of Work

A. The work covered by this specification consists of furnishing all labor, equipment, materials and accessories, and performing all operations required, for the correct installation of terminal units and other items connected to the system as defined in the specifications and on the drawings.

1.02 Performance Requirements

A. Provide pressure independent air terminal units, heating coils and other options/accessories of the sizes and capacities as indicated on the drawings.

B. Structural Performance: Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".

C. Air terminal units shall be certified under the ARI Standard 880 Certification Program and carry the ARI Seal.

D. The air terminal unit liner shall comply with:

1. NFPA 90A
2. UL 723 and ASTM E 84 (25/50 Flame and Smoke)
3. UL 181 (Air Erosion/ Mold Growth and Humidity)
4. ASTM C 665 (Fungi Resistance)

1.03 Submittals

A. Product Data: For each type of the following products, including rated capacities, furnished specialties, sound-power ratings and accessories.

1. Air terminal units
2. Heating coils
3. Liners and adhesives

B. LEED Submittals: *Delete this section if LEED is not part of this project*

1. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

C. Operation and Maintenance Data: For air terminal units to include in operation, and maintenance manuals. Data," include the following: *Delete this section if DDC controls are provided by the temperature control contractor*

1. Instructions for resetting minimum and maximum air volumes.
2. Instructions for adjusting software set points.

D. Coordination Drawings: Plans drawn to scale on which the following items are shown and coordinated with each other using input from installers of the items involved: *This is not required for most projects*

1. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

1.04 Approved Manufacturers

A. The basis for air terminal units is as listed on the equipment schedules and shall represent the minimum level of construction. Units manufactured by Price, Titus or Trane shall be considered equal to these specifications.

PART 2 PRODUCTS

2.01 Single Duct Air Terminal Units

A. Casing: 22-gauge galvanized steel factory assembled casing. All air terminals shall be provided with side mounted angle brackets to facilitate box suspension without blocking access panels.

1. Duct connections: Slip and drive connections for duct attachment.
2. Access: Removable panels for access to parts requiring service, adjustment or maintenance; with airtight gasket.

B. Casing Internal Lining: Aluminum faced insulation with exposed edges coated with NFPA-90A approved sealant: *Base Liner, use for most projects.*

1. Thickness: 1”
2. Density: 4 lb/ft^3
3. R-Value: 3.5 ft^2 °F h/Btu @ 75°F

C. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings. In the full closed position, air leakage past the closed damper shall not exceed 2% of the nominal catalog rating at 3” inlet static pressure, when tested in accordance with ASHRAE 130.

D. Inlet velocity sensor: Multi-point center averaging type, with a minimum of four measuring ports parallel to the take-off point from the sensor. The sensor must provide a minimum differential pressure signal of 0.03” wg at an inlet velocity of 500 fpm.

E. Factory Mounted Hydronic Coils: Serpentine type, copper tube, with mechanically bonded aluminum fins and rated for a minimum working pressure of 200 psig. Number of coil rows, circuits and fin spacing shall be selected to provide performance as required on the drawings.

F. Sound ratings of air distribution assemblies shall not exceed 48 dB radiated/57 dB discharge in any octave band and shall not exceed NC 35 discharge/radiated at 1.0” static pressure drop across the unit, and the downstream static pressure of 0.5”. Use attenuation values found in appendix E of AHRI Standard 885-2008 'A procedure for estimating occupied space sound levels in the application of air terminals and air outlets'.

G. Option. Direct Digital Controls (DDC) - Factory Mounting *Base Option, this is used for projects with a temperature control contractor and a networked building management system.*

1. Terminal units shall be equipped with pressure independent direct digital controls, flow transducer and damper actuator supplied by the temperature control contractor and mounted by the terminal unit manufacturer. These controls components shall be mounted and wired per the temperature control contractor’s documentation.
2. The terminal unit manufacturer shall provide a factory mounted and wired Class 2 - 24 VAC transformer, disconnect switch and NEMA sheetmetal enclosure for mounting of the temperature controls.
3. Controls shall be programmed by temperature control contractor for the scheduled minimum and maximum flow rates. Flow measuring taps and flow curves will be supplied with each terminal for field balancing of airflow. All pneumatic tubing shall be plenum rated.

H. Option. Direct Digital Controls (DDC) – Factory Provided and Mounted *Alternate Option, this is used for projects where there isn’t a networked building management system. All of the terminal units will operated stand-alone.*

1. Air terminals shall be equipped with pressure independent direct digital controls supplied and mounted by the terminal unit manufacturer.
2. The DDC shall include a dedicated, flash microprocessor based proportional-integral unit controller, actuator, termination board and pressure transducer for pressure independent operation. The DDC controller shall be configurable in the field at the space sensor with a configuration tool and associated software.
3. Option. Provide an expansion module shall for BACnet connectivity. *You can specify this option if the owner may add a building management system in the future and my want to connect this equipment to it.*
4. The DDC package shall be provided with a space temperature sensor with a service port for computer access to the DDC controller using the configuration tool. Provide the following types of space temperature sensors: *Edit these options to be project specific (delete any that are not used). If you are using more than one type of room temperature sensor, you need to indicate where the different sensors are to be installed.*
   a. Space temperature sensor (no local set-point adjustment)
   b. Space temperature sensor with setpoint adjustment and occupancy button
   c. Space temperature sensor, LCD with backlight and occupancy button
   d. Space temperature, LCD with motion sensor and backlight
5. The terminal manufacturer shall provide a factory mounted and wired Class 2 - 24 VAC transformer, disconnect switch and NEMA sheetmetal enclosure for mounting of the temperature controls.
6. Controls shall be programmed by air terminal manufacturer based on the scheduled airflows, control diagrams and sequences of operations on the Drawings. Flow measuring taps and flow curves will be supplied with each terminal for field balancing of airflow. All pneumatic tubing shall be plenum rated. Each terminal shall be clearly labeled showing unit location, size and scheduled air flows.
7. The air terminal unit manufacturer shall factory furnish and install all auxiliary control devices necessary to achieve the terminal unit control as indicated on the control diagrams and sequence on the drawings. Where factory provided control devices must be field mounted (space temperature sensor, duct discharge temperature sensor, etc.) the air terminal unit manufacturer shall provide clear directions for installation and wiring.

2.02 Parallel Fan Powered Air Terminal Units

A. Casing: 22-gauge (minimum) galvanized steel factory assembled casing. All air terminals shall be provided with side mounted angle brackets to facilitate box suspension without blocking access panels.

1. Duct connections: Slip and drive connections for duct attachment.
2. Access: Bottom access door to allow removal of fan and servicing of unit.

B. Option. Casing Internal Lining: Aluminum faced insulation with exposed edges coated with NFPA-90A approved sealant: *Base Liner, use for most projects.*

1. Thickness: 1”
2. Density: 4 lb/ft^3
3. R-Value: 3.5 ft^2 °F h/Btu @ 75°F

C. Option. Casing Internal Lining: Provide fiber free foam lining with self-sealing edges: *Optional Liner, use for Healthcare Projects. Delete aluminum faced insulation liner above if this is selected.*

1. Thickness: 1”
2. Density: 1.5 lb/ft^3
3. R-Value: 4 ft^2 °F h/Btu @ 75°F

D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings. In the full closed position, air leakage past the closed damper shall not exceed 2% of the nominal catalog rating at 3” inlet static pressure, when tested in accordance with ASHRAE 130.

E. Fan: Constructed of steel with forward curved blades, dynamically balanced wheels and direct drive motor. Motors shall be permanent split capacitor type, with lubricated bearings and thermal overload protection. Provide isolation between motor and blower assembly. Motor shall be designed for use with electronic fan speed controller which allows continuously adjustable fan speed from maximum to minimum. Speed control shall be equipped with a factory adjusted minimum voltage stop to ensure motor will not operate in the stall mode. Provide a backdraft damper at the fan section outlet to prevent cold primary air from flowing back through the fan into return air plenum.

F. Option. Fan: Constructed of steel with forward curved blades, dynamically balanced wheels. Motors shall be ECM DC brushless motors complete with and operated by a single phase integrated controller/inverter. All motors shall be designed for synchronous rotation. Motor rotor shall be permanent magnet type with near zero rotor losses. Motor shall be permanently lubricated with ball bearings. Motor shall maintain a minimum of 70% efficiency over its entire operating range. Motors shall be direct coupled to the blower. Provide isolation between motor and blower assembly. Speed control shall accept as standard a signal for remote fan adjustment from unit DDC controller. *ECM motors can provide added energy efficiency and better temperature control, but are more expensive. Verify that ECM motors are needed and within the project budget.*

G. Electrical: Single point electrical and control connection with disconnect switch and thermal overload protection for the fan motor. *Disconnect switch cannot be provided on units with electric heat.*

H. Filter: 1" thick pleated throwaway filter on the inlet of the fan housing. Filter face velocity shall not exceed 450 fpm at the scheduled fan rating. Filter clips shall be furnished to provide direct back access for filter removal. Terminals shall not be operated without filters in place.

I. Inlet velocity sensor: Multi-point center averaging type, with a minimum of four measuring ports parallel to the take-off point from the sensor. The sensor must provide a minimum differential pressure signal of 0.03” wg at an inlet velocity of 500 fpm.

J. Option. Factory Mounted Hydronic Coils: Serpentine type, copper tube, with mechanically bonded aluminum fins and rated for a minimum working pressure of 200 psig. Number of coil rows, circuits and fin spacing shall be selected to provide performance as required on the drawings.

K. Option. Factory Mounted Electric Coils:

1. Terminal and heater assembly shall be UL 1995 and ETL certified. The heater frame and cabinet shall be constructed of heavy gauge galvanized steel. Heating elements shall be open-coil type constructed of high grade 80/20 NiCr resistance wire. Elements shall be low density and designed to minimize hot spots and nuisance cycling of the thermal resets. Coil elements shall be insulated from the frame using floating ceramic bushings.
2. Electric coils shall be supplied with contactors, relays and transformers as required. Two thermal cutouts of automatic reset and manual reset type shall be

provided as primary and secondary overload protection, respectively. Coil safety devices and circuit protection shall be in accordance with the applicable requirements of the National Electric Code. A differential pressure switch shall be provided to ensure air flow is present before heater is energized. A door-interlock disconnect switch shall be provided to cut power to the electric coil prior to accessing components in the control enclosure. Coil capacities and stages shall be as scheduled on the Drawings. *Staged electric heat is our standard option and is fine for small heaters, but it can result in some large temperature swings in the supply air. Review each application and look at the temperature rise for each stage of heat.*

3. Option. Electronic Modulating Control: Heater shall be capable of providing proportional control using an analog input signal from a room thermostat or other device. The Electronic Modulating Controller (EMC) shall pulse the coil on and off in proportion to the thermostat demand, matching the heating capacity to the room load. The EMC controller shall employ solid state switching with zero cross-over for silent operation and minimal electrical interference. Heater shall be provided with an electronic air flow sensor. The air flow sensor shall modulate the heater output proportionally based on the amount of air flow that is available to prevent tripping of the thermal safety devices and extend the element life. The electronic air flow sensor shall ensure heater operates under safe conditions. Coil capacities shall be as scheduled on the Drawings. *Modulating electric heat is needed for applications where the temperature fluctuations associated with staged heat is not acceptable. This is usually for large heaters. This option is about a 50% add in cost and should be evaluated.*

L. Sound ratings of air distribution assemblies shall not exceed 48 dB radiated/57 dB discharge in any octave band and shall not exceed NC 35 discharge/radiated at 1.0" static pressure drop across the unit, and the downstream static pressure of 0.5". Use attenuation values found in appendix E of AHRI Standard 885-2008 'A procedure for estimating occupied space sound levels in the application of air terminals and air outlets'.

M. Option. Direct Digital Controls (DDC) - Factory Mounting *Base Option, this is used for projects with a temperature control contractor and a networked building management system.*

1. Terminal units shall be equipped with pressure independent direct digital controls, flow transducer and damper actuator supplied by the temperature control contractor and mounted by the terminal unit manufacturer. These controls components shall be mounted and wired per the temperature control contractor's documentation.
2. The terminal unit manufacturer shall provide a factory mounted and wired Class 2 - 24 VAC transformer, disconnect switch and NEMA sheetmetal enclosure for mounting of the temperature controls.
3. Controls shall be programmed by temperature control contractor for the scheduled minimum and maximum flow rates. Flow measuring taps and flow curves will be supplied with each terminal for field balancing of airflow. All pneumatic tubing shall be plenum rated.

N. Option. Direct Digital Controls (DDC) – Factory Provided and Mounted *Alternate Option, this is used for projects where there isn't a networked building management system. All of the terminal units will operated stand-alone.*

1. Air terminals shall be equipped with pressure independent direct digital controls supplied and mounted by the terminal unit manufacturer.

2. The DDC shall include a dedicated, flash microprocessor based proportional-integral unit controller, actuator, termination board and pressure transducer for pressure independent operation. The DDC controller shall be configurable in the field at the space sensor with a configuration tool and associated software.
3. Option. Provide an expansion module shall for BACnet connectivity. *You can specify this option if the owner may add a building management system in the future and my want to connect this equipment to it.*
4. The DDC package shall be provided with a space temperature sensor with a service port for computer access to the DDC controller using the configuration tool. Provide the following types of space temperature sensors: *Edit these options to be project specific (delete any that are not used). If you are using more than one type of room temperature sensor, you need to indicate where the different sensors are to be installed.*
   a. Space temperature sensor (no local set-point adjustment)
   b. Space temperature sensor with setpoint adjustment and occupancy button
   c. Space temperature sensor, LCD with backlight and occupancy button
   d. Space temperature, LCD with motion sensor and backlight
5. The terminal manufacturer shall provide a factory mounted and wired Class 2 - 24 VAC transformer, disconnect switch and NEMA sheetmetal enclosure for mounting of the temperature controls.
6. Controls shall be programmed by air terminal manufacturer based on the scheduled airflows, control diagrams and sequences of operations on the Drawings. Flow measuring taps and flow curves will be supplied with each terminal for field balancing of airflow. All pneumatic tubing shall be plenum rated. Each terminal shall be clearly labeled showing unit location, size and scheduled air flows.
7. The air terminal unit manufacturer shall factory furnish and install all auxiliary control devices necessary to achieve the terminal unit control as indicated on the control diagrams and sequence on the drawings. Where factory provided control devices must be field mounted (space temperature sensor, duct discharge temperature sensor, etc.) the air terminal unit manufacturer shall provide clear directions for installation and wiring.

PART 3 EXECUTION

3.01 Installation

A. Install air terminal units level and plumb. Maintain sufficient clearance as required by NEC and for normal service and maintenance.

3.02 Hanger and Support Installation

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Hangers Exposed to View: Threaded rod and angle or channel supports.
2. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.03 Connections

A. Install piping adjacent to air terminal unit to allow service and maintenance.

B. All terminal units shall be installed with straight lengths of ductwork at the unit inlet. Minimum lengths shall be as follows:

1. One and one half duct diameters
2. Minimum of 1'-0" length

C. All reducers required to match indicated inlet duct size to the control unit inlet size shall be installed at the termination of the branch duct indicated on the plans prior to flexible duct. Final run to air control units shall match the size of the control unit inlet size.

3.04 Identification

A. Label each air terminal unit with plan number, nominal airflow and maximum and minimum factory-set airflows.

3.05 Startup Service

A. Perform the following startup service:

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that inlet duct connections are as indicated on the drawings, specifications and as recommended by air terminal unit manufacturer to achieve proper performance.
3. Verify that controls and control enclosure are accessible.
4. Verify that control connections are complete.
5. Verify that nameplate and identification tag are visible.
6. Verify that controls respond to inputs as specified.

3.06 Owner Training and Demonstration

A. Train Owner's maintenance personnel using the manufacturer’s installation, operation and maintenance documentation to adjust, operate and maintain air terminal units.

End of Section 23 36 13

SECTION 23 37 13 - GRILLES, REGISTERS, DIFFUSERS, AND LOUVERS

PART 1 GENERAL

1.01 Description of Work

A. Provide all supply, return and exhaust registers, diffusers, grilles, and louvers as specified and as indicated on the drawings.

1.02 QUALITY ASSURANCE

A. Codes and Standards:

1. ARI Compliance: Test and rate air outlets and inlets in accordance with ARI 650 "Standard for Air Outlets and Inlets".
2. AMCA Compliance: Test and rate louvers in accordance with AMCA 500 "Test Method for Louvers, Dampers and Shutters".
3. AMCA Seal: Provide louvers bearing AMCA Certified Rating Seal.
4. NFPA Compliance: Install air outlets and inlets in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.03 Approved Manufacturers

A. The basis the grilles, registers, and diffusers are those listed and scheduled and shall represent the minimum level of construction. Units manufactured by EH Price, Carnes, Krueger, Titus and Nailor shall be considered equal to these specifications.

B. The basis the louvers are those listed and scheduled and shall represent the minimum level of construction. Units manufactured by Industrial Louver, Louvers and Dampers, Penn Ventilator, Ruskin, and Greenheck shall be considered equal to these specifications.

PART 2 PRODUCTS

2.01 Air Diffusers

A. Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.

C. Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.

D. Provide ceiling diffusers of type, capacity, and with accessories and finishes as listed on diffuser schedule.

2.02 Registers and Grilles

A. Except as otherwise indicated, provide manufacturer's standard registers and grilles where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation.

B. Provide wall registers and grilles that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer's current data.

C. Provide registers and grilles with border styles that are compatible with adjacent wall systems, and that are specifically manufactured to fit into wall construction with accurate fit and adequate support. Refer to general construction drawings and specifications for types of wall construction which will contain each type of wall register and grille.

D. Provide wall registers and grilles of type, capacity, and with accessories and finishes as listed on register and grille schedule.

PART 3 EXECUTION

3.01 Inspection

A. Examine areas and conditions under which air outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.02 Installation

A. General: Install air outlets and inlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to insure that products serve intended function.

B. Coordinate with other work, including ductwork and duct accessories, as necessary to interface installation of air outlets and inlets with other work.

C. Locate ceiling air diffusers, registers, and grilles, as indicated on general construction "Reflected Ceiling Plans". Unless otherwise indicated, locate units in center of acoustical ceiling module.

End of Section 23 37 13

SECTION 23 41 13 - GENERAL AIR FILTERING EQUIPMENT

PART 1 GENERAL

1.01 Description of Work

A. Provide the air filtration equipment as specified and indicated on the drawings.

1.02 Approved Manufacturers

A. The basis for the air filter specification is Camfil Farr and shall represent the minimum level of construction. Filters manufactured American Air Filter shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Air Handling Unit and AHU Pre-Filter

A. Provide two sets of Camfil Farr Class 2, 30/30, 2" thick filters with the following features.

1. Air filters shall be medium efficiency ASHRAE pleated panels consisting of cotton and synthetic media, welded wire media support grid, and beverage board enclosing frame.
2. Filter media shall be a cotton and synthetic blend, lofted to a uniform depth of 0.15”, and formed into a uniform radial pleat.
3. A welded wire grid, spot-welded on one-inch centers and treated for corrosion resistance shall be bonded to the downstream side of the media to maintain radial pleats and prevent media oscillation.
4. An enclosing frame of no less than 28-point high wet-strength beverage board shall provide a rigid and durable enclosure. The frame shall be bonded to the media on all sides to prevent air bypass. Integral diagonal support members on the air entering and air exiting side shall be bonded to the apex of each pleat to maintain uniform pleat spacing in varying airflows.
5. The filter shall have a Minimum Efficiency Reporting Value of MERV 8 when evaluated under the guidelines of ASHRAE Standard 52.2-2007. It shall also have a MERV 8 when tested per Appendix J of the same standard. The media shall maintain or increase in efficiency over the life of the filter.
6. Initial resistance to airflow shall not exceed 0.31” W.G. at 500 fpm on 2” deep models.
7. The filter shall have an Energy Cost Index (ECI) value of five stars.
8. The filter shall be classified by Underwriters Laboratories as UL Class 2.
9. Manufacturer shall provide evidence of facility certification to ISO 9001:2000.
10. Manufacturer shall guarantee the integrity of the filter pack to 2.0” w.g.
11. Provide product test report including all details as prescribed in ASHRAE Standards 52.2, including Appendix J.

2.02 Heat Pump and Fan Powered Terminal Unit Filters

A. Provide two sets of Camfil Farr, Aeropleat III, 1" thick filters with the following features:

1. Air filters shall be medium efficiency ASHRAE pleated panels consisting of a cotton and synthetic media blend, media support grid, and enclosing frame.
2. Filter media shall be a synthetic blend, lofted to a uniform depth, and formed into a uniform radial pleats. There shall be at least 12 pleats per linear foot for 1” deep filters.
3. A welded wire grid, spot-welded on centers and treated for corrosion resistance, shall be bonded to the downstream side of the media to maintain the radial pleat

and prevent media oscillation.

4 An enclosing frame, of high wet-strength beverage board shall provide a rigid and durable enclosure. The frame shall be bonded to the media to prevent air bypass, and include integral diagonal support members on the air entering and air existing side to maintain uniform pleat spacing in varying airflows.

5. The filter shall have a Minimum Efficiency Reporting Value of MERV 6 when evaluated under the guidelines of ASHRAE Standard 52.2-2007. It shall also have a MERV of 6 when tested per Appendix J of the same standard.

6. Initial resistance to airflow shall not exceed 0.23” W.G. at 500 fpm on 1” deep filters.

7. The filter shall be classified by Underwriters Laboratories as UL Class 2.

8. Manufacturer shall provide evidence of facility certification to ISO 9001:2000.

9. Provide product test report including all details as prescribed in ASHRAE Standards 52.2, including Appendix J.

PART 3 EXECUTION

3.01 Filters

A. The contractor shall provide all construction filters to protect terminal units and duct system during construction.

B. Construction filters shall be changed at regular intervals when loaded to manufacturer's maximum pressure drop.

C. Contractor shall install new specified system filters prior to test and balancing and provide one spare set for owner's use.

End of Section 23 41 13

SECTION 23 52 16 – GAS-FIRED HIGH EFFICIENCY BOILERS

PART 1 GENERAL

1.01 Description of Work

A. Provide all equipment as hereinafter specified and shown.

1.02 Approved Manufacturers

A. This specification is based on the Benchmark Standard Series boilers as manufactured by AERCO International Inc. Equivalent units and manufacturers must meet all performance criteria, and will be considered upon prior approval.

B. Basis-of-Design Product: Subject to compliance with requirements, provide AERCO International, Benchmark Series Boiler Models:

C. Approved Equals:

a. AERCO Benchmark Platinum boilers BMK
b. Viessmann Vitocrossal
c. Superior Boiler - Creek Series
d. Simons Boilers - FTC Titan
e. Request for substitutions will be considered in writing no less than 30 days prior to bid date.

1.03 Shop Drawings

A. Shop drawings shall be submitted as specified in Division 1.

B. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Dimensional drawings showing layout, connection points, and detailed layout of components.
4. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: The manufacturer must have been regularly engaged in the manufacture of condensing hydronic boilers for not less than thirty (30) years. The manufacturer must be headquartered in North America and manufacture pressure vessels in an ASME-certified facility wholly owned by the manufacturer. The specifying engineer, contractor and end customer must have the option to visit the factory to witness test fire and other relevant procedures

B. Electrical Components, Devices and Accessories: Boilers must be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. AHRI Performance Compliance: Condensing boilers must be rated in accordance with applicable federal testing methods and is capable of achieving the energy efficiency and performance ratings within prescribed tolerances.

D. ASME Compliance: Condensing boilers must be constructed in accordance with ASME Boiler and Pressure Vessel Code, Section IV “Heating Boilers”.

E. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."

F. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, "Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers."

G. UL Compliance: Boilers must be tested for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

H. NOx Emission Standards: When installed and operated in accordance with manufacturer’s instructions, the following condensing boiler models shall comply with the NOx emission standards outlined in South Coast Air Quality Management District (SCAQMD), Rule 1146.1; and the Texas Commission on Environmental Quality (TCEQ), Title 30, Chapter 117, and Rule 117.465 or the NOx emissions referenced below:

- BMK750-2000, BMK4000-6000: 9 ppm NOx corrected to 3% oxygen at all firing rates when firing on natural gas

PART 2 PRODUCTS

2.01 CONSTRUCTION

A. Description: Boiler shall be either natural gas, propane or dual fuel (nat. gas/propane; BMK1500-6000 models only) fired, fully condensing, fire tube design. Power burner shall have full modulation, discharge into a positive or negative pressure vent and the minimum firing rate shall not exceed the following per model:

- BMK1500: 75,000 BTU/hr input
- BMK2000: 100,000 BTU/hr input

Boilers that have an input greater than what is specified above at minimum fire will not be considered. Boiler efficiency shall increase with decreasing load (output), while maintaining setpoint. Boiler shall be factory-fabricated, factory-assembled and factory-tested, fire-tube condensing boiler with heat exchanger sealed pressure-tight, built on a steel base, including insulated jacket, flue-gas vent, combustion-air intake connections, water supply, return and condensate drain connections, and controls.

B. Heat Exchanger: The heat exchanger shall be constructed of 439 stainless steel fire tubes and tubesheets, with a one-pass combustion gas flow design. The fire tubes shall be 1/2” or 5/8” OD, with no less than 0.049” wall thickness. The upper and lower stainless steel tubesheet shall be no less than 0.25” thick. The pressure vessel/heat exchanger shall be welded construction. The heat exchanger shall be ASME stamped for a working pressure not less than 150 psig. Access to the tubesheets and heat exchanger shall be available by burner and exhaust manifold removal. Minimum access opening shall be no less than 8-inch diameter.

C. Pressure Vessel: The pressure vessel shall have a maximum water volume per each model as listed below:

- BMK1500: 44 gallons (166.6 liters)
- BMK2000: 40 gallons (151.4 liters)

The boiler water pressure drop shall not exceed the following per model size:

- BMK1500-2000: 3 psig @ 170 gpm

The boiler water connections shall be flanged 150-pound, ANSI rated.

- BMK1500 - 3000: 4 inch flange

The pressure vessel shall be constructed of ASME SA53 carbon steel, with a 0.25-inch thick wall and 0.50-inch thick upper head. Inspection openings in the pressure vessel shall be in accordance with ASME Section IV pressure vessel code. The boiler shall be designed so that the thermal efficiency increases as the boiler firing rate decreases.

E. Modulating Air/Fuel Valve and Burner: The boiler burner shall be capable of the following firing turndown ratios without loss of combustion efficiency or staging of gas valves. The turndown ratios shall be as follows and are based on BTU size:

- BMK1500: 20:1
- BMK2000: 20:1

The burner shall not operate above 7.5% oxygen level or 55% excess air. The burner shall produce less than 20 ppm of NOx, under standard calibration, corrected to 3% excess oxygen when firing on natural gas. The burner shall be metal-fiber mesh covering a stainless steel body with spark or proven pilot ignition and flame rectification. All burner material exposed to the combustion zone shall be of stainless steel construction. There shall be no moving parts within the burner itself. A modulating air/fuel valve shall meter the air and fuel input. The modulating motor must be linked to both the gas valve body and air valve body with a single linkage. The linkage shall not require any field adjustment. A variable speed cast aluminum pre-mix blower shall be used to ensure the optimum mixing of air and fuel between the air/fuel valve and the burner.

F. Fuel: The boiler shall use one of the following gas train options:

1. Natural gas or propane: The unit gas train shall be specifically designed and calibrated for a single predetermined fuel. The gas train shall be a ventless gas train.

G. Exhaust Manifold: The exhaust manifold shall be of corrosion resistant cast aluminum or 316 stainless steel with the following diameter flue connections:

- BMK750-1500: 6 inch

The exhaust manifold shall have a collecting reservoir and a gravity drain for the elimination of condensation.

I. Blower: The boiler shall include a variable-speed, DC centrifugal fan to operate during the burner firing sequence and pre-purge the combustion chamber.

1. Motors: Blower motors shall comply with requirements specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."

a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require a motor to operate in the service factor range above 1.0.

J. Ignition: Ignition shall be via spark or proven pilot ignition with 100 percent main-valve shutoff and electronic flame supervision.

K. Combustion Air: The boiler shall be designed such that the combustion air is drawn from the inside of the boiler enclosure, decoupling it from the combustion air supply and preheating the air to increase efficiency.

L. Combustion Air Filter: The boiler shall be equipped with an automotive high flow air filter to ensure efficient combustion and unhindered burner components operation.

M. Enclosure: The plastic and sheet metal enclosure shall be fully removable, allowing for easy access during servicing.

N. O_2 sensor located in the Combustion Chamber: The boiler shall be equipped with an Oxygen sensor. The sensor shall be located in the boiler combustion chamber. Boilers without Oxygen sensor or boilers with an Oxygen sensor in the exhaust shall not be acceptable due to measurement estimation and performance accuracy.

2.02 CONTROLS

A. The boiler shall have an integrated boiler control that provides contact closure for its associated accessories including but not limited to pump, valve and air inlet damper.

1. The control shall have a 5 inch color touch screen display as well as six function buttons that are separate from the display. User shall have the ability to navigate the menus via touchscreen or navigation buttons. Controls not equipped with navigation button options shall not be permitted.
2. The control shall be equipped with a multi-color linear LED light to indicate the level of firing and/or air/fuel valve position.
3. The control shall display two temperatures using two dedicated three-digit seven-segment displays.
4. The control shall offer an Enable/Disable toggle switch as well as two buttons for Testing and Resetting the Low Water Cutoff.

B. The Manager designated boiler control shall be capable of the following functions without the need for additional external controls:

1. Sequence up to 16 boilers,
2. Control boiler pumps and/or modulating motorized valves,
3. Building Automation: The control shall be able to communicate to Building Management Systems using RS485 and communicate using Modbus RTU protocol.

C. The control system shall be segregated into three components: Edge [i] Control Panel, Power Panel and Input/Output Connection Box. The entire system shall be Underwriters Laboratories recognized

D. The control panel shall consist of seven individual circuit boards using surface-mount technology in a single enclosure. Each board shall be individually field replaceable. These circuit boards shall include:

1. A microcontroller board with integrated 5 inch touchscreen color display providing the user interface.

2. A 7-segment display board. This board includes two 3-digit 7-segment displays. These displays shall be used to view a variety of temperature sensor values and operating and startup function status.
3. An Interface board connects the microcontroller board to internal components using ribbon cables.
4. An electric low-water cutoff board connects to the test and manual reset functions on the microcontroller board.
5. A power supply board is designed to provide the different DC voltages to the rest of the boards. It also acts as voltage regulator and reduce power noise.
6. An ignition and combustion board. This board controls the air/fuel valve and Safety Shutoff Valve, flame status and ignition transformer
7. A connector board used to connect all external electrical connection.

E. Control settings transfer using USB: The control shall simplify and significantly lessen startup and boiler setting time by being able to use a USB flash drive to copy settings from one boiler to another boiler. Installers shall use successfully preconfigured boiler settings in their portfolio to newly installed boilers.

F. Combustion calibration: The control shall offer at least 5 calibration points. The use of less than 5 calibration points is not permitted to improve overall system efficiency under all firing rates. Each combustion calibration point shall operate with 5 to 7% O_2 levels to improve operating efficiency. Deviating away from these values shall not be acceptable.

G. Unit and Plant Status: The control shall provide a quick view of the unit status and plant status.

1. The unit status screen shall provide temperature setpoint, all water inlet and outlet and supply air and exhaust temperature sensors' values. It shall also provide unit current and target firing rates. Additional screens shall display unit run hours, cycle count and average cycles per hour.
2. The plant status screens shall provide plant temperature setpoint, plant water supply and return temperatures, outdoor temperature. Additionally, a status screen shall show the boiler status of each plant unit, plant firing rate.
3. Unit and Plant event history: The manager control shall display the last 500 historical events per plant or 200 historical events for single unit installations.

H. Software update: The control shall be capable of field software updates without a need for hardware component(s) replacement. This shall be performed either using software on a USB flash drive or via Internet connection. The software update mechanism shall be performed by a trained technician. The software update menus shall be secured using a password level. After the software update, the control shall retain all of its prior field settings.

I. Copy settings from one boiler to the other: To significantly reduce installation time by reducing long repetitive work, the control shall have the capability of saving its settings to a USB flash drive. In addition, the control shall have the ability of copying new settings from a flash drive.

J. The controls shall annunciate boiler and sensor status and include extensive self-diagnostic capabilities.

K. The control panel shall incorporate three self-governing features designed to enhance operation in external control modes. When operating by an external control signal, the control panel can work to eliminate nuisance faults, such as over-temperature, resulting from improper external signal or loss of external signal. These features include:

1. Setpoint High Limit: Setpoint high limit allows for a selectable maximum boiler

outlet temperature and acts as temperature limiting governor. Setpoint limit is based on a PID function that automatically limits firing rate to maintain outlet temperature within a 0 to 10 degree selectable band from the desired maximum boiler outlet temperature.

2. Setpoint Low Limit: Allow for a selectable minimum operating temperature.
3. Failsafe Mode: Failsafe mode allows the boiler to switch its mode to operate from an internal setpoint if its external control signal is lost, rather than shut off. This is a selectable mode, enabling the control can to shut off the unit upon loss of external signal, if so desired.

L. The boiler control system shall incorporate the following additional features for enhanced external system interface:

1. System start temperature feature
2. Pump delay timer
3. Remote interlock circuit
4. Delayed interlock circuit
5. Delta-T Limiter
6. Freeze protection
7. Fault relay for remote fault alarm
8. Warm-weather shutdown
9. The control shall offer multi-level user security access using different passwords. For additional security, the passwords shall expire if control display was not touched for an extended period 30 minutes.

M. Each boiler shall include an electric, single-seated combination safety shutoff valve/regulator with proof of closure switch in its gas train. Each boiler shall incorporate dual over-temperature protection with manual reset, in accordance with ASME Section IV and CSD-1.

N. Each boiler shall utilize a low cost reliable automotive O_2 sensor that measures and monitors the oxygen content of the exhaust gases. The system shall adjust the blower speed to maintain optimal air-fuel ratios in the event of air inlet temperature changes. The system shall have the following capabilities:

1. The system shall provide warnings or alerts in the following cases:
   a. O_2 percentage out of range
   b. When O_2 sensor has fallen out of calibration

Output of O2 information shall be displayed on the Edge [i] control panel.

The O_2 sensor shall be installed through the unit's burner plate and measure the oxygen content directly within the unit's combustion chamber.

Boilers without an equivalent O_2 sensing system will be deemed unacceptable. Due to the moisture content of flue gases from condensing boilers, placing the O_2 sensor in the exhaust manifold or stack will be deemed unacceptable.

O. Each boiler shall be onAER ready with a standard Ethernet port and include a 5 year onAER subscription at no additional charge. AERCO's onAER service grants the user online access to real time operation and status of their system plant from any computer, tablet or mobile device along with the following capabilities:

1. Efficiency status and trends
2. O2 levels
3. Efficiency and performance optimization tips
4. Preventative Maintenance alerts and scheduling
5. Predictive Maintenance algorithms.
6. Warning and error messages
7. Weekly or monthly performance and status reports
8. Manage multiple boiler plants or buildings
9. Customizable dashboard
10. Add email contacts for alerts and reports, including local AERCO trained technicians
11. Manage and store startup, maintenance and service documentation

The boiler manufacturer shall be able to provide a network hub or a network switch to connect up 16 boilers to an online network.

P. Each boiler shall have integrated Boiler Sequencing Technology (BST), capable of multi-unit sequencing with lead-lag functionality and parallel operation. The system will incorporate the following capabilities:

1. Efficiently sequence 2 to 16 units on the same system to meet load requirement.
2. Integrated control and wiring for seamless installation of optional isolation valve. When valves are utilized, the system shall operate one motorized valve per unit as an element of load sequencing. Valves shall close with decreased load as units turn off, with all opening under no-load conditions.
3. Automatically rotate lead/lag amongst the units on the chain and monitor run hours per unit and balance load in an effort to equalize run hours among active units.
4. Option to manually designate lead and last boiler
5. Designated manager control, used to display and adjust key system parameters.
6. Automatic bump-less transfer of manager function to next unit on the chain in case of designated manager unit failure; manager/client status should be shown on the individual unit displays.

Q. For boiler plants greater than 16 units, the Boiler Manufacturer shall supply as part of the boiler package a completely integrated AERCO Control System (ACS) to control all operation and energy input of the multiple boiler heating plant. The ACS shall be comprised of a microprocessor based control utilizing the MODBUS protocol to communicate with the Boilers via the RS-485 port. One ACS controller shall have the ability to operate up to 32 AERCO boilers.

The controller shall have the ability to vary the firing rate and energy input of each individual boiler throughout its full modulating range to maximize the condensing capability and thermal efficiency output of the entire heating plant. The ACS shall control the boiler outlet header temperature within ±2ºF. The controller shall be a PID type controller and uses Ramp Up/Ramp Down control algorithm for accurate temperature control with excellent variable load response. The ACS controller shall provide contact closure for auxiliary equipment such as system pumps and combustion air inlet dampers based upon outdoor air temperature.

The ACS shall have the following anti-cycling features:

- Manual designation of lead boiler and last boiler.
- Lead boiler rotation at user-specified time interval.

- Delay the firing/shutting down of boilers when header temperature within a predefined deadband.

When set on Internal Setpoint Mode, temperature control setpoint on the ACS shall be fully field adjustable from 50ºF to 190ºF in operation. When set on Indoor/Outdoor Reset Mode, the ACS will operate on an adjustable inverse ratio in response to outdoor temperature to control the main header temperature. Reset ratio shall be fully field adjustable from 0.3 to 3.0 in operation. When set on 4ma to 20ma Temperature Control Mode, the ACS will operate the plant to vary header temperature setpoint linearly as an externally applied 4-20 ma signal is supplied.

When set on MODBUS Temperature Control Mode, the ACS will operate the plant to vary header temperature setpoint as an external communication utilizing the MODBUS protocol is supplied via the RS-232 port. The ACS controller shall have a vacuum fluorescent display for monitoring of all sensors and interlocks. Non-volatile memory backup of all control parameters shall be internally provided as standard. The controller will automatically balance the sequence of operating time on each boiler by a first-on first-off mode and provide for setback and remote alarm contacts. Connection between central ACS system and individual boilers shall be twisted pair low voltage wiring, with the boilers 'daisy-chained' for ease of installation.

2.03 ELECTRICAL POWER

A. Controllers, Electrical Devices and Wiring: Electrical devices and connections are specified in Division 26 sections.

B. Single-Point Field Power Connection: Factory-installed and factory-wired switches, motor controllers, transformers and other electrical devices shall provide a single-point field power connection to the boiler.

2.04 VENTING

A. The exhaust vent must be UL Listed for use with Category II, III and IV appliances and compatible with operating temperatures up to 230°F, condensing flue gas service. UL-listed vents of Polypropylene and Al 29-4C stainless steel must be used with boilers.

B. The minimum exhaust vent duct size for each boiler is six-inch (BMK750-1500), 8-inch (BMK2000-3000).

C. Combustion-Air Intake: Boilers shall be capable of drawing combustion air from the outdoors via a metal or PVC duct connected between the boiler and the outdoors.

D. The minimum ducted combustion air duct size for each boiler is six-inch (BMK750-1500), 8-inch (BMK2000-3000.

E. Common vent and common combustion air must be an available option for boiler installation. Consult manufacturer for common vent and combustion air sizing.

F. Follow guidelines specified in manufacturer's venting guide.

2.05 SOURCE QUALITY CONTROL

A. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions and carbon monoxide in flue gas, and to achieve combustion efficiency. Perform hydrostatic testing.

B. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.

1. If boilers are not factory assembled and fire-tested, the local vendor is

responsible for all field assembly and testing.

C. Allow Owner access to source quality-control testing of boilers. Notify Architect fourteen days in advance of testing

PART 3 EXECUTION

3.01 BOILER INSTALLATION

A. Install gas-fired boilers according to NFPA 54.

B. Assemble and install boiler trim.

C. Install electrical devices furnished with boiler but not specified to be factory mounted.

D. Install control wiring to field-mounted electrical devices.

3.02 Codes

A. All Boiler equipment, and their installation, shall be in full compliance with the Kansas Boiler Codes and ASME CSD-1A.

3.03 EXAMINATION

A. Before boiler installation examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations and piping and electrical connections to verify actual locations, sizes and other conditions affecting boiler performance, maintenance and operations.

1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

B. Examine mechanical spaces for suitable conditions where boilers will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.04 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 sections. Drawings indicate general arrangement of piping, fittings and specialties.

B. Install piping adjacent to boiler to permit service and maintenance.

C. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

D. Connect gas piping to boiler gas-train inlet with unions. Piping shall be at least full size of gas train connection. Provide a reducer if required.

E. Connect hot-water piping to supply and return boiler tappings with shutoff valve and union or flange at each connection.

F. Install piping from safety relief valves to nearest floor drain.

G. Boiler Venting

1. Install flue venting kit and combustion-air intake.

3.05 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Perform hydrostatic test. Repair leaks and retest until no leaks exist.
3. Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
    a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.
    b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

C. Remove and replace malfunctioning units and retest as specified above.

D. Occupancy Adjustments: When requested within 2 months of date of Substantial Completion, provide on-site assistance adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

E. Performance Tests:

The boiler manufacturer is expected to provide partial load thermal efficiency curves. These thermal efficiency curves must include at least three separate curves at various BTU input levels. If these curves are not available, it is the responsibility of the boiler manufacturer to complete the following performance tests:

1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
3. Perform field performance tests to determine capacity and efficiency of boilers.
    a. a. Test for full capacity.
    b. b. Test for boiler efficiency at [low fire, 20, 40, 60, 80, 100, 80, 60, 40 and 20] percent of full capacity. Determine efficiency at each test point.
4. Repeat tests until results comply with requirements indicated.
5. Provide analysis equipment required to determine performance.
6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
7. Notify Architect in advance of test dates.
8. Document test results in a report and submit to Architect.

End of Section 23 52 16

SECTION 23 64 28- WATER COOLED ROTARY WATER CHILLERS

PART 1 GENERAL

1.01 Summary

A. Section includes design, performance criteria, refrigerants, controls, and installation requirements for water-cooled rotary compressor chillers.

1.02 Approved Manufacturers

A. The basis for the equipment in this specification Trane and shall represent the minimum level of construction. Equipment from McQuay and York shall be permitted to bid these specifications by alternate.

1.03 References

A. Comply with applicable Standards/Codes of ARI 550/590-98, ANSI/ASHRAE 15, ETL, cETL, NEC, and OSHA as adopted by the State. Units shall meet the efficiency standards of ASHRAE Standard 90.1, October 2001.

1.04 Submittals

A. Submit shop drawings and product data in accordance with the specifications.

B. Submittals shall include the following:

1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
2. Summary of all auxiliary utility requirements, such as electricity, water, compressed air, etc. Summary shall indicate quality and quantity of each required utility.
3. Single-line schematic drawing of the power field hookup requirements, indicating all items that are furnished.
4. Schematic diagram of control system indicating points for field interface/connection.
5. Diagram shall fully delineate field and factory wiring.
6. Certification of factory-run test of chiller unit signed by company officer.
7. Installation manuals.

1.05 Quality Assurance

A. The quality management system applied by Trane has been subject to independent third-party assessment and approval to ISO 9001. The products described in this catalog are designed, manufactured and tested in accordance with the approved system requirements described in the Trane Quality Manual.

1.06 Delivery and Handling

A. Chillers shall be delivered to the job site completely assembled and charged with refrigerant and oil by the manufacturer.

B. Comply with the manufacturer's instructions for rigging and handling equipment.

1.07 Warranty

A. The refrigeration equipment manufacturer's guarantee shall be for a period of one year from date of equipment start-up but not more than 18 months from shipment. The guarantee shall provide for repair or replacement due to failure by material and workmanship that prove defective within the above period, excluding refrigerant.

1.08 Additional Warranty Requirements

A. Provide chiller with 5-year compressor warranty. Provide with first year refrigerant and labor warranty to be furnished by unit manufacturer.

1.09 Chilled Water System Volume

A. The chilled water system indicated has been design minimum system volume of twice the evaporator flow rate. Equivalent manufacturer's shall verify minimum system volume for their specific equipment and provide additional storage tank capacity if required. Storage tank calculations shall be included with shop drawings

PART 2 PRODUCTS

2.01 Unit Description

A. Provide and install as shown on the plans factory-assembled, factory-charged, and factory-tested water-cooled rotary compressor packaged chillers in the quantity specified. Each chiller shall consist of rotary compressor(s), direct expansion evaporator, water-cooled condenser section, microprocessor-based control system and all components necessary for controlled unit operation.

B. Units are constructed of galvanized steel frame with galvanized steel panels and access doors. Component surfaces are finished with a powder-coated paint. Each unit ships with full operating charges of refrigerant and oil.

C. Chiller shall be as scheduled with ratings based on 45.0° F. chilled water temperatures & 85 F entering condenser water temperature.

2.02 Chiller -175 to 400 ton

A. General

1. Exposed metal surfaces are painted with air-dry beige, direct-to-metal, single component paint. Each unit ships with full operating charges of refrigerant and oil. Molded neoprene isolation pads are supplied for placement under all support points. Startup and operator instruction by factory-trained service personnel are included,

B. Compressor and Motor

1. The unit is equipped with a semi-hermetic, direct drive, 3600-rpm (3000 rpm @ 50 Hz) rotary compressor that includes a capacity control slide valve, oil sump heater, and differential pressure refrigerant oil flow system. Four pressure-lubricated, rolling-element bearing groups support the rotating assembly.

2. The motor is suction gas-cooled, hermetically sealed, two-pole, squirrel cage induction type.

C. Unit-Mounted Starter

1. The unit is supplied with a NEMA 1 type enclosure with top power-wiring access and three-phase, solid state overload protection.

2. The starter is available in a Wye-Delta configuration, factory mounted and fully pre-wired to the compressor motor and control panel, A factory-installed, factory wired 600VA control power transformer provides all unit control power (120 VAC secondary) and CH530 module power (24VAC secondary).

3. Optional starter features include circuit breakers, ground fault circuit breakers, and mechanical, non-fused disconnects.

D. Evaporator and Condenser

1. Shells are carbon steel plate. The evaporator and condenser are designed,

tested, and stamped in accordance with ASME Code for refrigerant side/ working-side pressure of 200 psig.

2. All tube sheets are made of carbon steel. Tubes are mechanically expanded into tube sheets and mechanically fastened to tube supports. Evaporator tubes are 1.0inch (25.4 mm) diameter and condenser tubes are 0.75-inch (19.05 mm) diameter. Both types can be individually replaced. Standard tubes are externally finned, internally enhanced seamless copper with lands at all tube sheets.
3. All water pass arrangements are available with grooved connections (150 or 300 psig waterside). All connections may be either right- or left-handed. Waterside shall be hydrostatically tested at 1.5X design working pressure.

E. Refrigerant Circuit

1. An electronically controlled expansion valve is provided to maintain proper refrigerant flow.

F. Unit Controls (CH530)

1. The microprocessor-based control panel is factory-installed and factory-tested. The control system is powered by a control power transformer, and will load and unload the chiller through adjustment of the compressor slide valve. Microprocessor-based chilled water reset based on return water is standard.
2. The CH530 microprocessor automatically acts to prevent unit shutdown due to abnormal operating conditions associated with low evaporator refrigerant temperature, high condensing temperature, and/or motor current overload. If an abnormal operating condition continues and the protective limit is reached, the machine should shut down.
3. The panel includes machine protection shutdown requiring *manual* reset for the following conditions:
   a. low evaporator refrigerant temperature and pressure
   b. high condenser refrigerant pressure
   c. low oil flow
   d. critical sensor or detection circuit faults
   e. motor current overload
   f. high compressor discharge temperature
   g. lost communication between modules
   h. electrical distribution faults: phase loss, phase imbalance, or phase reversal
   i. external and local emergency stop
   j. starter transition failure
4. The panel also includes machine protection shutdown with *automatic reset for* the following correctable conditions:
   a. momentary power loss
   b. under-over voltage
   c. loss of evaporator or condenser water flow
5. When a fault is detected, the control system conducts more than 100 diagnostic checks and displays results.
6. The display will identify the fault, indicate date, time, and operating mode at time

of occurrence, and provide type of reset required and a help message. The diagnostic history will display the last ten diagnostics with their times and dates of occurrence.

G. Language Display Panel

1. Factory-mounted to the control panel door, the operator interface has an LCD touch-screen display for operator input and information output. This interface provides access to the following information: evaporator report, condenser report, compressor report, ASHRAE Guideline 3 report, operator settings, service settings, service tests, and diagnostics. All diagnostics and messages are displayed in "clear language""

2. Data contained in available reports includes:
   a. Water and air temperatures
   b. Refrigerant levels and temperatures "Oil pressure
   c. Flow switch status
   d. EXV position
   e. Head pressure control command
   f. Compressor starts and run-time
   g. Line phase percent RLA, amps, and volts

3. All necessary settings and setpoints are programmed into the microprocessor based controller via the operator interface. The controller is capable of receiving signals contemporaneously from a variety of control sources, in any combination, and priority order of control sources can be programmed. The control source with priority determines active setpoints via the signal it sends to the control panel. Control sources may be:
   a. the local operator interface (standard)
   b. a hard-wired 4-20 mA or 2-10 VDC signal from an external source(interface optional; control source not supplied)
   c. Generic BAS (optional points; control source not supplied)
   d. Lon Talk LCI-C (interface optional; control source not supplied)
   e. Trane Tracer Summit"' system (interface optional)

H. Options and Accessories EDIT FOR PROJECT

1. The following options are to be included:
   a. Insulation: All low temperature surfaces are covered with factory installed 3/4 inch Armaflex II or equal (k=0.28) insulation, including the evaporator and water boxes, suction line, and motor housing. 3/8" foam insulation is used on the liquid level sensor and gas pump assembly, including piping.
   b. Low-Temperature Evaporator: Addition of an oil cooler to the oil circuit enables evaporator operation down to minimum leaving water temperature of 10°F.
   c. High-Temperature Condenser: Addition of an oil cooler to the oil circuit enables condenser operation up to maximum leaving water temperature of 114°F.
   d. Smooth-Bore Condenser Tubes Smooth-bore copper or premium cupro-

nickel condenser tubes, 3/4" in diameter with .035" (0.889 mm) wall thickness, are available for high fouling water applications.

e. Refrigerant Isolation Valves Factory-installed condenser inlet and outlet refrigerant valves allow isolation of the full refrigerant charge in the condenser while servicing the chiller.

f. Marine Water Boxes: Addition of marine water boxes for the condenser allows tube cleaning without water pipe interference.

g. 300 psig Evaporator and Condenser Water Boxes: Water boxes are designed for 300 psig maximum waterside working pressure, and grooved pipe water connections are provided for ease of installation.

h. 2-Way Condenser Water Regulating Valve For water regulation, a field-installed, 2-way butterfly-type (lug-style) valve, with integral electrical operator and factory-mounted valve actuator, is available. The single-phase, reversible motor can be factory-wired for 115 VAC, 60 Hz or 220 VAC, 50 Hz. The 2-way valve is field-wired and controlled by the chiller regulating valve control output; valves are available in 6" and 8" sizes.

i. Nitrogen Charge: Unit is shipped with a nitrogen holding charge in lieu of refrigerant.

J. Main Power Disconnect Options: EDIT FOR PROJECT

1. The following options are to be included:

a. Non-fused Disconnect: A UL-approved non-fused molded case disconnect switch, factory pre-wired with terminal block power connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power.

b. Standard Interrupting Capacity Circuit Breaker: A UL-approved standard interrupting molded case capacity circuit breaker, factory pre-wired with terminal block power connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power.

c. High Interrupting Capacity Circuit Breaker: A UL approved high interrupting molded case capacity circuit breaker, factory prewired with terminal block power connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power.

d. Ground Fault Circuit Breaker: A UL approved standard interrupting molded case capacity circuit breaker with ground fault interrupting capability, factory pre-wired with terminal block connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power.

K. Control Options: EDIT FOR PROJECT

1. The following options are to be included:

a. Tracer Summit Communications: Link to factory-installed, tested communication board, via single twisted pair wiring, adds Tracer Summit communications to the system.

b. Lon Talk LCI-C Interface: Lon Talk (LCI-C) communications capabilities are available, with communication link via single twisted-pair wiring to

factory-installed, tested communication board.

c. External Chilled Water Setpoint: External Chilled Water Setpoint is communicated to a factory-installed, tested communication board through a 210Vdc or 4-20mA signal.

d. External Current Limiting: External Current Limit Setpoint is communicated to a factory-installed, tested communication board through a 210Vdc or 4-20mA signal.

e. External Base Loading: External Base Loading is communicated to a factory-installed and tested communication board through a 2-10Vdc or 4-20mA signal.

f. Ice Making Control: Controls and safeties allow operation with brine temperatures down to 20°F (-6.7°C), and dual setpoints enable both ice making and daytime comfort cooling.

g. Programmable Relays: Default-set, factory-installed, programmable relays allow the operator to select four relay outputs from a list of eight. Available relays are: AlarmLatching, Alarm-Auto Reset, General Alarm, Warning, Chiller Limit Mode, Compressor Running, Head Pressure Relief Request, and Tracer Control.

h. Chilled Water Reset-- Outdoor Air Temperature: Controls, sensors, and safeties allow reset of chilled water temperature, based on temperature signal, during periods of low outdoor air temperature (chilled water reset based on return chilled water temperature is standard).

j. Condenser Regulating Valve Control Chiller applies a Proportional Integrative Control (PID) algorithm to control water regulating valve via 0-10Vdc signal.

k. Percent of Full Run Load Amps Output: Control system indicates the active chiller percent of full run [Gad amps, based on a D-10Vdc signal.

m. Condenser Pressure Output: Control system indicates chiller differential pressure or condenser pressure, based on a 0-10Vdc signal.

n. Refrigerant Monitor Input: Control system indicates refrigerant monitor status of 0-100 or 0-1000 ppm (user selectable), based on a 2-10Vdc / 4-20 mA signal.

2.03 Chiller -70 to 150 ton

A. General

1. Exposed metal surfaces are painted with air-dry beige, direct-to-metal, single-component paint. Each unit ships with full operating charges of refrigerant and oil. Optional molded neoprene isolation pads are supplied for placement under all support points.

B. Compressor and Motor

1. The unit is equipped with two semi-hermetic, direct-drive, 3600 rpm, 60 Hz rotary compressors that include a load/unload valve, rolling element bearings, oil filtration device and heater.
2. The motor is a suction gas-cooled, hermetically sealed, two-pole squirrel cage induction motor.
3. Oil separator device is provided separate from the compressor. Check valves in

the compressor discharge and lube oil system and a solenoid valve in the tube system are also provided.

C. Unit Mounted Starter

1. The unit is supplied with a NEMA 1 type enclosure with top power-wiring access and three-phase, overload protection. The starter is available in a wye-delta or across-the-line configuration, factory-mounted and fully pre-wired to the compressor motor and control panel.
2. A factory installed, factory-wired 820 VA control power transformer provides all unit control power (120 VAC secondary) and Trane CH530 module power (24 VAC secondary).
3. Optional starter features include circuit breakers, high interrupt circuit breakers, or mechanical, non-fused disconnects,

D. Evaporator

1. Dual circuited, shell and tube falling film evaporator design is used. Seamless internally finned, copper tubes are mechanically expanded into tube sheets and mechanically fastened to tube supports. Evaporator tubes are 1.0 inch diameter on standard efficiency chillers and 0.75 inch diameter on high efficiency chillers. All tubes can be individually replaced.
2. Shells and tube sheets are made of carbon steel. Designed, tested, and stamped in accordance with ASME code. The evaporator is designed for refrigerant-side/working-side pressure of 200 psig.
3. All water pass arrangements are available with grooved connections with 150 psig waterside working pressure. Waterside shall be hydrostatically tested at 225 psig.

E. Condenser

1. Dual circuited, shell and tube condenser designed with seamless internally/externally finned tubes expanded into tube sheets and mechanically fastened to tube supports. Condenser tubes are 1.0 inch diameter on standard efficiency chillers and 0.75 inch diameter on high efficiency chillers. All tubes can be individually replaced.
2. Shells and tube sheets are made of carbon steel. Designed, tested, and stamped in accordance with ASME code. The condenser is designed for refrigerant-side/working-side pressure of 300 psig.
3. Water side has single inlet and outlet piping connection. Ali water pass arrangements are available with grooved connections with 150 psig waterside working pressure. Waterside shall be hydrostatically tested at 225 psig.

F. Refrigerant Circuit

1. Each unit has two refrigerant circuits, with one rotary screw compressor per circuit.
2. Each refrigerant circuit includes compressor suction and discharge service valves, liquid line shut off valve, removable core filter, charging port and an electronic expansion valve.
3. Modulating compressors and electronic expansion valves provide variable capacity modulation over the entire building load and maintain proper refrigerant flow.

G. Oil Management

1. The RTWD is configured with an oil management system that ensures proper oil circulation throughout the unit. The key components of the system include an oil separator, oil filter and gas pump. An option oil cooler is installed when the unit is

used for heat recovery, water heat pump, ice making and low temperature process applications.

H. Unit Controls (Trane CH530)

1. The microprocessor-based control panel is factory-installed and factory-tested. The control system is powered by a pre-wired control power transformer, and will load and unload the chiller through adjustment of the compressor slide valve. Microprocessor-based chilled water reset based on return water is standard.
2. The Trane CH530 microprocessor automatically acts to prevent unit shutdown due to abnormal operating conditions associated with low evaporator refrigerant temperature, high condensing temperature, and/or motor current overload. If an abnormal operating condition continues and the protective limit is reached, the machine should shut down.
3. The panel includes machine protection shutdown requiring *manual reset for* the following conditions:
   a. Low evaporator refrigerant temperature and pressure
   b. High condenser refrigerant pressure
   c. Low oil flow
   d. Critical sensor or detection circuit faults
   e. Motor current overload
   f. High compressor discharge temperature
   g. Lost communication between modules
   h. Electrical distribution faults: phase loss, phase imbalance, or phase reversal
   i. External and local emergency stop
   j. Starter transition failure
4. The panel also includes machine protection shutdown *with automatic reset for the* following correctable conditions:
   a. Momentary power loss
   b. Under/over voltage
   c. Loss of evaporator or condenser water flow
5. When a fault is detected, the control system conducts more than 100 diagnostic checks and displays results. The display will identify the fault, indicate date, time, and operating mode at time of occurrence, and provide type of reset required and a help message.

I. Clear Language Display Panel

1. Factory-mounted to the control panel door, the operator interface has an LCD touch-screen display for operator input and information output. This interface provides access to the following information: evaporator report, condenser report, compressor report, ASHRAE Guideline **3** report, operator settings, service settings, service tests, and diagnostics. All diagnostics and messages are displayed in "clear language."
2. Data contained in available reports includes:
   a. Water and air temperatures
   b. Refrigerant levels and temperatures

c. Oil pressure

d. Flow switch status

e. EXV position

f. Head pressure control command

g. Compressor starts and run-time

h. Line phase percent RLA, amps, and volts

3. All necessary settings and setpoints are programmed into the microprocessor-based controller via the operator interface. The controller is capable of receiving signals simultaneously from a variety of control sources, in any combination, and priority order of control sources can be programmed. The control source with priority determines active setpoints via the signal it sends to the control panel. Control sources may be:

a. Local operator interface (standard)

b. Hard-wired 4-20 mA or 2-10 VDC signal from an external source (interface optional; control source not supplied)

c. Time of day scheduling (optional capability available from local operator interface)

d. Lon Talk LCI-C (interface optional; control *source not* supplied)

e. Trane Tracer Summit system (interface optional; control source not supplied)

H. Options and Accessories EDIT FOR PROJECT

1. Dual Relief Valve: Unit comes with dual relief valves on both the high pressure side and low pressure side of each refrigerant circuit. Each dual relief valve configuration includes an isolation valve. Single relief valves are standard.

2. Flanged Water Connection Kit: Kit to convert all four water connection from grooved pipe to flanged connections. This includes: grooved couplings, pipe offsets, and grooved to flange adapters.

3. High-Temperature Condenser: Optimized compressors, oil cooler and high condenser temperature control panel allows for leaving condenser water temperatures up to 140°F (60°C). This option is required for entering condenser water temperatures above 95°F (35°C).

4. Insulation: The evaporator, water boxes, and motor housing are covered with factory installed 0.75 inch (19.05 mm) Armaflex II or equal (k=0.28) insulation. Factory installed foam insulation is used on the suction line, liquid level sensor, oil return system assembly (with its associated piping).

5. Insulation for High Humidity: The evaporator and water boxes are covered with factory installed 1.5 inch (38.1 mm) Armaflex II or equal {k=0.28) insulation. Factory installed foam insulation is used on the motor housing, suction line, liquid level sensor, and oil return system assembly (with its associated piping).

6. Isolators: Molded elastomeric isolators ship with the unit.

7. Nitrogen Charge: Unit is shipped with a nitrogen holding charge in lieu of refrigerant. Performance Tests

8. Performance tests are available to certify chiller performance before shipment.

9. Standard Temperature Condenser: This option allows for leaving condenser water temperatures up to 105°F and for entering condenser water temperatures

up to 95°F.

10 Two-Way Condenser Water Regulating Valve: For water regulation, a field-installed, 2-way butterfly-type (lug-style) valve, with integral electrical operator and factory-mounted valve actuator, is available. The single-phase, dual frequency 50 or 60 Hz, motor can be selected with 115 V (can be powered directly from control power transformer at unit) or 220 V power. The 2-way valve is field-wired and controlled by the chiller regulating valve control output. Valves are available in 3 and 4 inch sizes.

11. Water-to-Water Heat Pump: Optimized compressors, oil cooler and high condenser temperature control panel allows for leaving condenser water temperatures up to 140°F. This option allows for entering condenser water temperatures above 95°F. Condenser leaving water temperature control option is required; the setpoint range is 80°F to 140°F.

I. Electrical Options EDIT FOR PROJECT

1. Across-the-Line Starter: Across-the-line starter is unit-mounted with a UL 1995 gasketed enclosure.
2. Wye-Delta Starter: This option provides a reduced unit-mounted inrush starter with a UL 1995 gasketed enclosure. Wye-delta starters are standard with 200-230 V machines.
3. Circuit Breaker: A molded case standard interrupting capacity circuit breaker, factory pre-wired with terminal block power connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power.
4. High Interrupt Circuit Breaker: A molded case high interrupting capacity circuit breaker, factory pre-wired with terminal block power connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power.
5. Non-Fused Disconnect: A non-fused molded case disconnect switch, factory pre-wired with terminal block power connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power.
6. Dual Point Power Connection: Unit is available with either dual or single point power connections.
7. Under/Over-Voltage Protection: Unit receives protection against variations in voltage (current lag and spike protection is standard).

J. Control Options EDIT FOR PROJECT

1. Chilled Water Reset - Outdoor Air Temperature: Controls, sensors, and safeties allow reset of chilled water temperature, based on temperature signal, during periods of low outdoor air temperature (chilled water reset based on return chilled water temperature is standard).
2. Condenser Leaving Water Temperature Control: Enables the unit to use the leaving condenser water temperature to load and unload the chiller relative to the leaving condenser water setpoint, based on a 0-10 VDC signal. The control system allows for a condenser leaving temperature range of 80°F (26.7°C) to 105°F (40.6°C) with a standard condenser and 80°F (26.7°C) to 140°F (60°C) with a high temperature condenser or water to water heat pump.
3. Condenser Refrigerant Pressure Output: Control system indicates chiller pressure based on a 0-10 VDC signal.

4. External Chilled Water Setpoint: External chilled water setpoint is communicated to a factory-installed, tested communication board through a 2-10 VDC or 4-20 mA signal.
5. External Current Limiting: External current limit setpoint is communicated to a factory-installed, tested communication board through a 2-10 VDC or 4-20 mA signal.
6. Lon Talk/Tracer Summit Interface: Lon Talk (LCl-C) or Tracer Summit communications capabilities are available, with communication link via single twisted-pair wiring to factory-installed, tested communication board.
7. Motor Current Analog Output: Control system indicates the active chiller percent of full run load amps, based on a 0-10 VDC signal.
8. Power Meter: Tracks energy consumption for compressors only with kWh meter.
9. Programmable Relays: Predefined, factory-installed, programmable relays allow the operator to select four relay outputs. Available outputs are: Alarm-Latching, Alarm-Auto Reset, General Alarm, Warning, Chiller Limit Mode, Compressor Running, Head Pressure Relief Request, and Tracer Control.
10. Time of Day Scheduling: Time of day scheduling capabilities are available for scheduling single chiller applications through Trane CH530 panel (without the need for building automation system - BAS). This feature allows the user to set up to 10 events in a 7 day time period.
11. Variable Evaporator Flow Compensation: The variable flow compensation feature varies the evaporator leaving water temperature control gains to provide stability of the evaporator leaving water temperature relative to setpoint. This feature uses the EXV position and pressure drop across the EXV as inputs to calculate the evaporator waterside temperature drop. The evaporator water flow rate can then be calculated from the temperature drop and can be used as an input to varying the leaving water temperature control gains. This new feature is available as standard.

2.04 Chiller Plant Accessories

A. The chiller manufacturer shall provide all self-contained breathing apparatus, refrigerant monitors, local alarm horns and all other items as required by ASHRAE 15 specifications. Locate in the evaporator room for chiller as indicated on the Drawings.

B. Refrigerant Leak Detectors

1. The refrigerant leak detector shall be a standalone device and shall provide a SPDT output to directly energize the refrigeration room exhaust ventilation fans. The detector shall include a sensor or sensors connected to a control panel. Two relay contacts at the control panel shall provide trouble and alarm indication to the Facility Management System. The alarm relay contact shall also directly energize the exhaust fans.
2. The refrigerant leak detector shall sense the type of refrigerant used in the specified chillers. Multiple sensors shall be required to detect different refrigerants and/or provide proper sensing coverage for the area of the refrigeration room.
3. Acceptable manufacturers: Johnson Controls, MSA Instruments

2.05 Chilled Water Storage Tank EDIT FOR PROJECT

A. Chilled water storage tank shall be Adamson, or approved equal, Model G-72 vertical storage tank with 379 gallon capacity

B. Storage tank shall be steel construction to ASME standard and labeled for 125 psi usage. Unit shall be factory painted with prime coat upon fabrication.

C. Provide with 6” flanged chilled water supply and return connections, 1” drain tapping on bottom, and 1 ½” top tapping for relief valve.

PART 3 EXECUTION

3.01 Factory Supervision

A. The complete chiller installation including wiring, piping, start-up and programming, shall be performed under the supervision of factory trained and manufacturer's approved personnel.

B. Supervision shall include a project specific custom point to point wiring diagram and recommendations and for location of sensors which affect chiller operation.

C. Supervision shall include, but not be limited to, initial start-up and operational check which shall include the following:

1. Complete check and calibration of refrigeration controls.
2. Complete operating log listing system operating pressures and temperatures (W.B. and D.B.), ambient temperatures and safety cutout points.

3.02 Factory Start-up

A. The Chiller Service and start-up personnel shall provide oil, refrigerant, and up to one filter drier change during the chiller start-up in accordance with the following limitations

1. Up to one gallon of compressor oil per circuit
2. Replacement of liquid line filter driers during start-up

B. The service agency shall verify contractor installation of piping and wiring, oil charge, refrigerant charge, and will perform start-up of chiller.

End of Section 23 64 28

SECTION 23 64 16 - WATER COOLED CENTRIFUGAL WATER CHILLERS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes

1. Centrifugal chiller(s), both semi-hermetic and open drive types.
2. Centrifugal chiller installation, testing, commissioning, and start-up services.

B. In addition to submitting a base bid proposal that complies with this specification and the scheduled performance data, manufacturers are encouraged to submit alternate chiller selections that provide best value/lowest total cost of ownership. Clearly identify each alternate proposal, and highlight how it differs from base bid requirements. Alternative selections should typically be chillers that provide or exceed the scheduled capacity while providing overall better value. For each alternative proposed, provide a list of any items that fall below this specification.

1.02 SUBMITTALS:

A. Provide product data as follows:

1. Rated capacity, weight with and without refrigerant charge, furnished specialties and accessories.
2. Manufacturer's assembly type shop drawings indicating dimensions, required clearances; pipe connection types, locations and sizes; component assembly methods, support and vibration isolator details, marine water box details, and location and size of all field connections.
3. Impeller speed (RPM), number of bearings, type of bearings, high speed impeller shaft RPM, number of stages, number of sets of inlet guide vanes, type and amount of refrigerant charge (in pounds), and amount of oil required.
4. “A”-weighted sound pressure level and octave band sound pressure levels in accordance with AHRI Standard 575. Provide sound data in the format recommended by the AHRI Standard 575 Appendix D and E.
5. Manufacturer's wiring diagrams for interlock and control wiring, clearly identifying required field wiring.
6. AHRI-550/590 certified computerized selections, adjusted for zero capacity and zero NPLV tolerance. Provide capacity and NPLV performance selections at 100/75/50/25 percent load, with a condenser water temperature of 85°F at 100 percent load; 75°F at 75 percent; 65°F at 50 percent, and 65°F at 25 percent load; at the specified evaporator leaving water temperature and condenser/evaporator water flow rates and fouling factor allowances. Provide complete performance data at all selection points, to include all data required by AHRI-550/590 Minimum Data Requirements for Published Ratings.
7. For open motors, provide curve showing motor heat loss versus chiller load.
8. Shipping, handling, and storage instructions.
9. Installation and start-up instructions.
10. Project specific maintenance and operating data, and recommended spare parts list.
11. Certification of compliance with ASME, UL, & ASHRAE fabrication requirements, specified elsewhere in these specifications.
12. Confirmation that Coefficient of Performance (COP) for centrifugal chiller is not less than prescribed by ASHRAE 90.1.
13. Reports specified in Part 3.

1.03 QUALITY ASSURANCE:

A. Manufacturers and Products: The products and manufacturers specified in this Section establish the standard of quality for the Work. Subject to compliance with all requirements, provide specified products from the manufacturers named in Part 2.

B. Reference Standards: Products in this section shall be built, tested, and installed in compliance with the following quality assurance standards; latest editions, unless noted otherwise.

C. UL, CSA, ETL, or MET label for chiller electrical requirements.

D. ANSI/ASME SEC VIII Div. 1 Boiler and Pressure Vessel Code for construction and testing.

E. NFPA 70/NEC 2005

F. ANSI/NEMA 250 Enclosures for Electrical Equipment (1000 volts maximum).

G. ANSI/NEMA MG 1 Motors and Generators.

H. ANSI/ASHRAE 15 Safety Code for Mechanical Refrigeration.

I. ASHRAE 90.1-2013 Energy Standards for Low Rise Buildings Except Low Rise Residential Buildings

J. ANSI/AHRI: Standard 550/590 Performance Rating of Water Chilling Packages Using the Vapor Compression Cycle.

K. ANSI/AHRI 575 Method of Measuring Machinery Sound Within an Equipment Space

L. ANSI/AHRI 580 Non-Condensable Gas Purge Equipment for Use With Low Pressure Centrifugal Liquid Chillers

M. ASTM C 534 Specification for Preformed Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

1.04 DELIVERY, STORAGE, AND HANDLING:

A. Ship the chiller with weather-protected wrap for storage outdoors. Protect control panels, pipe openings, and other sensitive components with heavy plastic or other durable means to ensure unit cleanliness is maintained during shipping and storage.

B. Provide rigging and installation instructions in advance to allow for planning.

1.05 WARRANTY

A. Provide a complete parts and labor warranty for a minimum of 1 year from the date of Substantial Completion. Warranty coverage shall include loss of refrigerant.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturers:

1. Trane Co.
2. York International by Johnson Controls
3. Daikin

2.02 CENTRIFUGAL PACKAGED CHILLER

A. Provide factory assembled, factory-tested, packaged, water cooled, centrifugal liquid chiller consisting of compressor, starter or variable speed drive as indicated, condenser, evaporator, built in purge system, refrigeration accessories, lifting lugs for servicing and installation, and factory-mounted instrument/direct digital control panel.

B. Provide chillers with complete oil and refrigerant charge.

C. All components listed above shall be provided by the chiller manufacturer.

2.03 PERFORMANCE REQUIREMENTS

A. Refer to schedules on Drawings for fundamental performance requirements. Also comply with the performance requirements specified in this Section.

1. Fouling Factor Allowance:
   a. Evaporator tubes: 0.00010 h·ft2·ºF/Btu
   b. Condenser tubes: 0.00025 h·ft2·ºF/Btu

B. Rated in compliance with AHRI-550/590, zero Net Refrigeration Capacity, zero Total Power Input, and zero Energy Efficiency (kW/ton) tolerance.

C. All chiller selections shall be capable of unloading to 15 percent of design tonnage at 85°F entering condenser water temperature while maintaining surge-free, stable operation.

D. Maximum self-excited vibration velocity at compressor and motor bearings in the vertical, horizontal and axial directions shall not exceed, in any direction, 0.19 inches per second RMS over the entire chiller operating range.

2.04 COMPRESSOR

A. Single or multiple stage compressor, inlet guide vanes or multi stage capacity control guide vanes, shrouded aluminum alloy impellers designed and assembled for no critical speeds within operating range.

B. The compressor shall be dynamically balanced and overspeed tested to 120 percent of design speed.

2.05 EVAPORATOR AND CONDENSER

A. Carbon steel plate shells with carbon steel tube sheets and intermediate tube support sheets as required to prevent tube vibration and to allow replacement from either end of heat exchangers. Provide suitable baffles or distributing plates in condenser tubes to distribute refrigerant discharge gas on tubes evenly. Test refrigerant side under vacuum and test water side at minimum 225 psig.

B. Tubes shall be seamless copper internally and externally enhanced, individually cleanable and replaceable. Tubes shall be minimum

C. 0.025 inches wall thickness and provide 0.050 inches tube wall thickness at the plane lands contacting the intermediate tube supports and end sheets. Expand ends of tubes in tube sheets with intermediate tube support for tight fit.

D. Evaporator and condenser water boxes shall be marine type (unless otherwise indicated) of fabricated steel with integral water connections bolted to shell of vessel, with vent and drain connections and hinged water box covers on both ends of the condenser and evaporator. Provide water piping stub outs with welded flanges for flanged connections.

E. Units with multi-stage compressors shall incorporate an inter- stage flash vessel "economizer." Units with single stage compressor shall have the condenser circuited for liquid sub- cooling and be provided with a thermometer well to monitor the amount of sub-cooling.

F. Provide service valves and other factory-installed accessories required to facilitate transfer of refrigerant from chiller shell to chiller shell or from chiller to a remote refrigerant storage/recycling system and to sense refrigerant pressure or temperature.

2.06 COMPRESSOR CASING AND SHELL FINISHES

A. Casing shall be fine grain cast iron with gasket sealed joints.

B. Factory applied paint, all exposed ferrous metal surfaces on assembled chiller. Minimum one coat of primer, minimum 2 mils dry film thickness (DFT). Final finish with two coats of air dried or baked alkyd enamel metal coating, minimum 4 mils total DFT. Two coats of matching, insulation compatible paint on all factory installed insulation.

C. Factory applied insulation. 3/4 inch minimum thickness for the evaporator water box, compressor motor, motor barrel, suction elbow and suction cover, 3/8 inch minimum thickness on economizer, 1/2 inch thick pipe insulation on liquid lines and all cold surfaces of chiller capable of forming condensation.

D. Insulation: Flexible, closed cell elastomeric insulation, meeting requirements of ASTM C534, conductivity of 0.30, water vapor permeability of 0.20. Materials shall have a flame spread index of less than 25 and a smoke-developed index of less than 50 when tested in accordance with ASTM E 84, latest revision.

E. Before insulating steel surfaces, prepare surfaces for paint and prime and paint as indicated for other painted components.

F. Seal seams and joints to provide a vapor barrier.

G. Acceptable product and manufacturer:

1. AP Armaflex by Armacell LLC, or equivalent.

2.07 COMPRESSOR LUBRICATION SYSTEM

A. Submerged pump and replaceable oil filter; complete with automatic oil heater designed to separate refrigerant from oil, site glass and oil cooler. System shall provide positive pressure lubrication of journals, bearing, and seals (if any), during start-up, operation and coast-down of chiller, including power interruptions.

2.08 PRESSURE RELIEF DEVICES

A. Comply with ASHRAE 15; provide rupture disc(s) or pressure relief device(s).

B. Additionally, provide spring-loaded relief valve (s) (Trane Rupture-guard or York Vent-guard) to help contain refrigerant charge after an over-pressure event.

2.09 PURGE SYSTEM (R123 SYSTEMS ONLY)

A. Rated, tested, marking and nameplate data; meeting all conformance requirements of AHRI 580. To include purge tank with dryer elements and 115v/60/1 pump out compressor. Rated for no more than 0.0049 lb. of refrigerant per 1 lb. non-condensable at standard room conditions with condensing refrigerant temperatures greater than 80°F.

2.10 REFRIGERANT FLOW CONTROL DEVICES

A. Provide refrigerant flow control devices between evaporator and condenser (and as required elsewhere) to regulate refrigerant flow at volume and pressure required to maintain evaporator liquid refrigerant level sufficient to keep evaporator tubes adequately wetted through full range of chiller operation.

2.11 COMPRESSOR MOTOR AND ACCESSORIES

A. Continuous duty, squirrel cage, induction type, either hermetically sealed, refrigerant cooled or open drive/open drip proof, rated for operation at 460 volts, 3 phase, 60 Hz. Full load operation of the motor shall not exceed nameplate full load current rating or enter into the service factor. The first critical speed shall be above the operating speed. Provide for removal of the stator without breaking the main refrigerant piping connections. Provide RTD's or thermistors, one per phase, to monitor motor winding

temperature.

B. Motors used with variable frequency drives shall be rated inverter duty and comply with NEMA MG-1 Part 31, with minimum insulation Class F and insulation temperature rise rating of Class B.

2.12 VARIABLE SPEED DRIVE

A. Unit mounted and pre-wired variable speed drive to adjust compressor motor speed automatically in conjunction with compressor vane position, to maximize part load efficiency. Drive shall be mounted in a NEMA 1 enclosure and UL labeled 508C

B. PWM type, utilizing IGBT's with a power factor of 0.96 or higher at all loads and speeds.

C. Drive efficiency shall be 97 percent or higher at full load and full speed.

D. Drive shall have a 65,000 AIC short circuit withstand rating.

E. Drive shall be insensitive to incoming power phase rotation and shall be capable of auto restart after a momentary power loss.

F. Provide 120 volt control power transformers to power chiller controller, purge system, oil system, and all other auxiliary equipment and controls

G. Variable speed drive shall include the following features:

1. Over-voltage and-under voltage protection; 3-phase sensing motor over-current protection, single phase protection, and over temperature protection
2. Digital readout at the chiller controller of output frequency, input voltage, 3-phase output current, input kilowatts, and self-diagnostic service parameters. Separate meters for this information will not be acceptable.
3. kW Meter - The unit's input power consumption shall be measured and displayed digitally via the chiller controller. The kW meter accuracy shall be +/- 3 percent of reading.
4. Ammeter – Simultaneous three-phase true RMS digital readout via the chiller controller. Three current transformers shall provide isolated sensing. The ammeter accuracy shall be plus or minus 3 percent of reading.
5. Voltmeter – Simultaneous three-phase true RMS digital readout via the chiller controller. The voltmeter accuracy shall be plus or minus 3 percent of reading.
6. Elapsed Time Meter – Digital readout of the unit's elapsed running time (0 – 876,600 hours, resettable) shall be displayed via the chiller controller.

2.13 CHILLER CONTROLLER

A. Unit mounted pre-wired chiller controller mounted in a NEMA 1 enclosure, labeled by UL, CSA, ETL or MET. All external factory wiring shall be installed to minimize potential damage, and all power wiring, 110V and higher, shall be in a NEC compliant conduit system. Controller shall include an adjustable mounting system such that center of panel may be set at a maximum of 6 feet 6 inches above the finished floor, inclusive of housekeeping pad and vibration isolator heights.

B. The chiller controller shall automatically adjust compressor pre- rotation vane position, variable speed drive when provided, and other chiller systems to maximize part-load efficiency and to provide capacity control.

C. Capacity modulation shall be maintained within plus or minus 0.5°F of CHW set point, at entering condenser water temperatures as low as 65°F from full load to 15 percent load, without overshoot, hunting, surging, or cycling the machine off.

D. Provide the chiller controller with the required hardware and software for the following functions.

1. Safeties:
    a. Compressor starter failure detection
    b. Compressor start up, shut down sequences
    c. High compressor discharge temperature
    d. Surge detection and protection
    e. High lubricating oil temperature
    f. Low lubricating oil pressure
    g. High bearing temperature
    h. Evaporator and or condenser loss of flow
    i. High condenser pressure limit and high pressure cut out
    j. Evaporator low refrigerant temperature limit
    k. Low evaporator leaving fluid cut out
    l. Motor current limit, motor current overload
    m. High motor winding temperatures
    n. High vacuum operation limit
    o. Power loss, phase unbalance, phase loss, reverse rotation
    p. Over/under voltage
    q. Short cycling protection
2. Front panel display in clear English language and inch/pound units of the following:
    a. Operating mode run status
    b. Set point source or reset source
    c. Password protection security
    d. Evaporator freeze protection and low limit control data
    e. Evaporator leaving fluid set point
    f. Evaporator and condenser flow proof
    g. Calculated chiller capacity (tons)
    h. Compressor discharge temperature
    i. Chiller starts and run-time counter
    j. Entering and leaving evaporator water temperature
    k. Entering and leaving condenser water temperature
    l. Saturated condenser temperature and pressure
    m. Saturated evaporator temperature and pressure
    n. Bearing or bearing oil temperatures
    o. Lubricating oil temperature and pressure
    p. Current limit or demand limit
    q. Phase voltage and current
    r. Motor winding temperature
    s. Power demand (kW) and power factor
    t. Purge compressor suction temperature (R123 machines only)
    u. Purge pump out rate (R123 machines only)
    v. Purge pump out time last or current cycle (R123 machines only)
    w. Total purge pump out time (R123 machines only)
    x. Total purge run time (R123 machines only)
3. DDC Control Inputs:
    a. Remote Start/Stop
    b. Chilled water temperature set point reset
4. Binary Outputs:
    a. Evaporator Pump Relay
    b. Condenser Pump relay
    c. Chiller Running Relay

d. Alarm Relay (manual reset required)

E. The controller shall provide an output signal to the Owner's DDC system for controlling condenser water temperature to maximize chiller operating efficiency while maintaining proper refrigerant head pressure at all times. Provide in the chiller controller a 4 to 20 mA or 0 to 10 volt output signal to allow Owner's DDC system to reset condenser water temperature via cooling tower fan speed control and tower bypass valve modulation while maintaining proper chiller refrigerant head pressure.

F. Provide an ON-OFF-AUTO rocker switch on the front of the controller panel to allow local control or remote control of the start/stop function by Owner's DDC system. When switch is set to ON or OFF positions, the remote start or stop signal from the Owner's DDC shall be ignored. If turning the chiller on or off at the chiller control panel interface accomplishes the same thing, an ON-OFF-AUTO rocker switch is not required.

G. Provide factory installed and pre-wired proof-of-flow switches that confirm flow thorough the evaporator and condenser to the chiller control panel. Alternatively, provide United Electric Model J21K-14829 differential pressure switches for field installation to prove evaporator and condenser water flows.

PART 3 EXECUTION

3.01 EXAMINATION, STORAGE, AND PREPARATION

A. Upon delivery, validate holding charge and that integrity of the delivery protection has been maintained, the chiller is undamaged, and all accessory parts were delivered. Reject damaged chillers. Provide a delivery report indicating chiller condition to the Owner's Representative.

B. Rig units off delivery trucks. Comply with Manufacturer's rigging instructions.

C. Move all refrigerant or oil supplied by the manufacturer to a location next to the chiller and contact the Owner's Representative to inform them of the amount and type of refrigerant and oil delivered.

D. Store units protected from weather, dirt, water, construction debris, and physical damage. Support stored units at points as required by manufacturer.

E. Verify during storage that unit refrigerant or nitrogen holding charge levels are being maintained. Record the charge pressure and ambient temperature weekly and provide report to Owner's Representative. Take immediate action under the supervision of the manufacturer to restore any significant reduction in charge pressure level.

F. Examine chillers before installation. Validate holding charge has been maintained and that the chiller is undamaged. Provide a pre- installation report indicating chiller condition to the Owner's Representative.

G. Examine roughing-in for equipment support, anchor-bolt sizes and locations, piping, and electrical connections to verify actual locations, sizes, and other conditions affecting chiller performance, maintenance, and operations before equipment installation.

1. Final chiller locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

H. Rig units into final locations. Comply with Manufacturer's rigging instructions. Conduct a pre-installation conference to review rigging and installation requirements with all parties involved.

I. CHILLER INSTALLATION

J. Install the chiller in strict compliance with manufacturer's installation instructions and

Related Sections. Maintain manufacturer's recommended clearances for service and maintenance.

K. Install chiller on support structure or concrete base as indicated.

L. Provide connection-size ball valves with threaded hose end connections at all water vent and drain connections on the evaporator and condenser, whether indicated on Drawing details or not.

M. Install relief vent piping in strict accordance with chiller manufacturer's recommendations.

N. Adjust chiller control panel so that center of panel is set at maximum of 6 feet 7 inches above finished floor, inclusive of housekeeping pad and vibration isolator heights.

O. Install separate devices furnished by manufacturer and not factory installed.

P. Repair all damaged insulation to factory equivalent.

Q. Repair scratches to factory equivalent finish, using chiller manufacturer provided paint.

R. Complete the manufacturer’s pre-start checklist and submit it for scheduling of the manufacturer’s field startup technician.

3.02 SYSTEM STARTUP

A. Manufacturer shall provide a factory-trained representative for the time required to complete start-up, commissioning, and testing each chiller. This service shall be provided on days and at times required to meet the construction schedule and/or project phasing requirements, at the complete discretion of the Owner’s representative, without additional charges. There shall be no time limit on this service, but shall be the time required to bring the unit to proper operation. This service must include all necessary written and verbal instructions to operating personnel. The manufacturer's factory-trained representative shall:

1. Verify correct installation and organize, instruct and assist the mechanical contractor's personnel in start-up procedures.
2. Fill chiller with oil if not factory installed, and charge the chiller with refrigerant.
3. Verify all pre-start checks. Start-up the chiller, set controller parameters, make field adjustments, refrigerant balance the chiller, verify proper chiller operation. Assist Owners personnel with proper set-up of remote control operation of the chiller. Provide a written report after each visit, prior to leaving.

B. If the initial start-up and machine trim is accomplished under chiller load condition of less than 100 percent load, the manufacturer's representative shall return to the job site and re- adjust the machine during 100 percent load conditions at no additional cost.

C. The manufacturer representative's written report shall include complete data on all services provided, and document all programmed settings as well as the amount of refrigerant and other fluids installed, both from the factory and in the field during startup.

3.03 OWNER TRAINING

A. Manufacturer’s factory-trained representative shall train Owner's maintenance personnel on start-up and shutdown procedures, trouble-shooting, vibration test locations, service schedules, and preventative maintenance procedures, minimum of 8 hours. Review with Owner's personnel, the data contained in the Operating and Maintenance Manuals.

B. Schedule training with Owner through the Architect/Engineer with at least 7 days prior notice. Training and start up services are separate functions and training shall not be combined with startup services.

3.04 FIELD QUALITY CONTROL

A. Chiller manufacturer shall perform vibration testing. Measure at compressor and motor bearings in the vertical, horizontal and axial directions, to demonstrate compliance with Part 2 vibration performance requirements. Permanently label the location where each vibration measurement was taken with a unique identification number.

B. Provide report to owner within 1 week of testing. Include diagram of chiller with measurement points labeled to match field labels.

C. The Chiller manufacturer shall make corrections and retest if it is determined the cause of excess vibration is due to defective equipment. The Installing contractor shall make corrections and pay for a chiller mfr. retest if it is determined the cause of excess vibration is improper installation.

End of Section 23 64 16

SECTION 23 65 13 - OPEN CIRCUIT COOLING TOWERS

PART 1 GENERAL

1.01 Description of Work

A. Provide the cooling tower as specified and indicated on the drawings.

1.02 Approved Manufacturers

A. The basis for this specification is Marley Cooling Tower Co. which shall represent the minimum level of construction. Products manufactured by Baltimore Air Coil and Evapco shall be permitted to bid these specifications.

1.03 Shop Drawings

A. Shop drawings shall be submitted as specified in Division 1.

B. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Dimensional drawings showing layout, connection points, and detailed layout of components.
4. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.

PART 2 PRODUCTS

2.01 Performance Data EDIT CONDITIONS TO YOUR PROJECT

A. Base: Furnish and install an induced-draft, crossflow, factory-assembled, steel cooling tower of one cell, as shown on plans. Tower shall be similar and equal in all respects to Marley Model NC1201.

B. Performance: Tower shall cool 300 GPM of water from 95 F to 85 F at a design entering air wet-bulb temperature of 78 F.

C. Construction: Structural components of the tower, including the cold water basin, framework, mechanical equipment supports, casing hot water basin and fan cylinder, shall be fabricated of heavy-gauge steel, protected against corrosion by G-235 galvanizing. All components subjected to factory welding shall be hot dip galvanized after completion of fabrication to a zinc thickness equivalent of G-235. Cold galvanizing is not acceptable.

D. Motor: Motor shall be 5 HP, totally enclosed, specially insulated for cooling tower duty. Speed and electrical characteristics shall be 1800 RPM, three phase, 60 hertz, 480 volts.

E. Mechanical Equipment: Fan(s) shall be fixed-pitch propeller type. Fan shall be driven through geareducer series 10.1 with 3.27 to 1 ratio.

F. Fill, Louvers and Drift Eliminators: Fill shall be film-type, vacu-formed PVC, with louvers and drift eliminators formed as part of each fill sheet. Fill shall be suspended from hot dip galvanized structural tubing supported from the upper tower structure, and shall be elevated above the floor of the cold water basin to facilitate cleaning. Air inlet faces of the tower shall be free of water splash-out. Guaranteed drift losses shall not exceed

0.005% of the design GPM.

G. Hot Water Distribution System: An open basin above the fill bank shall receive hot water piped to each cell of the tower. This basin shall be installed and sealed at the factory. The basin shall be designed to provide adequate freeboard against overflow and splashout. Removable and replaceable polypropylene nozzles installed in the floor of the basin shall provide full coverage of the fill by gravity flow. Nozzles must all have the same orifice size and be spaced symmetrically in both longitudinal and transverse directions.

H. Cold Water Basin and Accessories: The cold water basin shall be completed and sealed at the factory. Provide with side suction connection and include a protective screen and anti-cavitation device.

I. Provide the tower with the following accessories:

1. Model M-1 fan vibration switch.
2. Extended lube line and dipstick.
3. 9 Kw, 480 volt basin heater.
4. Ladder and handrail.
5. Two flow balance valves - 6" sac.
6. Air inlet screens.
7. B & W electric water make-up probe.

PART 3 EXECUTION

End of Section 23 65 13

SECTION 23 72 19 – AIR-TO-AIR ENERGY RECOVERY EQUIPMENT

PART 1 GENERAL

1.01 General Description

A. This section includes Air-to-Air Energy Recovery Ventilators (ERV) for indoor installation.

B. Drawings and general provisions of the contract, including General Requirements Division 01, Division 23, Division 23 Specifications Sections, and common work requirements for HVAC apply to work specified in this section.

1.02 Approved Manufacturers

A. The basis for the equipment in this specification Trane and shall represent the minimum level of construction. Equipment manufactured by Johnson Controls (York) shall be considered equal to these specifications.

1.03 Shop Drawings

A. Shop drawings shall be submitted as specified in Division 1.

B. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Unit performance data for both Supply Air and Exhaust Air, with system operating conditions indicated.
4. Enthalpy plate performance data for both summer and winter operation.
5. Motor ratings and unit electrical characteristics.
6. Dimensional drawings showing layout, connection points, and detailed layout of components.
7. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.

1.04 Quality Assurance

A. Source Limitations: Obtain Air-to-Air Energy Recovery Ventilator with all appurtenant components or accessories from a single manufacturer.

B. For the actual fabrication, installation, and testing of work under this section, use only thoroughly trained and experienced workers completely familiar with the items required and with the manufacturer's current recommended methods of installation.

C. The ERV core shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of ten (10) years from the date of purchase. The balance-of-unit shall be warranted to be free of manufacturing defects and to retain its functional characteristics, under circumstances of normal use, for a period of two (2) years from the date of installation.

D. Manufacturer shall be able to provide evidence of independent testing of the core by Underwriters Laboratory (UL), verifying a maximum flame spread index (FSI) of 25 and a maximum smoke developed index (SDI) of 50 thereby meeting NFPA90A and NFPA 90B requirements for materials in a compartment handling

air intended for circulation through a duct system. The method of test shall be UL Standard 723.

E. Certifications:

1. The energy recovery cores used in these products shall be third party Certified by AHRI under its Standard 1060 for Energy Recovery Ventilators. AHRI published certifications shall confirm manufacturer's published performance for airflow, static pressure, temperature and total effectiveness, purge air (OACF) and exhaust air leakage (EATR). Products that are not currently AHRI certified will not be accepted. OACF shall be no more than 1.02 and EATR shall be at 0% against balanced airflow.
2. Entire unit shall be listed under UL 1812 Standard for Ducted Air to Air Heat Exchangers and comply with CSA Standard 22.2.

F. Every unit to be factory tested prior to shipping: Motor Dielectric Voltage-Withstand Bench Test, Unit Dielectric Voltage-Withstand Test, Continuity of Internal Control Circuits Test, Unit Amperage Test

1.05 Coordination

A. Coordinate size and location of all building penetrations required for installation of each Energy Recovery Ventilator and associated electrical systems.

B. Coordinate sequencing of construction for associated plumbing, HVAC, electrical supply.

PART 2 PRODUCTS

2.01 General

A. Air-to-Air Energy Recovery Ventilators shall be fully assembled at the factory and consist of a fixed-plate cross-flow heat exchanger with no moving parts, an insulated double wall G90 galvanized and painted 20-gauge steel cabinet, motorized outside air intake damper, filter assemblies for both intake and exhaust air, enthalpy core, supply air blower assembly, motorized exhaust air damper, exhaust air blower assembly and electrical control box with all specified components and internal accessories factory installed and tested and prepared for single-point high voltage connection. Entire unit with the exception of field-installed components shall be assembled and test operated at the factory.

2.02 Cabinet

A. Materials: Formed double wall insulated metal cabinet, fabricated to permit access to internal components for maintenance.

B. Outside casing: 20 gauge, galvanized (G90) steel meeting ASTM A653 for components that do not receive a painted finish. Painted components as supplied by the factory shall have polyester urethane paint on 20 gauge G90 galvanized steel.

C. Access doors shall be hinged with airtight closed cell foam gaskets. Door pressure taps, with captive plugs, shall be provided for cross-core pressure measurement allowing for accurate airflow measurement.

D. Unit shall have factory-installed duct flanges on all duct openings.

E. Cabinet Insulation: Unit walls and doors shall be insulated with 1 inch, 4 pound density, foil/scrim faced, high density fiberglass board insulation, providing a cleanable surface and eliminating the possibility of exposing the fresh air to glass

fibers, and with a minimum R-value of 4.3 (hr-ft2-°F/BTU).

F. Enthalpy core: Energy recovery core shall be of the total enthalpy type, capable of transferring both sensible and latent energy between airstreams. Latent energy transfer shall be accomplished by direct water vapor transfer from one airstream to the other, without exposing transfer media in succeeding cycles directly to the exhaust air and then to the fresh air. No condensate drains shall be allowed. The energy recovery core shall be designed and constructed to permit cleaning and removal for servicing. The energy recovery core shall have a ten year warranty. Performance criteria are to be as specified in AHRI Standard 1060.

G. Control center / connections: Energy Recovery Ventilator shall have an electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections to the non-fused disconnect.

H. Passive Frost Control: The ERV core shall perform without condensing or frosting under normal operating conditions (defined as outside temperatures above -10°F and inside relative humidity below 40%). Occasional more extreme conditions shall not affect the usual function, performance or durability of the core. No condensate drains will be allowed.

I. Motorized Isolation Damper(s): Exhaust Air and Outside Air motorized damper(s) of an AMCA Class I low leakage type shall be factory installed.

2.03 Blower Section

A. Blower section construction, Supply Air and Exhaust Air: Blower assemblies consist of a 208-230V 3 Phase 60 HZ, TEFC motor, and a belt driven forward-curved blower.

B. Blower assemblies: Shall be statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and horsepower.

2.04 Motors

A. Blower motors shall be Premium Efficiency, EISA compliant for energy efficiency. The blower motors shall be totally enclosed (TEFC) and be shall be supplied with factory installed motor starters.

B. Belt drive motors shall be provided with adjustable pulleys and motor mounts allowing for blower speed adjustment, proper motor shaft orientation and proper belt tensioning.

2.05 Controls

A. Fan control: Onboard VFD for both airstreams.

B. Sensors: Dirty filter monitor for both airstreams.

C. Factory-installed microprocessor controller and sensors, ERV controls that:

1. Comply with requirements in Division 23 Section "Sequence of Operations for HVAC Controls"
2. Has factory-installed hardware and software to enable the building automation interface via BACnet to monitor, control, and display status and alarms
3. The sensors that will be required for control are:
4. (2) Temperature sensor for fresh air and exhaust air
5. (2) Temperature and humidity sensor for outside air, return air

6. (2) Adjustable current switches

D. The microprocessor controller shall have factory pre-programmed multiple operating sequences for control of the ERV. Factory default settings shall be fully adjustable in the field. Available factory pre-programmed sequences on operations are:

2.06 Filter Section

A. ERV shall have 2" thick MERV 8 disposable pleated filters located in the outdoor air and exhaust airstreams. All filters shall be accessible from the exterior of the unit.

PART 3 EXECUTION

3.01 Examination

A. Prior to start of installation, examine area and conditions to verify correct location for compliance with installation tolerances and other conditions affecting unit performance.

B. Examine roughing-in of plumbing, electrical and HVAC services to verify actual location and compliance with unit requirements.

C. Proceed with installation only after all unsatisfactory conditions have been corrected.

3.02 Installation

A. Installation shall be accomplished in accordance with these written specifications, project drawings, manufacturer's installation instructions as documented in manufacturer's IOM, Best Practices and all applicable building codes.

B. Install unit with clearances for service and maintenance.

3.03 Field Quality Control

A. Contractor to inspect field assembled components and equipment installation, to include electrical and piping connections. Report results to Architect/Engineer in writing. Inspection must include a complete startup checklist to include (as a minimum) the following: Completed Start-Up Checklists as found in manufacturer's IOM. Insert any other requirements here.

3.04 Start-Up Service

A. Contractor to perform startup service. Clean entire unit, comb coil fins as necessary, and install clean filters. Measure and record electrical values for voltage and amperage. Refer to Division 23 "Testing, Adjusting and Balancing" and comply with provisions therein.

3.05 Demonstration and Training

A. Contractor to train owner's maintenance personnel to adjust, operate and maintain the entire Make-Up Air unit. Refer to Division 01 Section Closeout Procedures and Demonstration and Training.

End of Section 23 72 19

SECTION 23 73 13 - INDOOR AIR HANDLING UNITS

PART 1 GENERAL

1.01 Description of Work

A. Provide air handling units as specified and as indicated on the drawings.

B. All coil data shall be certified in accordance with ARI Standard 410. All air handling data shall be certified in accordance with ARI Standard 430 and all sound data shall be based on AMCA 300 standards.

C. Provide vertical air handling unit and mixing box. Air-handling airflow data shall be certified in accordance with AHRI standard 430. The unit shall be UL listed to US safety standards and comply with NFPA 90A. Air handlers shall consist of a hydronic coils, drain pan, and centrifugal fan with motor in a common cabinet. Motor location and coil connections are independent for the same or opposite side location (refer to plans).

1.02 Approved Manufacturers

A. The basis for this specification is Trane and shall represent the minimum level of construction. Units manufactured by Johnson Controls (York) shall be considered equal to these specifications.

1.03 Shop Drawings

A. Shop drawings shall be submitted as specified in Division 1.

B. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Dimensional drawings showing layout, connection points, and detailed layout of components.
4. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.

PART 2 PRODUCTS

2.01 Blower Coil Units

A. Provide blower coil units as hereinafter described and scheduled on the plans.

B. The casing is heavy gauge galvanized steel. All sections are insulated with one inch, 1.5 lbs per cubic foot density fiberglass insulation. Coil access panels are on both sides of the unit and allow access to clean the drain pan and remove the internal coils from either side of the unit. Fan access panels provide access to the fan motor and drive from both sides of the unit.

C. All units have drain pan and centrifugal fan with motor and drive mounted in a common cabinet. Motor and drive locations can be on the same side as the unit coil connections to allow for all service to be from one side of the unit.

D. Drain pans shall be provided with an insulated, double-wall, stainless steel, 2-way sloping IAQ drain pan to allow for proper condensate removal.

E. Motor shall be open drip-proof with size, type and electrical characteristics as shown on equipment schedule and suitable for use with variable frequency drives where

applicable.

F. Coils shall be manufactured by the supplier of the air-handling unit. Coils shall be installed such that headers and return bends are enclosed by unit casings. Coils shall have aluminum plate fins and seamless copper tubes. Fins shall have collars drawn, belled and firmly bonded to tubes by mechanical expansion of the tubes. Soldering or tinning shall not be used in the bonding process. Capacities, pressure drops and selection procedure shall be certified in accordance with ARI Standard 410.

G. Supply and return headers of water coils shall be clearly labeled on the outside of the unit to ensure that direction of coil water flow is counter to direction of unit airflow. Coils shall be rated for 300 psig and 200 F maximum.

H. Filter Mixing Box: A module shall be provided that supports damper assembly for outside and return air. Dampers shall modulate the volume of outside and return air. Dampers shall be arranged in opposed blade configuration. The filter section shall include filter racks, and access doors on the access side of the unit (as indicated on plans) for the side loading and removal of filters. Angular filter arrangements shall be provided for 2” thick pleated panel filters as specified elsewhere.

I. AHU units shall be as scheduled on plans:

PART 3 EXECUTION

3.01 Installation

A. Install equipment per industry standards, applicable codes, and manufacturer's instructions.

B. Do not use AHUs for temporary heating, cooling or ventilation prior to complete inspection and startup performed per this specification.

C. Install AHUs on a concrete pad, roof curb, or structural steel base, as shown on drawings.

D. Install AHUs with manufacturer's recommended clearances for access, coil pull, and fan removal.

E. Provide one complete set of filters for testing, balancing, and commissioning. Provide second complete set of filters at time of transfer to owner.

F. Install AHU plumb and level. Connect piping and ductwork according to manufacturer's instructions.

3.02 Field Quality Control

A. Store per AHU manufacturer's written recommendations. Store AHUs indoors in a warm, clean, dry place where units will be protected from Weather, construction traffic, dirt, dust, water and moisture. If units will be stored for more than 6 months, follow manufacturer's instruction for long-term storage.

B. Rig and lift units according manufacturer's instructions.

3.03 Installation Inspection

A. Hire manufacturer's factory trained and factory-employed service technician to perform an inspection of unit and installation prior to startup. Technician shall inspect and verify the, following as a minimum:

1. Damage of any kind
2. Level installation of unit

3. Installation of shipped-loose parts, including filters, dampers, etc.
4. Completion and tightness of electrical, ductwork and piping connections
5. Tight seals around wiring, conduit and piping penetrations through AHU casing.
6. Supply of electricity from the building's permanent source
7. Integrity of condensate trap for positive or negative pressure operation
8. Condensate traps charged with water
9. Removal of shipping bolts and shipping restraints
10. Tightness and full motion range of damper linkages (operate manually)
11. Complete installation of control system including end devices and wiring
12. Cleanliness of AHU interior and connecting ductwork
13. Proper installation of filters

B. Resolve any non-compliant items prior to proceeding with the inspection of the fan assembly.

3.04 Fan Assembly Inspection

A. Hire the manufacturer's factory-trained and factory-employed service technician perform an inspection of the unit fan assembly subsequent to general unit inspection and prior to startup. Technician shall inspect and verify the following as a minimum.

1. Tight set screws on pulleys, bearings and fan
2. Tight fan bearing bolts
3. Tight fan and motor sheaves
4. Tight motor base and mounting bolts
5. Blower wheel tight and aligned to fan shaft
6. Sheave alignment and belt tension
7. Fan discharge alignment with discharge opening
8. Fan bearing lubrication
9. Free rotation of moving components (rotate manually)

B. Manufacturer shall perform service to bring fan performance within factory specifications.

End of Section 23 73 13

SECTION 23 81 46 – WATER-SOURCE UNITARY HEAT PUMPS

PART 1 GENERAL

1.01 Description of Work

A. Provide the water-source heat pumps as hereinafter specified and scheduled on plans.

B. Equipment shall be completely assembled, piped, internally wired, fully charged with R-410A refrigerant and test operated at the factory. Filters, thermostat field interface terminal strip, and all safety controls are furnished and factory installed.

C. The system water inlet and outlet connections shall be female NPT composed of copper.

D. This equipment shall contain ETL, CETL and ANSI/AHRI/ASHRAE/ISO13256-1 listings and labels prior to leaving the factory. Units meet the efficiency standards of the ASHRAE 90.1-2016 standard. Service and caution area labels shall also be placed on the unit in their appropriate locations.

E. Approved Manufacturers

1. The basis for water-source heat pumps are those scheduled and shall represent the minimum level of construction. Units manufactured by Johnson Controls (York) shall be considered equal to these specifications.

1.02 Shop Drawings

A. Shop drawings shall be submitted as specified in Division 1.

B. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Dimensional drawings showing layout, connection points, and detailed layout of components.
4. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.

PART 2 PRODUCTS

2.01 Horizontal Style Water-Source Heat Pumps

A. Air-to-Refrigerant Coil

1. Internally finned, 3/8-in. copper tubes mechanically bonded to a configured aluminum plate fin as standard. Coils are leak tested at the factory to ensure the pressure integrity. The coil shall be leak tested to 450 PSIG and pressure tested to 650 PSIG. The tubes are to be completely evacuated of air and correctly charged with proper volume of refrigerant prior to shipment.
2. The refrigerant coil distributor assembly shall be of orifice style with round copper distributor
3. tubes. The tubes are sized consistently with the capacity of the coil. Suction header is fabricated from rounded copper pipe.

4. A thermostatic expansion valve is factory selected and installed for a wide range of control.

B. Blower Motor

1. The motor is an ECM variable speed motor with electronic protection. The ECM motor is programmed to provide soft starting and a constant CFM over a range of static pressure. A means to adjust the air flow is provided on the control board. Fan speed shall be capable of reducing to provide 50% of the scheduled airflow. The motor contains a quick disconnect plug and permanently lubricated bearing. The fans are provided in a draw-through configuration. Fans are constructed of corrosion resistant galvanized material.

C. Cabinet

1. Unit casing shall be constructed of zinc coated, heavy gauge, galvanized steel.
2. Service to the refrigerant and controls shall be provided through a single access panel at the front of the equipment. Access to the refrigerant and controls for the larger units shall be provided through the front and side access panels.
3. Panels shall be insulated with ½” thick closed cell elastomeric foam. The elastomeric foam is UL listed with a flame spread of 25 or less and a smoke developed classification of 50 or less per ASTM E-84 and UL 723. Insulation has a minimum rated service air velocity of 3600 feet per minute (FPM) and meets the erosion requirements of UL 181.
4. Access for inspection and cleaning of the unit drain pan, coils and fan section shall be provided.
5. Four rubber grommets are enclosed with every horizontal unit. These grommets are to be used in conjunction with unit hanging rods to isolate vibration

D. Compressor

1. The unit will contain a high efficiency rotary or scroll compressor. External vibration isolation shall be provided by rubber mounting devices located underneath the mounting base of the compressor. A second isolation of the refrigeration assembly shall be supported under the compressor mounting base.
2. Internal thermal overload protection shall be provided. Protection against excessive discharge pressure is provided by means of a high-pressure switch. Protection against a loss of charge is provided by a low pressure safety.

E. Unit Drain Pan

1. The stainless steel unit drain pan and the drain stubout shall be constructed of heavy gauge type 304 stainless steel. Stainless steel material shall meet the requirements of ASTM A480/A480M and comply with the chemical composition requirements of ASTM A240.
2. The drain pan shall be insulated to prevent moisture accumulation on the drain pan material.
3. The drain pan insulation material shall be suitable to be used in the airflow and consists of closed cell elastomeric insulation, complying with flammability requirements of UL94-5V.

F. Electrical

1. The unit control box shall contain all necessary devices to allow heating and cooling operation to
2. occur from a remote wall thermostat. These devices are as follows:
   a. 24 Vac energy limiting class II 50 VA (minimum) transformer
   b. 24 Vac compressor contactor for compressor control
   c. Field thermostat connections shall be provided for ease of hook-up to a terminal strip located in the unit's control box.
   d. Lockout function controls cycling of the compressor shall be provided to protect the compressor during adverse operating conditions.
   e. A high pressure switch shall protect the compressor against operation at refrigerant system pressures exceeding 650 PSIG.
   f. Factory installed wire harness.
   g. Nameplate information shall be provided for the application of either time-delay fuses or HACR circuit breakers for branch circuit protection from the primary source of power.

G. Filters

1. Provide MERV 8 with average arrestance of 75% and dust holding capacity of 26-grams per square foot.

H. Provided Options

1. Provide a motorized water valve for each water source heat pump as part of the hose kit accessory. The motorized valve shall stop flow to the unit.
2. On/Off switch mounted on the left hand front corner of the unit and sized per requirements
3. of UL1995 to handle the unit load. The field power connections shall be made at the ON/OFF switch. The switch shall be mounted on a NEMA compliant junction box. The junction box shall be UL 514 compliant. The junction box shall have knock outs on all four sides to provide access for field wiring to the switch. The switch shall be UL508 Compliant and the body shall be constructed of glass reinforced thermoplastic.
4. The refrigerant circuit shall contain a thermal expansion device. Service pressure ports shall be factory supplied on the high and low pressure sides for easy refrigerant pressure or temperature testing. Filter driers are standard.
5. Refrigerant tubing shall be of 99% pure copper. This system shall be free from contaminants and conditions such as drilling fragments, dirt and oil. All water lines that are located in the indoor air stream shall be insulated with 3/8 in. thick elastomeric insulation.
6. Sound attenuation shall be applied as a standard feature in the product design. The sound reduction package shall include vibration isolation to the compressor and water-to-refrigerant coil, unit base stiffeners, insulated metal compressor enclosure, and a second stage of vibration isolation to the compressor and water-to-refrigerant base pan.
7. The water-to-refrigerant heat exchanger shall be of a high quality co-axial coil for maximum heat transfer. The copper or optional cupro-nickel coil shall be deeply fluted to enhance heat transfer and minimize fouling and scaling. The coil has a working pressure of 400 PSIG on the water side and 650 PSIG on the refrigerant side. The factory shall provide rubber

isolation to the heat exchanging device to enhance sound attenuation.

2.02 Vertical Stack Water-Source Heat Pumps

A. General

1. Equipment is factory assembled, piped, internally wired, fully charged with R-410A refrigerant and oil. Units are tested at the factory.
2. Products are certified in accordance ANSI/AHRI/ASHRAE/ISO13256-1 Certification Program. All units have an ETL label that meets USA (UL std) and Canadian (CSA std).
3. All units shall come standard with a 5-year compressor warranty.

B. Air-to-Refrigerant Coil

1. Internally finned, 3/8” copper tubes mechanically bonded to a configured aluminum plate fin are
2. standard. Coils are leak tested at the factory to ensure the pressure integrity. The coil is leak tested to 200 PSIG and pressure tested to 650 PSIG.
3. The refrigerant coil distributor assembly shall be of orifice style with round copper distributor
4. tubes. The tubes are sized consistently with the capacity of the coil. Suction header is fabricated
5. from rounded copper pipe.
6. A thermostatic expansion valve is factory selected and installed for a wide range of control.

C. Casing

1. The cabinet assembly is constructed of heavy-gauge galvanized steel. It houses the blower, fan and control hook-up to the unit thermostat or zone sensor. A basepan with condensate hose is included with the cabinet design. Base rails allow ease of chassis installation/removal for service or maintenance.
2. The chassis is constructed of heavy-gauge galvanized steel. The chassis houses the compressor, reversing valve, water-to-refrigerant heat exchanger, air-to-refrigerant heat exchanger, thermal expansion valve, corrosive resistant condensate pan, and water inlet/outlet connections. The chassis is installed into the cabinet by sliding it in place on the locating rails within the cabinet design.
3. The insulation contains a flame spread rating of less than 25 and smoke density rating of less than 50 (as tested in accordance with ASTM-85).

D. Compressors

1. All units have direct-drive, hermetic, rotary or scroll type compressors. The compressor contains rubber isolation to aid in noise reduction during compressor start/stop.
2. Internal thermal overload protection and compressor anti-short cycle timers are also provided. Protection against excessive discharge pressure is provided by means of a high pressure switch. Loss of charge protection is provided by a low pressure switch.

E. Controls

1. The unit control box contains all necessary devices to allow heating and cooling operation to occur from a wall mounted thermostat or sensor. The

devices are as follows:

a. 24 VAC energy limiting class II 75 VA breaker type transformer.
b. 24 VAC blower motor relay.
c. 24 VAC compressor contactor for compressor control.
d. A high pressure switch protects the compressor against operation at refrigerant system pressures exceeding 650 PSIG.
e. A low pressure switch is provides that trips at 40 PSIG. A freezestat is provided - tripping at either 35° or 20°F.
f. Factory installed wire harness
g. Power connections are through a factory installed on/off switch and conduit located at the top of the unit's cabinet. The conduit accesses directly to the control box.

2. .

F. Drain Pan

1. The condensate pan is constructed of corrosive resistant material. The bottom of the drain pan is sloped in two planes to pitch the condensate towards the drain connection. Condensate is piped to a lower base pan through condensate hose for ease of chassis removal. A clear drain hose is factory clamped onto the drain connection for field hook-up.

G. Filters

1. Provide MERV 8 with average arrestance of 75% and dust holding capacity of 26-grams per square foot.

H. Fan

1. The blower is a double width, double inlet (DWDI) forward curved wheel. The blower is a direct drive ECM fractional horsepower motor. The blower/motor assembly is designed for efficient and quiet operation. The ECM motor is programmed to provide four constant CFM profiles and is shipped on the rated CFM of the unit. The motor is factory programmed to provide 80% airflow in the fan only mode for additional energy savings. Service or maintenance to the blower/motor is achieved by removal of a single bracket.

I. Refrigerant Circuits

1. The refrigerant circuit contains a thermal expansion device, service pressure ports, and system safety devices factory-installed.

J. Return-Air Hinged Acoustical Door

1. A frame mounted acoustical door is provided to attenuate noise. The door is hinged to the wall frame, and contains magnetic latches to keep the door aesthetically in place. It is flush mounted to the wall as to not protrude into the owner space. The door allows access to the unit for ease of filter replacement.
2. The door is constructed from heavy-gauge formed galvanized steel and painted light white. Provide with tamper proof lock design.

K. Risers

1. Provide factory supply and return risers of Type L copper. The drain riser is Type M copper. Swages from one diameter to another are performed as specified by the engineer in the field. Diameters and length are specified by the equipment model number. Riser insulation for

condensate contains a flame rating per UL94-5V with flame spread rate of no more than 25.

L. Sound Attenuation

1. Provide units with the deluxe sound reduction package is including a heavy gauge base plate, gasket and insulation around the compressor enclosure, and vibration isolation between the chassis and cabinet. Additional dampening treatment shall be applied around the compressor enclosure to achieve greater acoustical reductions.

M. Water-to-Refrigerant Heat Exchanger

1. The water-to-refrigerant heat exchanger is of a high quality co-axial coil for maximum heat transfer.
2. The copper or optional cupro-nickel coil is deeply fluted to enhance heat transfer and minimize fouling and scaling. The coil has a working pressure of 650 PSIG on the refrigerant side and 400 PSIG on the water side.

PART 3 EXECUTION

3.01 Installation

A. Install equipment per industry standards, applicable codes, and manufacturer's instructions.

B. Do not use equipment for temporary heating, cooling or ventilation prior to complete inspection and startup performed per this specification.

C. Install heat pumps with manufacturer's recommended clearances for access.

D. Provide one complete set of filters for testing, balancing, and commissioning. Provide second complete set of filters at time of transfer to owner.

E. Install heat pumps plumb and level. Connect piping and ductwork according to manufacturer's instructions.

3.02 Field Quality Control

A. Store per heat pumps manufacturer's written recommendations. Store heat pumps indoors in a warm, clean, dry place where units will be protected from Weather, construction traffic, dirt, dust, water and moisture. If units will be stored for more than 6 months, follow manufacturer's instruction for long-term storage.

End of Section 23 81 19

SECTION 26 01 00 - GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 Related Documents

A. The drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements (Division 1), and Section 23 05 13 - ELECTRICAL PROVISIONS OF HVAC WORK, Section 22 05 13 – ELECTRICAL PROVISIONS OF PLUMBING, and Section 21 05 13 – ELECTRICAL PROVISIONS OF FIRE PROTECTION apply to the work specified in Division 26 - ELECTRICAL.

1.02 Description of Work

A. The Electrical Contract includes all labor, material, and equipment required for the complete electrical systems as shown and specified.

1.03 Quality Assurance

A. Each major component of equipment shall have the manufacturer's name, address, model number, rating, and UL label securely affixed in a conspicuous place.

B. All equipment of one type (such as panelboards, switches, wiring devices, etc.) shall be the product of one manufacturer, unless specified otherwise.

C. In the event of discrepancies between the drawings and specifications, the contractor shall advise the engineer before proceeding with the work in order that correct progress is ensued.

1.04 Shop Drawings and Submittals

A. Shop drawings shall be submitted as specified in Division 1. Product data shall be submitted for all materials and equipment specified in DIVISION 23. Shop drawings and submittals must be submitted in PDF format and emailed to the design team.

B. Shop drawings for equipment ‘Packages” shall be complete and include all items to be provided by a manufacturer’s representative or supply house. No partial submittals will be reviewed or approved without a complete and total equipment submittal.

C. Each shop drawing shall include a letter indicating all deviations from the drawings and/or specifications.

D. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Dimensional drawings showing layout, connection points, and detailed layout of components.
4. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.
5. Conspicuously mark on each submittal the exact model, fittings, accessories, and devices to be supplied. When a schedule is shown on the drawings or in the specifications, provide a copy of that schedule with the shop drawing indicating the equipment capacities and characteristics of the actual equipment being proposed.

6. Tags for equipment submitted shall match the tags indicated on the design drawings or specifications. Where equipment is noted on the drawings and not scheduled, refer to plan note and sheet number on the submittal.

E. they meet the requirements of the drawings and specifications before forwarding to the architect and engineer. All shop drawings submitted shall bear the stamp of the contractor to show that they have been reviewed in detail.

F. No work shall be fabricated and no equipment ordered until the architect and engineer have returned acceptable reviewed shop drawings.

1.05 Project Sequencing

A. The contractor shall refer to the architectural plans and specifications for areas of work and general schedules to determine the scope of work required during each phase of the construction.

B. All temporary services, temporary electrical connections to HVAC valves, dampers, etc. which are not indicated, but required by the phasing plan, shall be included in the base bid.

1.06 Substitutions

A. The materials, products, and equipment described in these specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. Listing of these manufacturers shall in no way be construed as a device intended to limit the bidders to those specifically listed.

B. Reference to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number, shall be interpreted as having established a standard of quality and shall not be construed as limiting competition. Articles, fixtures, etc. of equal quality by manufacturers listed in this specification for the applicable use, shall be acceptable, subject to spatial, structural, and electrical constraints of the project design.

C. No substitution will be considered unless written request for approval has been received by the engineer at least ten working days prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and complete description of the proposed substitute including shop drawings, performance and test data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment, or work that incorporation of the proposed substitute would require, shall be included. The burden of proof of the merit of the proposed substitute is on the proposer. The engineer's approval or disapproval of a proposed substitution shall be final.

D. Approval of a proposed substitution prior to receipt of bids shall be set forth in an Addendum. Approvals made in any other manner shall not be considered binding.

E. The Engineer reserves last opinion as to a product’s equality or superiority to that specified.

1.07 Definitions

A. Furnish: The term “furnish” is used to mean “supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations.”

B. Install: The term “install” is used to describe operations at the project site including the actual “unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.”

C. Provide: The term “provide” means “to furnish and install, complete and ready for the intended use.”

D. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including all items incidental to the Work, including all services necessary for proper installation and operation. The Installation shall be included under the guarantee required by this Division.

E. The design engineer, referred to as “engineer” shall mean the engineering firm, HOSS & BROWN ENGINEERS, INC., Contact person: Casey Steiner.

1.08 Record Drawings

A. During the progress of the work of this section, this Contractor shall maintain an accurate record of all changes made in the installation of the system(s). Upon completion of the work, accurately transfer all record information to an unmarked full-size set with neatly handwritten or typed notes. Scan full-size drawings to PDF at 300 dpi.

1.09 Operation and Maintenance Manuals

A. Three (3) Flash Drives containing PDFs of Operation and Maintenance (O&M) Manuals shall be submitted as described below. Files and folder names shall be clearly labeled. Folder structure and names shall be intuitive and clearly labeled.

B. Before project close-out, submit O&M operating, maintenance instructions, and parts lists for equipment provided. Include in the manual a list of emergency service organizations capable of rendering service for each piece of equipment.

C. Keep in a safe place all keys, wrenches, and other specialty tools furnished with equipment. Present to owner at project close-out and receive a receipt showing the Owner has received the same.

D. At the completion of the project furnish to the Architect for the Owner O&M brochures divided and tabbed, containing all data, diagrams, capacities, spare part numbers, manufacturers service and maintenance data, warranties, guarantees, etc., including local contacts and escalation schedule complete with addresses and telephone numbers, of all equipment, apparatus, and system components furnished and installed under this Division of the specifications.

1.10 Codes and Ordinances

A. All work shall be in accordance with applicable codes, rules, ordinances, and regulations of local, state, and federal governments and other authorities having jurisdiction.

B. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.

C. The contractors shall secure and pay for the necessary permits and certificates of inspection for their trade. Keep record of all permits and inspections and submit two copies to the engineer with request for final inspection.

1.11 Owner Training

A. When training is required by any section of these specifications, all training sessions shall be video taped on a single DVD. Provide four copies of the DVD at the end of construction. The contractor shall prepare a letter of receipt to be signed by the owner

when the tapes are delivered.

1.12 Warranty

A. This contractor shall warrant that the complete systems installed under this contract shall be free of defects in workmanship and materials for a period of one (1) year from the date of substantial completion by the arch/owner.

B. If defects occur during the one year guarantee period, this contractor shall repair or replace such defects at no expense to the owner and to the satisfaction of the owner and engineer.

PART 2 PRODUCTS

2.01 General

A. Where the quality of required material is not specified, the Contractor shall furnish a first class standard item as approved by the Architect/Engineer.

B. Capacities of equipment and materials shall not be less than those indicated.

C. All work performed shall provide a neat and workmanlike appearance when completed, to the satisfaction of the engineer.

D. Provide 3-1/2” concrete base for all floor mounted equipment unless shown or noted otherwise.Provide 6x6 welded wire fabric reinforcing minimum or as required by the structural engineer.

E. Adequately protect equipment from damage after delivery to the jobsite. Cover with heavy polyethylene plastic. Elevate equipment when there is danger of water damage. Equipment damaged will be rejected.

F. Any scratches to factory finishes shall be touched up using factory supplied paint before final acceptance. If extensive damage to factory finishes has occurred, equipment panels shall be replaced to the satisfaction of the engineer. If rust has formed, remove as recommended by the manufacturer prior to touch-up.

2.02 Equal Products of Listed Manufacturers

A. In general, the specifications and drawings identify required materials and equipment by naming first the manufacturer whose product was used for the basis of design. The manufacturer’s product, series, model, catalog, and/or identification numbers shall set quality, construction and dimensional requirements for comparing the other manufacturer’s products. The capacity and performance of all equipment shall meet or exceed what is indicated on the drawings and/or scheduled.

B. Where other manufacturer’s names are listed, they are considered approved for the product specified; however, the listing of their names implies no prior approval of any product unless specific model or catalog numbers have been shown.

C. **Where other than first named products are used, it shall be the responsibility of the contractor to determine prior to bid time that his proposed materials and equipment selections do not require adjustments in the mechanical or electrical connections as shown on the drawings. The contractor shall include in his bid all costs associated with any required adjustments.**

PART 3 EXECUTION

3.01 Installation

A. Install all equipment in strict accordance with the manufacturer's recommendations and

the shop drawings reviewed by the Engineer.

B. The complete installation shall function as designed and intended with respect to efficiency, capacity, and noise level, etc. Any abnormal noise caused by rattling equipment, conduit, or fixtures will not be acceptable

C. Locations of equipment, conduit, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.

D. Any item interfering with proper placement of other work shall be removed and relocated without extra cost if reasonable coordination would have eliminated the interference. Damage to other work caused by this contractor shall be restored as specified for new work.

E. Written dimensions are preferred over scaled dimensions. When written dimensions are not available, the contractor shall be responsible for determining the proper installed location.

F. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus, and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification.

G. Contractor shall perform initial start-up of systems and shall provide necessary supervision and labor to make the first seasonal change-over of systems. Owner's operating personnel shall be present during this operation.

H. It is the contractor's responsibility to provide materials and trim which fit properly the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.

3.02 Connections to Building Structure

A. Any item connecting to building structure shall be done in a manner accepted by the structural engineer.

B. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.

3.03 Cleaning

A. Periodically during construction and prior to Owner acceptance of the building, Contractor shall remove from the premises and dispose of all packing material and debris.

3.04 Visit to the Site

A. Before submitting his bid, the Contractor shall visit the actual location of the job and shall fully understand the scope of the work to be done and the conditions under which it is to be performed. In no case shall additional compensation be granted when existing conditions could reasonably be determined.

3.05 Existing Utilities

A. Locate and mark all known utilities prior to proceeding with work. Proceed with caution since unmarked utilities may exist on site.

B. Should any existing utilities be damaged or disrupted, immediately notify Owner. Repair the existing utilities and related equipment to the condition/working order prior to starting

work. All costs of repairs shall be paid by the contractor(s) responsible for the damage.

C. The Contractor shall closely coordinate all utility downtime with the Owner and Architect giving a minimum fourteen (14) day notice prior to downtime.

D. Downtimes are to be held to a minimum duration with the Owner being notified as to the extent of said downtime.

End of Section 26 01 00

SECTION 26 01 13 - ELECTRICAL CONNECTIONS

PART 1 GENERAL

1.01 Description of Work

A. The Electrical Contractor shall provide all conduit and wiring and shall connect complete and ready for operation all electrical motors and equipment in the other contracts. The other contractors shall furnish to the Electrical Contractor all switches, electrical controls, and other accessories required. Installation of all motors, equipment, etc., shall be made by the Contractor furnishing the equipment, except otherwise indicated.

B. Unless specified or shown otherwise, variable speed drives will be furnished by the Contractor providing the motor, and installed by the Electrical Contractor. The Electrical Contractor shall provide the control switch as shown or noted and motor starters per Section 262913. Control switch cover plate shall be engraved denoting item to be controlled and the switch position shall be engraved "AUTO-OFF TEST," "ON-OFF," or other applicable labeling as approved or noted.

C. The Electrical Contractor shall provide disconnect switches as shown.

D. The Electrical Contractor shall make all required electrical connections as hereinafter listed.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 Electrical Connections

A. The Electrical Contractor shall provide all conduit and wiring and shall connect complete and ready for operation all electrical motors and equipment for other trades as shown on the drawings and as required for complete and operating systems.

B. For specific equipment listed below, provide the following:

Mechanical/Plumbing/HVAC Items:

1. ERV Air Handling Unit: The MC will provide air handling unit(s) complete with combination magnetic motor starter/disconnect. The Electrical Contractor shall make all required electrical connections
2. Terminal Units: The MC will provide terminal units with prewired unit disconnect. The Electrical Contractor shall make all required electrical connections.
3. Fan Coil Units: The MC shall provide units complete with factory mounted and wired disconnect, speed control switches, and factory mounted and wired electric heating coil. The Electrical Contractor shall make all required electrical connections.
4. Temperature Controls: The temperature control supplier will provide all low voltage control wiring. The EC shall provide indicated 120 volt power supplies and connection. The EC shall provide all rough-in boxes and conduits for thermostat indicated under the direct supervision of the Temperature Control Contractor. Coordinate all requirements with the Temperature Control Contractor.
5. Smoke and Combination Fire/Smoke Dampers: The Electrical Contractor shall provide a 120V/20A dedicated feeder for smoke dampers serving each floor.

Provide relays as required and connect to fire alarm system. Smoke dampers shall close upon signal from fire alarm system.

Communications/Security Items:

6. Fire Alarm: The fire alarm supplier/contractor will provide all low voltage control wiring. The EC shall provide indicated 120 volt power supplies and connections. The EC shall provide all rough-in boxes and conduits for devices as indicated under the direct supervision of the Fire Alarm Contractor. Coordinate all requirements with the Fire Alarm Contractor.
7. Security System: The security system supplier/contractor will provide all low voltage control wiring. The EC shall provide indicated 120 volt power supplies and connections. The EC shall provide all rough-in boxes and conduits for devices as indicated under the direct supervision of the Security Contractor. Coordinate all requirements with the Security Contractor.
8. Intercom System: The intercom system supplier/contractor will provide all low voltage control wiring. The EC shall provide indicated 120 volt power supplies and connections. The EC shall provide all rough-in boxes and conduits for devices as indicated under the direct supervision of the Intercom Contractor. Coordinate all requirements with the Intercom Contractor.
9. Structured Cabling System: The structured cabling system supplier/contractor will provide all low voltage control wiring. The EC shall provide indicated 120 volt power supplies and connections. The EC shall provide all rough-in boxes and conduits for devices as indicated under the direct supervision of the Structured Cabling Contractor. Coordinate all requirements with the Structured Cabling Contractor.

General Contractor/Architect Items:

10. Elevators: The Electrical Contractor shall provide disconnects as indicated for elevator, 120 volt disconnects for cab lights (etc), and the control wiring, shunt trip, and contactors as necessary for the emergency shutdown feature. The Electrical Contractor shall make all required electrical connections.
11. Handicapped Door Operators: The Electrical Contractor shall provide disconnect as required and make all rough-ins for controllers. The Electrical Contractor shall make all required electrical connections.
12. Security Door Lock System: The Electrical Contractor shall provide disconnect as required and make all rough-ins for controllers. The Electrical Contractor shall make all required 120 volt and low voltage electrical connections.
13. Hand Dryers: The Electrical Contractor shall verify rough-in requirements for the dryers provided. The Electrical Contractor shall make all required electrical connections.

End of Section 26 01 13

SECTION 26 01 15 - ELECTRICAL RELATED WORK

PART 1 GENERAL

1.01 Description of Work

A. The following is the work required by the General Contractor to facilitate the work of the Electrical Contractor.

1. Openings and chases.

B. The following is the work required by the Electrical Contractor to facilitate the work of his contract.

1. Cutting and patching.
2. Excavation and backfilling.
3. Conduit sleeves.

1.02 Related Documents

A. Refer to Division 2 for backfilling requirements.

B. Unless otherwise addressed in the specification, as a minimum, backfill in 6” lifts, compacting to a minimum of 90%. The first 12” of fill above any buried item outside the building shall be sand in order to contrast with other fill material. Provide a yellow warning tape at the top of the sand layer.

PART 2 PRODUCTS

2.01 Conduit Sleeves

A. Conduit sleeves and supports shall be provided and the Contractor shall be responsible for their proper and permanent location. Conduit will not be permitted to pass through footings or beams without consent of the Architect.

B. Conduit sleeves will be required in all penetrations through new exterior walls, masonry walls, floors and fire rated gyp board walls. Sleeves shall be either Schedule 5 steel pipe, EMT conduit, field fabricated from minimum 16 gauge steel with 2" overlap at the seam, or as required by UL listed fire-stopping system.

C. Conduit sleeves will not be required in existing wall penetrations of masonry construction when such openings are made by "core-drilling.”

PART 3 EXECUTION

3.01 General Contractor's Work

A. The General Contractor shall leave such openings and chases in new construction for pipes, cabinets, access doors, and equipment as may be necessary or directed by the Architect to facilitate the work of the Electrical Contractor and to refinish around same. The Electrical Contractor shall properly advise in due time as to the location and sizes of such openings and chases.

3.02 Electrical Contractor's Work

A. The Electrical Contractor shall be responsible for locating and setting his own sleeves, and be well aware of the job progress to avoid unnecessary delay for setting of same.

B. The Electrical Contractor shall be responsible for cutting his own holes in existing construction, unless noted otherwise, and for patching and finishing around same. Any holes left in walls when existing devices or conduit is removed by the Contractor shall be

patched and finished by the Contractor.

C. The Electrical Contractor shall do all excavation and backfilling necessary to complete work under this contract. Lines shall be used to lay out the trenches for underground work. Trenches shall be of sufficient width and shall be cribbed and braced to prevent cave-in or settlement. Trenches close to walls and columns of the building shall not be excavated without the Architect's prior consent.

D. Hand backfill and tamp into place at sides of conduits until installation has been approved.

E. All sidewalks, street or alley surfaces that have to be broken in connection with this contract shall be patched to the satisfaction of the Architect.

3.03 Conduit Sleeves

A. Space between sleeves and conduit in outside walls shall be filled or tightly caulked with oakum, butyl rubber, link seals or other approved equally effective material to resist the penetration of water. Conduit sleeve shall be sufficient diameter to provide approximately 1/2" clearance around conduit.

B. Space between sleeves and conduits in other wall construction shall be the diameter necessary to provide the clearance required by the UL listed fire stopping method chosen by the contractor. Shop drawings of the fire stopping method shall be approved prior to the setting of any sleeves and shall clearly define the fire stopping method and required sleeve clearances.

C. Sleeves shall be set no closer than two pipe diameters center to center and shall be set 3/4" past all wall surfaces, and be securely anchored to the wall.

End of Section 26 01 15

SECTION 26 01 17 - FIRESTOPPING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 Related Documents

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 Definitions

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 General Description of the Work of this Section

A. Only tested firestop systems shall be used in specific locations as follows:

B. Penetrations for the passage of cables, conduit, and other electrical equipment through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

1.04 References

A. Test Requirements: ASTM E-814, "Standard Method of Fire Tests of Through Penetration Fire Stops" (July 1997).

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL Standard 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually. The UL Fire Resistance Directory includes the following:

1. Firestop Devices (XHJI)
2. Fire Resistance Ratings (BXUV)
3. Through-Penetration Firestop Systems (XHEZ)
4. Fill, Voids, or Cavity Material (XHHW)
5. Forming Materials (XHKU)

C. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

D. Inspection Requirements: ASTM E 2174 – 01, “Standard Practice for On-site Inspection of Installed Fire Stops.”

E. ASTM E-84, Standard Test Method for Surface Burning Characteristics of Building Materials.

F. All major building codes: ICBO, SBCCI, BOCA, UBC, and IBC.

G. NFPA 101 - Life Safety Code.

1.05 Quality Assurance

A. A manufacturer's direct representative shall be on-site during initial installation of firestop systems to train appropriate contractor personnel in the proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop System installation must meet requirements of ASTM E-814, UL Standard 1479 or UL Standard 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.

1.06 Submittals

A. Product Data: Submit manufacturer’s specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.

B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor’s name who will install firestop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to job-site.

1.07 Installer Qualifications

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A manufacturer’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.08 Project Conditions

A. Do not use materials that contain flammable solvents.

B. Scheduling

1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

1.09 Acceptable Manufacturers

A. Manufacturer's names are intended to establish type and quality of items to be provided via the contract. The materials, products, and equipment described in the specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. Listing of these manufacturers shall

in no way be construed as a device intended to limit the bidders to those specifically listed.

B. Manufacturers of equal or superior products consistent with the specifications will be acceptable upon written request and publication via addenda. No oral commitments will be binding.

C. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma, 800-879-8000

PART 2 PRODUCTS

2.01 Firestopping, General

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.02 Materials

A. Use only firestop products that have been UL Standard 1479, ASTM E-814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices are installed prior to concrete placement for use with non-combustible and combustible non-metallic conduit, or electrical cable bundles, penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device

C. Sealants, foams or caulking materials for use with non-combustible items including rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 620 Fire Foam

D. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including PVC jacketed, flexible cable or cable bundles and non-metallic conduit, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant

E. Foams, Intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 618 Firestop Putty Stick

F. Non-curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti CP 618 Firestop Putty Stick

G. Wall opening protective materials for use with UL listed metallic and specified non-

metallic outlet boxes, the following products are acceptable:

1. Hilti CP 617 Firestop Putty Pad

H. Materials used for complex penetrations made to accommodate cable trays, multiple conduits, electrical busways, the following products are acceptable:

1. Hilti FS 637 Trowelable Firestop Compound
2. Hilti FS 657 FIRE BLOCK
3. Hilti CP 620 Fire Foam

I. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel conduits, electrical busways, the following products are acceptable:

1. Hilti FS 657 FIRE BLOCK

J. Provide a firestop system with a "F" Rating as determined by UL Standard 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

PART 3 EXECUTION

3.01 Preparation

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Coordination

A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

3.03 Installation

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
2. Protect materials from damage on surfaces subjected to traffic.

3.04 Field Quality Control

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Inspection of through-penetration firestopping shall be performed in accordance with

ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.05 Adjusting and Cleaning

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

End of Section 26 01 17

SECTION 26 05 15 – LOW VOLTAGE POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 Description of Work

A. Provide the wire as specified and the circuiting as shown on the drawings.

1.02 Color Coding of Wiring

A. Color coding for 120/208 volt systems shall be Black/Blue/Red for phase conductors, White for neutral and green for grounding conductors.

B. Color coding for 277/480 volt systems shall be Brown/Orange/Yellow for phase conductors, Grey/White for neutral and green for grounding conductors.

1.03 Approved Manufacturers

A. The basis for this specification is Southwire and shall represent the minimum level of construction. Material manufactured by Senator Wire and Cable, Encore Wire and Cable, and Cerro Wire LLC shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Low Voltage Wire (600V and less)

A. All power wires and cables shall be copper, minimum #12 awg, unless noted otherwise, and shall be Code Type THWN or THHN.

B. All power wires and cables #10awg and smaller shall be annealed soft copper, solid or stranded construction, unless noted otherwise, and shall be Code Type THWN or THHN.

C. All power wires and cables #8awg and larger shall be annealed soft copper, compressed strand construction, and shall be Code Type THWN-2 or THHN.

D. At the contractor's option, wires and cables #6 and larger may be Alcan "Stabiloy", or Southwire "Triple E" with Code type XHHW-2 insulation. Cables shall be marked "Al Stabiloy 600V XHHW-2 (UL)" or "Al Triple E 600V XHHW-2". Note that wire and conduit sizes indicated on plans are based on copper. **If aluminum conductors are used, it is the responsibility of the contractor to size the conductors and conduit and shall be submitted to the engineer for review.** All circuits feeding mechanical equipment are sized based on copper wires, and shall be installed using copper feeders only.

E. All wiring shall be in conduit, unless noted otherwise.

F. All HVAC equipment feeders shall be copper code type THWN/THHN.

2.02 Low Voltage Cables (600V or less)

A. At the Contractor's option all interior branch circuits may be type MC cable with listed fittings and couplers in lieu of EMT conduit and conductors. All homeruns to panels will be made with EMT conduit (no MC connections to panel cans). Color coding shall be maintained.

PART 3 EXECUTION

3.01 Circuiting

A. The circuiting of all light and receptacle outlets has been shown on the plans, and the Contractor shall follow this circuiting layout.

B. Each 120 volt outlet circuit shall be provided with dedicated neutral conductors. Three

phase, four wire homeruns of 120 volt branch circuits will not be accepted.

C. Each light fixture shall be provided with a dedicated fixture whip from a junction box. The practice of ‘daisy-chaining’ from fixture to fixture will not be accepted. Multiple fixture whips from a single box is acceptable.

D. Machine or power pulling of cables into raceways shall be accomplished pulling stresses shall not exceed those recommended by the manufacturer.

E. All cables shall be lubricated with "Polywater,” or equally effective fire retardant material.

End of Section 26 05 15

SECTION 26 05 26 - GROUNDING AND BONDING

PART 1 GENERAL

1.01 Description of Work

A. Supplement the grounded neutral of the electrical distribution system with an equipment grounding system, installed so that metallic enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment, etc., operate continuously at ground potential and provide a low impedance path for ground fault currents.

B. The entire electrical system, including all special power systems, shall be grounded in accordance with the latest adopted version of the National Electrical Code.

C. Grounding conductors shall be installed in conduits as shown on the drawings. Provide 100% rated dedicated grounding conductors per each 120-volt outlet circuit.

D. Grounding conductors shall be installed in all PVC and Metal conduits.

E. Provide grounding plates in all telecommunication rooms and at main service grounding electrode.

PART 2 PRODUCTS

2.01 General

A. All materials shall be manufactured by:

1. Burndy
2. B-Line Systems
3. Crous Hinds
4. Gould
5. General Electric
6. Ideal Industries
7. Thomas and Betts
8. Western Electric

B. Unless otherwise indicated, provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC requirements and as noted on drawings.

2.02 Rod Electrodes

A. Rod electrodes shall be copper, 5/8"diameter and 8'-0" long.

2.03 Mechanical Connectors

A. Provide electrical terminals, connectors, lugs, and clamps as recommended by the manufacturer’s for the indicated applications.

1. Use mechanical (removable) clamps for connections to pipes.
2. Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, and bonding straps as recommended for the types of services indicated.

2.04 Grounding Bar (Plates)

A. Provide ¼”x20”x4” copper bus bar manufactured by Chatsworth Products, Inc. Catalog #10622-020 with #10622-000 Hardward Kit.

PART 3 EXECUTION

3.01 General

A. Examine areas and conditions under which electrical grounding connections are to be made and notify the Architect/Engineer in writing of conditions detrimental to proper completion of the work. Work shall not proceed until unsatisfactory conditions have been corrected.

B. Provide all materials, labor, and equipment for an electrical grounding system in accordance with applicable portions of the NEC and NECA. Coordinate electrical work as necessary to interface installation of electrical grounding systems with other work.

C. Grounding and bonding of electrical installations and specific requirements of systems, circuits and equipment required to be grounded shall be accomplished in temporary and permanent construction.

D. The path to ground from circuits, equipment, and conductor enclosures shall be permanent and continuous and shall have ample current carrying capacity to conduct safely any currents liable to be imposed on it, and shall have impedance sufficiently low to limit the potential above ground and to facilitate the operation of the overcurrent devices in the circuit.

E. Where the size of the grounding conductor is not shown, they shall be sized in accordance with the NEC. All grounding conductors shall be a minimum of #12 AWG.

F. Verify that final backfill and compaction has been completed before driving ground rod electrodes.

3.02 Equipment Grounding

A. All receptacles shall be permanently connected to the grounding system with a green wire ground conductor.

B. The metal frame of all motors shall be permanently connected to the grounding system with a green ground conductor.

3.03 Installation

A. Provide a separate green equipment grounding conductor in all electrical raceways to effectively ground all devices, equipment, and non-current carrying enclosures. Metal conduit shall not be used as the grounding path. The grounding conductors shall be connected to the building electrical system ground.

B. The path to ground from circuits, equipment, and conductor enclosures shall be permanent and continuous and shall have ample current carrying capacity to conduct safely any currents liable to be imposed on it, and shall have impedance sufficiently low to limit the potential above ground and to facilitate the operation of the overcurrent devices in the circuit.

3.04 Service Grounding

A. Provide service grounding per NEC Article 250 of the latest adopted Code version, and as shown on the drawings.

B. At the service entrance equipment, bond the utility neutral, building neutral, and building grounding conductor at the building disconnecting means. Refer drawings for exact location and configuration. Connect the ground bus to the building domestic cold water pipe (within 5 feet of the water service entrance per NEC Article 250-50) with a grounding or bonding conductor.

C. Service grounding shall comply with all applicable grounding requirements and rules of the Utility.

D. The earth shall not be used as the sole equipment grounding conductor or fault current path

3.05 Bonding

A. Provide bonding per NEC Article 250, and as shown on the drawings.

B. Electrically conductive materials, such as metal water piping, metal gas piping, ductwork, and structural steel members, that are likely to become energized shall be bonded as specified in NEC Article 250 to the supply system grounded conductor. Or in the case of an ungrounded electrical system, to the electrical system grounded equipment, in a manner that establishes an effective path for fault current.

3.06 Testing

A. Measure ground resistance to earth. Install additional ground rod and conductors as required if resistance to earth ground is over 25 ohms.

End of Section 26 05 26

SECTION 26 05 33 – ABOVE GROUND RACEWAYS AND BOXES

PART 1 GENERAL

1.01 Description of Work

A. Provide the conduits and raceways as specified and indicated on the plans.

B. Provide all electrical pull, junction and outlet boxes as specified and shown on the drawings, as well as those required for a complete and code acceptable installation.

1.02 Approved Manufacturers

A. The basis for the conduit specification is Wheatland Conduit and shall represent the minimum level of construction. Material manufactured by Western Tube, Republic Conduit, and Allied Tube shall be permitted to bid these specifications.

B. The basis for the surface raceway specification is Hubbell and shall represent the minimum level of construction. Material manufactured by Wiremold shall be permitted to bid these specifications.

C. The basis for the box specification is Steel City and shall represent the minimum level of construction. Material manufactured by RACO, Weigmann, E-Box, and Hoffman shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Conduits (600 Volt and less)

A. All exterior above grade conduits shall be rigid steel conduit or intermediate metal conduit with threaded couplings and fittings.

1. Rigid metal conduit shall be hot-dip galvanized steel. Threads shall be hot galvanized after cutting. Conduit shall be produced in accordance with UL Safety Standard #6 and ANSI C80.1.
2. Intermediate metal conduit shall be hot galvanized steel OD with an organic corrosion resistant ID coating. Threads shall be hot galvanized after cutting. Conduit shall be produced in accordance with UL Safety Standard #1242 and ANSI C80.6.

B. All other conduit shall be E.M.T. thinwall with compression, or setscrew couplings and fittings.

1. Electrical metal tubing shall be hot galvanized steel OD with an organic corrosion resistant ID coating. Conduit shall be produced in accordance with UL Safety Standard #797 and ANSI C80.3
2. Provide setscrew couplings and fitting for NEMA 1 installations and compression couplings and fitting for NEMA 3R installations as a minimum.

2.02 Non-Metallic Surface Raceway

A. Surface raceway shall be Hubbell Wall Trak PW2, Model PW2BC5 non-metallic latching, 2 compartment raceway.

B. Raceway system shall be specifically designed for category 5wiring systems complete with engineered large radius fittings to maintain 1-1/4" heading radius for data cabling as specified by TIA/EIA standards.

C. Provide with all fittings and outlet boxes, on centers indicated, as required for the complete non-metallic raceway system, including but not limited to:

1. PDB12S single gang, standard depth device box for outlets with KP8 covers
2. Wiring devices per Section 26 27 26
3. PDB12S single gang, standard depth data box for computer ports with KP14 blank covers.

D. Non-metallic raceway shall be constructed of off-white rigid PVC material complete with UL listing with self-extinguishing comparable with UL Standard 94VO.

2.03 Metallic Surface Raceway

A. Where shown, or needed for existing renovation work, surface raceway shall be HubbellSeries 4000 two channel raceway with full metal divider for multi-outlet installations as indicated.

B. Raceway system shall be specifically designed for category 5e wiring systems complete with engineered large radius fittings to maintain 1-1/4" heading radius for data cabling as specified by TIA/EIA standards.

C. Provide with all fittings and outlet boxes, on centers indicated, as required for the complete non-metallic raceway system, including but not limited to:

1. 4047BXIV single gang cover for outlets
2. Miscellaneous device bracket for outlets and telecom devices
3. 4047C1IV single gang cover for telecom devices

2.04 Junction and Pull Boxes

A. Junction and pull boxes shall be galvanized metal of the knockout type.

2.05 Outlet Boxes

A. All outlet boxes for light fixtures, receptacles, and wall switches shall be of the galvanized knockout type. Lighting fixture outlet boxes in ceiling shall be not less than 4" square of the knockout type. Gangable type boxes shall be used in all gypboard surfaces.

B. Provide gang boxes for all multi-switch locations. 277 volt installations require separate partitions per NEC.

2.06 Boxes and Conduit for Data and/or Phone Outlets

A. Unless noted otherwise, for data/phone outlets, provide a 4x4 deep back box with 2x4 trim ring. Extend a ¾” conduit up inside the wall, roll horizontal in the ceiling space, and provide a protective bushing at the end of the conduit. Where ceiling is drywall or other inaccessible surface, extend the conduit to the nearest accessible location and provide a label at the end of the conduit indicating outlet location.

PART 3 EXECUTION

3.01 Conduits (600 volt and less)

A. Single tubes will be used for all circuits, but more than one circuit may be carried in each conduit, provided the number of conductors and size of conductors are proportioned in accordance with the rules of the NEC, and conduits are amply large to allow for removal and replacement of conductors when necessary. (40% fill rate.)

B. Where conduit is carried in walls, it shall be thoroughly bedded and not visible. In placing conduits, they shall be so located as to not weaken or injure the construction of the building in any way, and the installation of these shall be approved by the Architect.

C. Joints must be made so the ends of the pipes come together in the center of the

coupling.

D. All conduit shall be run parallel or perpendicular to the building surfaces.

E. All conduit shall be concealed except in mechanical and electrical rooms and at all electrical panelboards.

F. Before pipes are covered with concrete, they shall be fished by the Contractor with a steel fish tape to insure that there is no obstruction in the pipes.

G. All empty conduit systems shall be provided with pull strings.

3.02 Surface Mounted Raceway

A. Surface raceway and fittings shall meet all requirements of the National Electrical Code and shall be UL listed and in full compliance with their standard #UL-5.

3.03 Junction and Pull Boxes

A. Junction and pull boxes shall be provided throughout in accessible locations. Locations shall be approved by the Architect or his representative before installation.

3.04 Outlet Boxes

A. Outlets shall be installed in the locations shown on the drawings, except outlets may be moved 4 feet in either direction if so directed before roughing, without additional cost to the Owner. Outlet boxes shall be flush mounted on all walls for concealed work.

B. Installation of all outlet boxes shall strictly conform to Article 300 of the National Electrical Code.

3.05 Switch and Outlet Boxes

A. Switch and outlet boxes installed in concrete and masonry construction shall be straight and level. The Electrical Contractor shall work closely with the General Contractor and masons to insure proper installation to the satisfaction of the Architect.

3.06 Thermostat Rough-ins.

A. The Electrical Contractor shall provide rough-in boxes and ½”conduit for thermostats, and other temperature control devices, under the supervision of the temperature controls installation contractor.

End of Section 26 05 33

SECTION 26 05 53 - ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.01 Description of Work

A. Provide all items of electrical identification as specified.

PART 2 PRODUCTS

2.01 Panel Schedule Cards and Labels

A. Inside each panel door, provide an approved typewritten schedule card showing what each circuit feeds.

B. Switches in main distribution panel shall be clearly and permanently labeled with engraved, white on black laminated plastic plate, mechanically affixed.

C. Provide engraved, white on black, laminated plastic plate, mechanically affixed labels on all panels, transformers, safety switches, motor starter, etc. Where panels, etc., occur in finished rooms, label shall be on inside of the door. Labels shall match designation indicated on the plans.

D. Provide engraved cover plates for switches controlling motor starters, fans, and other items of mechanical equipment.

PART 3 EXECUTION

End of Section 26 05 53

SECTION 26 09 39 – LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 Description of Work

A. Contractor shall provide a complete occupancy sensor control devices as indicated on the drawings and specified herein.

B. The contractor shall provide a Lighting control System that meets all performance requirements in accordance with approved plans and specifications.

1.02 Quality Assurance

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled. The terms "Listed" and "Labeled" are used as defined in the National Electrical Code, Article 100.

1.03 Approved Manufacturers

A. The basis for the low voltage switching is Watt Stopper and shall represent the minimum level of construction. Products manufactured by alternate manufacturer shall be permitted to bid these specifications.

B. The basis for the low voltage switching is Cooper and shall represent the minimum level of construction. Products manufactured by alternate manufacturer shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Occupancy Sensors

A. All products shall be Hubbell H-Moss or approved Watt Stopper or approved as specified and indicated on plans.

B. Hubbell H-MOSS Wall Switches provided in type as indicated on the plans

1. Adaptive Dual Technology Wall Switches
   a. 1000 sq. ft. coverage with photocell, 800w Incandescent, 1000w Fluorescent at 120V AC, 1800w Fluorescent at 277V AC wall switch, AD1277 Series
   b. 400 sq. ft. coverage with photocell, 800W Incandescent, 1000w Fluorescent at 120V AC, 1800W Fluorescent at 277V AC, (Ultrasonic) Switch, AU1277 Series
2. Adaptive Technology Wall Switches
   a. 1000 sq. ft. coverage with photocell, 800w Incandescent, 1000w Fluorescent at 120V AC, 1800w Fluorescent at 277V AC, Passive Infrared Wall Switch, AP1277 Series
3. Passive Infrared Wall Switches
   a. 1200 sq. ft. coverage with photocell, 800w Incandescent, 1200w Fluorescent at 277V AC, WS1277 Series
   b. 900 sq. ft. coverage with photocell, 800w Incandescent, 1000w Fluorescent at 120V AC, WS120 Series
   c. 900 sq. ft. coverage with photocell, 1800w Fluorescent at 277V AC, WS277 Series
   d. 100 sq. ft. coverage with photocell, 600W Incandescent at 120V AC, 1

circuit, 1000W Fluorescent at 120V, 2 circuit, 1800W Fluorescent at 277V AC, WS1277 Series

4. Wall switch sensors shall have 180˚ coverage capability.
5. Wall switch sensors shall have no leakage current to load, in manual or in Auto/Off mode for safety purposes and shall have voltage drop protection.
6. Where specified, wall switch sensors shall provide a field selectable option to convert sensor operation from automatic-ON to manual-ON.

C. Hubbell H-MOSS Ceiling Sensors provided in type as indicated on the plans

1. Adaptive Technology Dual Ceiling Sensor
   a. Adaptive Dual Ceiling Sensor, 2000 sq. ft, ATD2000C Series
   b. Adaptive Dual Ceiling Sensor, 1000 sq. ft. ATD1000C Series
   c. Adaptive Dual Ceiling Sensor, 500 sq. ft. ATD500C Series.
2. Adaptive Ultrasonic Ceiling Sensor
   a. Adaptive Ultrasonic Ceiling Sensor, 2000 sq. ft. ATU2000C Series
   b. Adaptive Ultrasonic Ceiling Sensor, 1000 sq. ft. ATU1000C Series
   c. Adaptive Ultrasonic Ceiling sensor, 500 sq. ft. ATU500C Series
3. Passive infrared Ceiling Sensor
   a. Adaptive Passive Ceiling sensor, 1500 sq. ft. ATP1500C series
   b. Adaptive Passive Ceiling sensor, 450 sq. ft. ATP450C Series

D. Hubbell H-MOSS Wall mount sensors provided in type as indicated on the plans

1. Adaptive Technology Dual Wall Mount Sensors.
   a. Adaptive Dual Wall Mount Sensors, 1600 sq. ft. ATD1600W Series
   b. Adaptive Passive Wall Mount Sensors, 450 sq. ft. ATD450W Series

E. Hubbell H-MOSS Controls

1. Control units and add-a-relay.
   a. 120 V AC, for use with ATD, ATU and ATP series ceiling and wall mount sensors, CU120A
   b. 277V AC, for use type with ATD, ATU and ATP series ceiling sensors and wall mount sensors
   c. 10/277V AC, 50/60Hz for use with ATD, ATU and ATP series ceiling sensors and wall mount sensors

F. Passive infrared sensors shall utilize Pulse Count Processing and Detection Signature Processing to respond only to those signals caused by human motion.

G. Passive infrared sensors shall provide high immunity to false triggering from RFI (hand-held radios) and EMI

H. Passive infrared sensors shall have a multiple segmented Fresnel lens, in a multiple-tier configuration, with grooves-in to eliminate dust and residue build-up.

I. Ultrasonic sensors shall utilize Advanced Signal Processing to adjust the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space.

J. Ultrasonic operating frequency shall be crystal controlled at 25 kHz within ± 0.005% tolerance, 32 kHz within ± 0.002% tolerance, or 40 kHz ± 0.002% tolerance to assure reliable performance and eliminate sensor cross-talk. Sensors using multiple frequencies are not acceptable.

K. All sensors shall be capable of operating normally with electronic ballasts.

L. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.

M. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.

N. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.

O. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.

P. All sensors shall have UL rated, 94V-0 plastic enclosures.

2.02 Circuit Control Hardware

A. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Control unit shall provide power to a minimum of two (2) sensors.

B. Relay Contacts shall have ratings of:

1. 20A - 120 VAC Ballast

C. Control wiring between sensors and controls units shall be Class II, 18-24 AWG, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.

D. Minimum acceptable wire gauge from the circuit control hardware relays shall be #12 AWG.

PART 3 EXECUTION

3.01 Installation

A. It shall be the contractor's responsibility to locate and aim sensors in the correct location required for complete and proper volumetric coverage within the range of coverage(s) of controlled areas per the manufacturer's recommendations. Rooms shall have ninety (90) to one hundred (100) percent coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room(s). The locations and quantities of sensors shown on the drawings are diagrammatic and indicate only the rooms which are to be provided with sensors. The contractor shall provide additional sensors if required to properly and completely cover the respective room.

B. Contractor shall warrant all equipment furnished in accordance to this specification to be undamaged, free of defects in materials and workmanship, and in conformance with specifications. The supplier’s obligation shall include repair or replacement, and testing without charge to the owner, all or any parts of equipment which are found to be damaged, defective or non-conforming and returned to the supplier. The warranty shall commence upon the owner's acceptance of the project. Warranty on labor shall be for a minimum period of one (1) year.

C. Delivery/installation of Lighting control Panels: The contractor is responsible for complete installation of the entire system according to strict factory standards and requirements. The following items shall constitute factory standards and requirements:

1. All system equipment shall operate in accordance with specification and industrial standard procedures.
2. An operational user program shall exist in the control system. The program shall execute and perform all functions required to effectively operate the site according to the requirements.
3. Demonstration of program integrity during normal operation and pursuant to a power outage.
4. Contractor shall provide a minimum of two training hours on the operation and use of the control system. Additional support services shall be negotiated between the contractor and the building owner or manager.

3.02 Lighting Control Devices Commissioning

A. Activation of Lighting Control Devices

1. Electrical contractor, under direction of Manufacturer Representatives and the Commissioning Authority (if applicable on project) shall initialize and calibrate all sensors, controllers and other control system components according to the plans, specifications and design intent for each space/system.

B. Installation Verification of Lighting control Devices and luminaires, lamps and ballasts

1. The Electrical contractor, under direction of the Commissioning Authority (if applicable on project) shall verify that the Lighting Control system has been installed and calibrated properly in accordance with the plans, specifications and design intent.

C. Programming of Lighting Control Devices

1. The Electrical contractor, under direction of the Lighting Designer, Owner's representative and the Commissioning Authority (if applicable on project) shall program all programmable lighting controls and schedule in accordance with the plans, specifications and design intent. Owner's representative and lighting designer shall be consulted on programming requirements prior to work being performed.

D. Performance testing of Lighting Control Devices

1. The Electrical contractor, under direction of Lighting Designer, Owner's representative and the Commissioning Authority (if applicable on project) shall verify that the Lighting Control system operates in accordance with approved plans, specifications and design intent.

E. Various verification, calibration, programming and testing tasks may be undertaken by a manufacturer representative instead of the Electrical Contractor with the approval of the Lighting Designer.

F. Functional tests shall prove that all modes and sequences of operation operate in accordance with approved plans and specifications.

G. Upon failure of a functional performance test, the Contractor shall correct all deficiencies within 14 days and in accordance with the applicable contract requirements. Testing of the checklist shall be repeated until it has been completed without errors.

H. The Lighting Designer and/or Commissioning Authority (if applicable on project) shall

evaluate the results to determine that the Lighting Control System is achieving or will achieve the Design Intent.

End of Section 26 09 39

SECTION 26 24 16 - PANELBOARDS

PART 1 GENERAL

1.01 Description of Work

A. Provide the panelboards as specified and scheduled on the plans.

3.03 Approved Manufacturers

B. The basis for this specification is Square D; Schneider and shall represent the minimum level of construction. Products manufactured by GE Electrical Distribution & Control, Eaton, and Siemens Energy & Automation, Inc.shall be permitted to bid these specifications.

C. AIC ratings shown for all equipment assume that system shall be fully rated. Series rated systems shall not be permitted without Engineer's prior approval.

PART 2 PRODUCTS

2.01 120/208 Volt Panelboards

A. Provide the following Square D, type NQ, 3 phase, 4-wire panelboards with circuit breakers as scheduled.

B. Provide panels with ground bars, surface mounted cabinets and UL label.

1. Circuit breakers shall be Square D Type QO (plug-on) or QOB (bolt-on) thermal-magnetic molded case circuit breakers. Type QO-GFI ground fault breakers and QO-CAFI combination arc breakers shall be provided as indicated and required by the NEC. Breakers shall be 1, 2 or 3-pole with an integral crossbar to assure simultaneous opening of all poles in multi-pole circuit breakers. Breakers shall have an overcenter, trip-free, toggle-type operating mechanism with quick-make, quick-break action and positive handle indication. Handles shall have "ON," "OFF" and "TRIPPED" positions. Plug-on (QO) and bolt-on (QOB) circuit breakers shall be able to be installed in the panelboard without requiring additional mounting hardware. Circuit breakers shall be UL listed in accordance with UL Standard 489 and shall be rated 240 volts ac maximum with continuous current ratings as noted on the plans. AFCI – Arc Fault breakers shall be provided for all circuits as required in section 210.12 of the NEC

C. Panelboard bus structure and main lugs or main circuit breaker current ratings as specified. Such ratings shall be established by heat rise tests, conducted in accordance with UL Standard 67. Bus structure shall be insulated. Bus bar connections to the branch circuit breakers shall be the "distributed phase" type and shall accept either plug-on (QO) on bolt-on (QOB) circuit breakers. All current carrying parts of the bus structure shall be plated.

D. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. Wiring gutter space shall be in accordance with UL Standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Each front shall include a door and have a flush, cylinder tumbler-type lock with catch and spring-loaded stainless steel door pull. All panelboards' locks shall be keyed alike. Fronts shall have trim screws which shall be completely concealed when the doors are closed. Doors shall be mounted with completely concealed steel hinges. Fronts shall not be removable with door in the locked position. A circuit directory card with a clear plastic covering shall be

provided on the inside of the door.

E. Where panelboard is indicated with main circuit breaker, provide Type HD breakers for 100 amp panels (25 Kaic), provide Type JD breakers for 200 amp panels (25 Kaic), and Type LD breakers for 400 amp panels (25 Kaic), Panels shall be as indicated and scheduled on the plans.

F. Fault current ratings shall match panel schedules. Frame size and circuit breaker type to match fault current rating.

G. Surge Protective Devices – per the requirements in Section 26 43 13 where panels are indicated on drawings or scheduled to be provided with SPD (TVSS).

PART 3 EXECUTION

End of Section 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 GENERAL

1.01 Description of Work

A. Provide the wiring devices cover plates, relays and contactors, time clocks, and photoelectric cell equipment as specified.

3.01 Approved Manufacturers

B. The basis for this specification is Hubbell and shall represent the minimum level of construction. Products manufactured by Pass and Seymour and Eagle shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Wiring Devices

A. The following devices shall be as manufactured by Hubbell, or approved equal. They shall be rated at 20 amps, 120/277 volts, unless specified otherwise. Verify device color with architect before ordering.

B. All devices shall be white in color, unless noted otherwise. Devices shall be as follows:

1. Switches:
   - a. S.P.S.T. — Hubbell CSB120
   - b. 2-pole switch — Hubbell CSB220
   - c. 3-way switch — Hubbell CSB320
   - d. 4-way switch — Hubbell CSB420
2. General Wall Receptacles:
   - a. 120 volt duplex outlet — Hubbell CR5352AG
   - b. 120 volt duplex tamper resistant with dual USB — Hubbell USB20A5
   - c. Controlled — Hubbell BR20C2
   - d. Tamper resistant — Hubbell BR20TR
   - e. Single outlet — Hubbell HBL5361
   - f. Drinking fountain/Vending — Hubbell GF20L
   - g. GFI outlet — Hubbell GF20L
   - h. Weatherproof outlet — Hubbell GFWRST20 with MM420C cover
3. General Wall Tamper-Resistant Receptacles (Dwelling Units):
   - a. 120 volt duplex outlet — Hubbell BR20TR
   - b. Controlled — Hubbell BR20C2TR
   - c. Single outlet — Hubbell RR201TR
   - d. GFI outlet — Hubbell GFTR20
   - a. Weatherproof cover/GFI outlet cover — Hubbell GFTWRST20 with MM420C
4. Floor Devices: (poke-through)
   - a. Duplex power — Hubbell Flush Series Fire rated “Poke-Thru” with FRF service fitting & PT7FSD-GXA through-floor fitting
   - b. Power/Telephone-Data — Hubbell Flush Series Fire rated “Poke-Thru” with PT2X2 service fitting & PT2X2FIT through-floor fitting

2.02 Cover Plates

A. All flush-mounted wiring devices shall be provided with Hubbell SS Series Stainless Steel Hubbell NP Series smooth nylon white plates in the configuration and number of gangs as required.

B. Cover plates for wiring devices in surface-mounted boxes shall be galvanized utility box covers, raised 1/4“.

C. Where more than one device is in a single location, a one-piece multi-gang cover plate shall be used.

D. All cover plates for switches controlling mechanical equipment and where indicated on the drawings, shall be stainless steel with standard 1/8" high engraved characters and black filler.

E. All cover plates for receptacles in hospitals shall be engraved with the panelboard and circuit number serving the device.

2.03 Ceiling Receptacle/Outlet Cord Sets

B. Each 120 volt ceiling receptacle indicated on the plans shall be safety-shroud, 20 amp twist lock type, Hubbel model L5-20R, and shall be provided with a ceiling outlet cord set. Cord set shall be comprised of HubbellHBL2311S plug, 6'-0" of 3-12 type SJO cord with strain relief at plug and box, Woodhead 3083-3 outlet box with coverplates, and two Hubbell GFR5352A devices.

2.04 Relays and Contactors

A. Provide Square D and ECG Phillips, or approved equal, I.T.E., Zenith or ASCO, relays and contactors as shown on the plans.

PART 3 EXECUTION

3.01 Device Elevations

A. Devices shall be set at the following elevations from the finished floor to the top of the box, unless otherwise indicated on the plans:

1. Light switches ..... 48"
2. Control switches ..... 48"
3. Thermostats..... 48"
4. Telephone outlets ..... 16" Btm
5. Convenience receptacles.... 16" Btm
6. Drinking fountain receptacles As required by manufacturer
7. Fire alarm break glass stations 48"
8. Fire alarm A/V units ..... Btm at 80"

B. Boxes for wall mounted light fixtures shall be at elevations noted on the plans.

C. Tamper resistant receptacles shall be provided at all locations as required by Section 406.11 (dwelling units) and Section 517 (pediatric areas) of the latest adopted version of the NEC

D. Ground fault interrupter receptacles shall be provided in all locations as required in Section 210.8 of the latest adopted version of the NEC

End of Section 26 27 26

SECTION 26 28 16 - SAFETY SWITCHES

PART 1 GENERAL

1.01 Description of Work

A. Provide heavy-duty safety switches as indicated on the plans and as specified. All safety switches shall be NEMA Type HD and Underwriters Laboratories listed.

3.02 Approved Manufacturers

B. The basis for this specification is Square D; Groupe Schneider and shall represent the minimum level of construction. Products manufactured by GE Electrical Distribution & Control, Eaton, and Siemens Energy & Automation, Inc. shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Safety Switches

A. Provide Square D heavy duty grade safety switches in configuration noted.

B. All switches shall have switchblades, which are fully visible in the "OFF" position when the switch door is open. All current carrying parts shall be plated to resist corrosion and promote cool operation. Switches shall have removable arc suppressors where necessary to permit easy access to line side lugs. Lugs shall be front removable and UL listed for 60° C or 75° C aluminum or copper wires.

C. Switches shall be quick-make, quick-break, such that during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing or opening action of the contacts has started. The operating handle shall be an integral part of the box, not the cover. Provisions for padlocking the switch in the "OFF" position with at least three locks shall be provided. Switches shall have a dual cover interlock to prevent unauthorized opening of the switch door when the handle is in the "ON" position, and to prevent closing of the switch mechanism with the door open. The handle position shall indicate whether the switch is "ON" or "OFF."

D. Switches shall be furnished in NEMA 1 heavy duty enclosures unless specified as NEMA 3R on the plans. Covers on NEMA 1 enclosures shall be attached with pin type hinges. NEMA 3R covers shall be securable in the open position. NEMA 3R enclosures for switches through 200 amps shall have provisions for interchangeable bolt-on hubs. Hubs shall be as indicated on the plans. NEMA 3R enclosures shall be manufactured from galvanized steel. Enclosures shall have a gray baked-enamel finish, electrodeposited on cleaned, phosphatized steel.

E. All fusible switches rated 100 through 600 amps at 240 volts and 30 through 600 amps at 600 volts, shall have a UL approved method of field conversion from standard Class H fuse spacing to Class J fuse spacing. The switch also must accept Class R fuses and have provisions for field installation of a UL listed rejection feature to reject all fuses except Class R. The UL listed short circuit rating of the switches shall be 200,000 rms symmetrical amps when Class R or Class J fuses are used with the appropriate rejection scheme. 800 and 1200 amp switches shall have provisions for Class L fuses and shall have a UL listed short circuit rating of 200,000 rms symmetrical amps.

PART 3 EXECUTION

End of Section 26 28 16

SECTION 26 29 23 - VARIABLE SPEED CONTROLLERS

PART 1 GENERAL

1.01 Description of Work

A. Provide the variable frequency controllers as specified and as indicated on the drawings.

B. This section provides specification requirements for solid-state, pulse-width modulated (PWM) Adjustable Frequency Drives, herein referred to as AC Drives, for use with NEMA® design AC motors.

C. This specification section applies to the air handling units, pumps, and exhaust fans as indicated on the control drawings.

1.02 References

A. ANSI®/NFPA® 70 - National Electrical Code® (NEC)

B. UL 508 - UL Standard for Industrial Control Equipment

C. UL 508C - UL Standard for Power Conversion Equipment

D. NEMA ICS 7.1

1.03 Additional Warranty Requirements

A. A one warranty shall be provided on materials and workmanship from the date of substantial completion of the total project, or 18 months from date of shipment.

1.04 Approved Manufacturers

A. The basis for this specification is Square D; Groupe Schneider E-Flex Variable Frequency Motor Controllers for HVAC and Pumping Applications (1-50 hp at 208/230 V and 1-100 hp at 460 V)

and shall represent the minimum level of construction. Products manufactured by ABB, Eaton/Cutler-Hammer, Magnetek, and Siemens shall be permitted to bid these specifications.

1.05 Submittals

A. A submittal package, including drawings, shall be furnished for the Engineers' approval prior to factory assembly of the AC Drives. These packages shall consist of elementary power and control wiring diagrams, and enclosure outline drawings. The enclosure drawings shall include front and side views of the enclosures with overall dimensions and weights shown, and conduit entrance locations. Standard catalog specification sheets showing voltage, horsepower, and full load current ratings shall be furnished as part of the submittal package.

1.06 Quality Assurance

A. The manufacturer of the AC Drive shall be a certified ISO 9001 facility.

B. The AC Drive and all associated optional equipment shall be UL Listed according to UL 508C - Power Conversion Equipment. As verification, a UL label shall be attached on the inside of the combination enclosure. A UL 508A panel builders label does not meet this specification.

C. The AC Drive shall be designed, constructed, and tested in accordance with UL, cUL NEMA, and NEC standards.

D. Every power converter shall be tested with an AC induction motor while under load.

PART 2 GENERAL

2.02 General Description

A. The AC Drive shall convert the input AC mains power to an adjustable frequency and voltage.

B. The input power section shall utilize a full wave bridge design. The rectifiers shall convert AC line power of fixed voltage and frequency to fixed DC voltage.

C. The output power section shall change fixed DC voltage to adjustable frequency AC voltage.

D. The adjustable frequency NEMA (Type 1, 12, or 3R) drive package shall consist of a circuit breaker disconnect, 120 V control transformer, and control circuit terminal board for digital and analog field wiring.

E. The Hand-Off-Auto switch, Speed Potentiometer and Adjustable Frequency Controller-Off-Bypass switch shall be mounted and wired to the drive door or located on the drive keypad.

F. The entire drive package, including the bypass starter circuit, shall be UL 508C listed and coordinated with NEMA ICS 7.1. A UL 508A panel builders label does not meet this specification.

2.03 Construction

A. The AC Drive power converter shall be enclosed in a NEMA (Type 1) enclosure with a circuit breaker disconnect, user terminal strip connections, and optional bypass controls. The enclosure shall provide dedicated user terminals for power and control device connection.

B. Provisions shall be included for locking the disconnect in the Off position with a padlock.

C. All enclosure and heat sink fans shall be accessible from the front and shall not require the removal of the AC drive power converter for fan replacement.

2.04 Application Data

A. The AC Drive shall be sized to operate a variable torque load.

B. The speed range shall be from a minimum speed of 1.0 Hz to a maximum speed of 72 hz.

2.05 Environmental Ratings

A. The AC Drive shall meet 1EC 60664-1 Annex A and NEMA ICS 1, UL, and cUL standards.

B. The AC Drive shall be designed to operate in an ambient temperature from -10 to 40 °C (14 to 104'F).

C. AC Drives in Type 3R enclosures shall be designed to operate in an ambient temperature from -10 to 50 °C (14 to 122 °F).

D. The storage temperature range shall be -25 to 65 °C (-13 to 149 °F).

E. The maximum relative humidity shall be 95%, non-condensing,

F. The AC Drive shall be rated to operate at altitudes less than or equal to 3300 ft (1000 m). For altitudes above 3300 ft (1000 in), the AC Drive should be de-rated according to drive specifications up to 10,000 ft.

G. The AC Drive shall meet the IEC 60721-3-3-3M3 operational vibration specification.

H. The AC Drive shall include an option which will ensure that the drive is Seismic Qualified to 2003 IBC Level 3 "Extreme" rating with an Importance Factor Ip=1.5.

2.06 Ratings

A. The AC Drive shall be designed to operate at the input line voltage indicated on the equipment schedule.

B. The AC Drive shall operate from an input frequency range of 60 Hz 15%.

C. The displacement power factor shall not be less than 0.95 lagging under any speed or load condition.

D. The efficiency of the AC Drive shall typically be 96% or greater.

E. The variable-torque rated AC Drive overcurrent capacity shall be not less than 110% for 1 minute.

F. The output carrier frequency of the AC Drive shall be programmable at 0.5, 1, 2, 4, 8 or 12 kHz. In addition, the output carrier frequency shall be modulated around the selected frequency.

2.07 Protection

A. Upon power-up, the AC Drive shall automatically test for valid operation of memory, loss of communication, DC-to-DC power supply, control power, and pre-charge circuit.

B. The enclosure shall provide a fully coordinated 100,000 AIC current rating marked on the enclosure nameplate, with short circuit coordination to UL 508C Power Conversion Equipment and NEMA ICS 7.1.

C. The AC Drive shall be protected against short circuits, between output phases and phase to ground.

D. The AC drive power converter shall have a ride-through function, which will allow the logic to maintain control for a minimum of one second (60 cycles).

E. For AC drives that automatically reset after a detected fault is cleared, an auto restart function will provide programmable restart attempts. The time delay before restart attempts will be 1 second, 5 seconds, 10 seconds, and then 1 minute thereafter.

F. Upon loss of the 4-20 mA analog process follower reference signal, the AC Drive shall be programmable to display a detected fault code.

G. The AC drive power converter shall have a solid-state UL 508C listed overload protective device and meet IEC 60947,

H. The output frequency shall be enabled to fold back when the drive is in an overcurrent condition.

I. There shall be three skip frequency ranges that can be programmed to a bandwidth of 0.1 to 10 Hz,

2.08 Adjustments and Configurations

A. The AC Drive will be factory programmed to operate all specified optional devices.

B. The acceleration and deceleration ramp times shall be adjustable from 0.05 to 999.9 seconds.

C. The memory shall retain and record run status, detected fault type, motor current, output frequency, elapsed time, mains voltage, motor thermal state, command channel, channel reference active, and status word information in the diagnostic fault history.

2.09 Keypad Display Interface

A. A graphic display interface shall offer the modification of AC Drive adjustments through a membrane keypad. All electrical values, configuration parameters, I/O assignments, application and activity function access, diagnostics fault history, local control, configuration storage, and diagnostics shall be accessible.

B. The AC Drive model number, torque type, software revision number, horsepower, output current, motor frequency, and motor voltage shall be listed on the drive identification portion of the LCD display.

2.10 Operator Controls

A. The control power for the digital inputs and outputs shall be 24 Vdc.

B. The internal power supply shall incorporate automatic current fold-back that protects the internal power supply if incorrectly connected or shorted. The transistor logic outputs will be current limited and will not be damaged if shorted.

C. Input/Output connection terminals shall be used on all logic and analog signal connections in the power converter.

D. Two voltage-free relay output contacts will be provided. One of the contacts will indicate the AC Drive detected fault status. The other contact shall indicate a drive run status.

E. The combination enclosure shall have the following operator controls depending on the options selected:

1. Hand-Off-Auto switch
2. Speed potentiometer (located either in the door or in the power converter)
3. AFC-Off-Bypass switch

F. The combination enclosure shall include a terminal point connection for a fire/freezestat interlock, to prevent drive (or bypass) operation. The interlock must shut down the motor in both the drive and bypass modes.

2.11 Serial Communication

A. The AC Drive shall have serial communications capability for Profibus, LonWorks®, Modbus"'„ Unitelway, Apogee PI, Metasys® N2, Ethernet, and BACnet.

2.12 Harmonic Mitigation

A. Each drive shall include a line reactor or DC bus choke to reduce power system harmonics and provide power quality protection for the internally or externally mounted drive,

PART 3 INSTALLATION

3.01 Inspection

A. Verify that the location is ready to receive work.

3.02 Protection

A. Before and during the installation, the AC Drive equipment shall be protected from water and site contaminants.

3.03 Installation

A. Installation shall be in compliance with the manufacturer's instructions, drawings, and recommendations.

B. The AC Drive supplier shall provide a representative to inspect the contractor's installation, and to test and start up the AC Drive(s) furnished under this specification.

3.04 Training

A. Training shall be offered by the AC Drive manufacturer.

End of Section 26 29 23

SECTION 26 33 23 - EMERGENCY POWER SUPPLY

PART 1 GENERAL

1.01 Description of Work

A. Provide the life safety emergency power system as shown on the drawings and as specified herein.

3.01 Codes and Standards

A. The Dual-Lite Spectron LSN Series Inverter System shall be listed to or comply with these standards:

- UL 924 Standard for Emergency Lighting and Power Equipment, when equipped with Type S batteries and a 90-minute run time.
- UL 1778 Standard for Uninterruptible Power Supply Equipment, when equipped with Type G or Type N batteries, or run times other than 90-minutes.
- ANSI C62.41: ANSI C62.45 (Cat. A & B)
- FCC class A
- National Electrical Code (NFPA 70)
- The Life Safety Code (NFPA 101)
- OSHA

3.02 Manufacturers

B. The basis for this specification is Dual-Lite Spectron LSN Series and shall represent the minimum level of construction. Products manufactured by Lithonia Emergency Systems, and Current Technologies shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 General

A. The Central Inverter System specified herein shall be the Synchron DLS Series Inverter System manufactured by Dual-Lite, a Hubbell Lighting, Inc. Life Safety Products Brand.

B. Furnish and install a Dual-Lite Synchron DLS Inverter System that shall supply a minimum of 525 VA and
525 W @ unity power factor, for a period of 1.5 hours upon interruption, brownout, or failure of the monitored AC utility line.

C. The system shall be contained in a code gauge, steel NEMA 1 enclosure, finished in a scratch resistant, powder coat finish, with a key lock, conduit knockouts at the top and sides, and front opening doors with air filters. Enclosures shall be designed to allow stacking to minimize the overall system's footprint. The system shall include a plenum to expel heated air from inside the unit. All components shall be front accessible and incorporate a modular design and a quick disconnect means to facilitate servicing.

3.03 Operation

A. System operation shall be fully automatic and include a linear transformer with boost tap and surge protection. In emergency mode, true "no break" Pulse Width Modulated (PWM) power shall be supplied to the load at all times. The charging system will maintain the batteries at full capacity at all times.

B. Three on-board microprocessors will continuously monitor charger settings and the system's overall readiness. Diagnostic circuitry shall include a multi-rate, software controlled charger, continuous monitoring of 265 operating parameters, and

programmable system testing capabilities.

C. Thirty individual alarms and nine system logs shall be provided. All alarms and logs shall be automatically recorded and readily displayed via the User Interface Display (UID). The system shall also include one RS232 serial port for remote communications.

D. Automatic overload and short circuit protection in normal and emergency mode shall consist of 150% momentary surge capability, 120% overload for 5 minutes, and 110% overload for 10 minutes. Protection shall also include a low battery voltage disconnect, AC input circuit breaker, a DC input breaker, and an AC output fuse. A digitally generated sinusoidal output waveform (PWM) with less than 5% total harmonic distortion at rated linear load shall be provided to the connected load. A boost tap transfer protection circuit shall maintain the desired output voltage during low voltage "brownout" conditions without continuously switching to batteries, thereby preserving battery capacity.

3.04 Input Voltage

A. Available input voltage selection shall include 120, 208, 240, 277, and 347 volts, +10% to -15%, single phase, with a frequency of 60Hz. The AIC rating shall be 42,000 RMS symmetrical amperes.

3.05 Output Voltage

A. Available output voltage shall include 120, 208, 277, 1201240, 1201277, 1201208, 347, 1201347 volts, +1- 5%, single phase sine wave, with a frequency of 60Hz + 0.05Hz.

B. The output frequency, when on utility power, shall be as supplied by the utility.

3.06 System Diagnostics

A. The user interface display (UID) shall include an array of 5 LED's, a 2-line, 40-character LCD display, and a keypad for system input. The UID shall be menu-driven and display individual system parameters using a numbered code (Hot Key). The LED array shall indicate, by color code, the following status modes: AC output presence (green), system ready (green), battery charging (red), inverter "ON" (amber), and alarm functions (red).

B. To ensure only authorized personnel have system access, a multi-level password shall be required to change all functions and operating parameters.

C. A continuous scrolling display of the following metered functions shall be provided:

AC input voltage	AC output voltage	AC output amps	Battery voltage
Battery charging	Battery discharge	Output volt-amps	Output power
Power factor	Percent loading	Input frequency	Output frequency
Ambient	Battery temperature	Last inverter run	Total inverter run
System run time	Date	Time	

3.07 Alarms

A. Thirty audible and visual alarms shall be provided, with automatic logging of the twenty-five most recent events. An alarm acknowledgement feature shall be provided, which will allow the user to silence only the current audible alarm without silencing other alarms or clearing the alarm condition until the fault has been addressed.

B. An alarm shall be sounded if any of the following operating conditions occur:

Low battery voltage	Near low battery	High battery	High AC input
High AC output	Low AC outputvoltage	Output overload	Low remaining
High Ambient Temp	High heat sink	System test failure	High battery temp.

Temp Probe failure	High transformer temp.	Tripped breaker

3.08 Manual and Automatic Testing

A. Manual and automatic test modes shall be provided.

- Manual user-initiated system test at any time
- Automatic weekly, monthly and annual self-diagnostic tests
- Automatic recording of the last twenty events in a Test Results log

3.09 Battery Charger

A. A three-step float charger shall be software controlled and temperatures compensated, and charge the batteries continuously while in normal "standby" condition (non emergency mode).

B. Following a power failure, the constant current charger mode shall be initiated until battery voltage reaches the equalize stage. Equalize stage shall be maintained until the charging current drops to .5 amps, or 0.3% of the battery amp/hour rating. Battery voltage shall then enter the float stage.

3.10 Batteries

A. To comply with UL Listing to Standard 924 (Emergency Lighting), Type S batteries shall be designed to provide a minimum 1.5 hours rated output voltage to the connected load in emergency mode without dropping below 87.5% of nominal battery voltage.

B. The batteries shall be enclosed in an enclosure that permits easy maintenance without requiring removal.

C. The following battery types shall be available:

1. **Sealed Lead Calcium, VRLA, (Type** S): Maintenance Free Construction

   Standard battery supplied, unless otherwise specified. Requires no addition of water over its useful life. The case and cover shall be constructed of polypropylene, contain a UL recognized low-pressure safety release vent, and be non-gassing in normal use. Life expectancy is 10-yeasr at 77°F (25°C) ambient temperature.

2. **Sealed Lead Calcium VRLA (Type** G): Maintenance Free Construction

   An optional long-life battery.Requires no addition of water over its useful. Life expectancy is 20-years at 77°F (25°C) ambient temperature.

3. **Wet Cell Nickel Cadmium (Type N):** Wet cell construction

   An optional long-life battery.Requires maintenance inspection and the addition of water to the cells when required. Pocket plate construction with a translucent case. Life expectancy is 25-years at 77°F (25°C) ambient temperature.

3.11 System Options

A. The following optional factory-installed equipment shall be available.

B. Normally-On Output Circuit Breaker Options:

1. A maximum of fourteen monitored positions (twenty positions without alarms - unmonitored) are available for all models. Single pole 120V and 277V breakers occupy one position each, while double pole 240V breakers occupy two positions (7 monitored, 10 unmonitored) each. When specifying circuit breaker options,

decrease the available number of output breakers by the proper number of positions chosen.

C. Normally-Off Output Breaker Options:

1. Used when the lighting fixtures are to be energized only during a power outage. The normally-off circuit breakers are user programmable for a delay of up to 999 seconds. A maximum of eight positions are available for all models. Single pole 120V and 277V breakers occupy one position each, while double pole 208V or 240V breakers occupy two positions each. When specifying circuit breakers, decrease the available number of output breakers by the proper number of positions chosen.

D. Short Battery Cabinet (SBC)

1. For applications where headroom is limited, the Short Battery Cabinet (SBC) can be used to reduce the overall installation by 15 inches. Available with 1.0, 2.0, 2.7, 3.7, 5.5 and 6.6 KVA systems with Type S batteries only. Consult factory for additional details.

E. Remote Status Panel (RSP):

1. Provides remote system annunciation of inverter and alarm status.Operates up to 1,000 feet away.

2. The following color-coded indicators are provided: Alarm LED (Red)

- Audible Alarm
- Charging LED (Red)
- Emergency Power LED (Yellow)
- Ready LED (Green)
- A/C On LED (Green)

F. System Monitoring Terminals (SMT):

1. Provides two PC-board mounted terminal blocks to allow customer access to RSP (Remote Status Panel) outputs, Inverter and Alarm active relays. These low power contacts (commonly referred to as "dry contacts") can be set for a time delay of up to 999 seconds. They incorporate normally-open and normally-closed contacts.Access to +12 Volts DC, DC ground and two normally-off relay driver signals are also provided.

G. Charger Upgrades (C10 or C20):

1. For enhanced battery recharge time:

- CI0 - 10 Amp charger upgrade. Available on 1.OkVA - 4.8kVA Series
- C20 - 20 Amp charger upgrade. Available on 5.5kVA - 17.5kVA Series
  - Not available with 120V input on 6.6kVA and above.
  - Not available with 208V input on 12.5kVA and above.
  - Not available with 204V input on 15kVA and above.

H. Internal Maintenance Bypass Switch: (IBS)

1. A factory-installed, internally-mounted three-position "make before break" switch. Compatible with all input/output combinations and any combination or quantity of output circuit breakers.Allows connecting the utility power supply to the load without placing the inverter in emergency mode.

3.12 System Accessories

A. External Maintenance Bypass Switch (MBB or BBM):

1. The external maintenance bypass switch allows power to be removed from the inverter system and remain connected to the load. This allows the inverter system to be completely removed, replaced or repaired without interruption to the load. The switch is supplied in a wall mounted, NEMA 1 enclosure. Available in Make-Before-Break (MBB) or Break-Before-Make (BBM) configurations. Not for use with systems having more than one single-pole output circuit breaker, or systems with different input and output voltages.

B. Multiplexer (MX):

1. An externally-mounted device that allows the use of a single analog phone line to communicate with up to 16 inverter systems, provided that one of the systems to be monitored has the FAX option installed. Systems can be installed up to 100 feet away from the Multiplexer without the use of Short Haul Modems.

C. Short Haul Modem (SHM):

1. A device that boosts signal levels when RS232 communications are installed more than 100 feet away from the system. The option consists of 2 devices; one installed on the inverter system and the other installed on the multiplexer.

PART 3 EXECUTION

3.13 Wiring

A. Input and output conductors shall be enclosed in separate conduits.

B. All load side wiring shall be sized as required for voltage drop conditions to assure proper operation of connected loads.

3.14 System Operation

A. The system shall allow connection of both "normally on" and "normally off ' (optional) loads. Connected loads shall receive utility power during nonnal operation, and `no break" system inverter power during utility interruptions.

3.15 Connected Loads

A. In emergency mode, the inverter system shall supply true digitally-generated AC sinusoidal output. Refer to plans for type and location of loads served by the system.

3.16 Factory Start-Up

A. A factory trained service representative shall be dispatched to perform the initial system start-up.

3.17 Installation

A. The system shall be installed in accordance with all appropriate manufacturers' instructions and in compliance with all appropriate codes.

End of Section 26 33 23

SECTION 26 32 13 - STANDBY GENERATOR SYSTEM

PART 1 GENERAL

1.01 Description of Work

A. Provide the following automatic start standby generator system that has been prototype tested, factory built, production tested, site tested, of the latest commercial design, together with all accessories necessary for a complete installation as shown on the plans and drawings and specified. The equipment supplied and installed shall meet the requirements of the National Electrical Code and all applicable local codes and regulations. All equipment shall be new, of current production by a firm which manufactures the generator and controls, and assembles the standby generator sets as a matched unit so that there is one-source responsibility for warranty, parts and service through a local representative with factory trained service personnel.

1.02 Testing

A. To assure that the equipment has been designed and built to the highest reliability and quality standards, the manufacturer shall be responsible for design prototype tests as described: Components of the emergency system, such as the engine/generator set and accessories, shall not be subjected to prototype tests since the tests are potentially damaging. Rather, similarly designed prototypes which will not be sold, shall be used for these tests. Prototype test programs shall include the requirements of NFPA-110 and the following:

1. Maximum power (kw).
2. Maximum starting (kva) at 35% instantaneous voltage dip.
3. Alternator temperature rise by embedded thermocouple and by resistance method per NEMA MG1-22.40 and 16.40.
4. Governor speed regulation under steady-state and transient conditions.
5. Voltage regulation and generator transient response.
6. Fuel consumption at 1/4, 1/2, 3/4, and full load.
7. Harmonic analysis, voltage waveform deviation and telephone influence factor.
8. Three phase, line-to-line short circuit test.
9. Alternator cooling air flow.
10. Torsional analysis testing to verify that the generator set is free of harmful torsional stresses.
11. Endurance testing.

1.03 Approved Manufacturers

A. The basis for this specification is MTU and shall represent the minimum level of construction. Products manufactured by Onan, Kohler, Generac, Cummins and Caterpillar shall be permitted to bid these specifications.

B. Provide submittals for approval.

PART 2 PRODUCTS

2.01 General

A. The standby generator set shall be MTU 6R0120-DS180 rated continuous for standby at 120/208 volts, three phase, 4-wire, .8 power factor with fan, 180.0 kw in accordance with SAE J1349 Standards while burning 7.6 gallons per hour at 100% load.

B. Final Production Tests: Each generator set shall be tested under varying loads with

guards and exhaust system in place. Tests shall include:

1. Single-step load pickup.
2. Transient and steady-state governing.
3. Safety shutdown device testing.
4. Voltage regulation.
5. Rated power.
6. Maximum power.

2.02 Engine

A. The 439 cubic inch displacement, 4 stroke, air cooled, turbocharged and aftercooled engine shall deliver a maximum of 331 HP at a governed speed of 1800 rpm. The engine shall be equipped with the following:

1. Modular air cleaner, single element with duct evacuator and service indicator
2. Radiator with guard, coolant drain line with valve, fan and belt guards, coolant and low coolant level alarm with shutdown. Provide with jacket water heater with shutoff valves.
3. Stainless steel exhaust flex and ANSI weld flange
4. Primary fuel filter/water separator, secondary fuel filter, fuel priming pump, and flexible fuel lines.
5. Lubricating oil and filter with oil line drain complete with valves
6. Formed steel mounting base with linear vibration isolators between engine and base
7. 45 amp charging alternator, ETR fuel shutoff solenoid, 12 volt starting motor, batteries with rack and cables, and battery disconnect switch

B. The engine shall be fueled with Diesel, have 4 cylinders and be liquid cooled. A unit-mounted radiator, blower fan, water pump, thermostat and radiator duct flange (unhoused only), shall properly cool the engine with up to 0.25" H20 external static pressure on the cooling system.

2.03 Generator

A. The alternator shall be 12 lead, reconnectable, self-ventilated of drip-proof IP22 construction with amortisseur rotor windings and skewed for smooth voltage wave form. The insulation material shall meet the NEMA standard for Class H and be provided with tropicalization and antiabrasion. The excitation system shall be of brushless construction controlled by a VR3 solid-state voltage regulator with adjustable Volts-per-Hertz operation capable of maintaining voltage within ± 1% at any constant load from 0 to 100% of rating.

B. A resettable line current sensing circuit breaker with 400 amp capacity of the inverse time versus current response shall be furnished complete with 24 volt shunt-trip device for interlocking with the transfer switch(s).

C. The generator, having a single maintenance free bearing, shall be directly connected to the flywheel housing with a semi-flexible coupling between the rotor and the flywheel.

2.04 Controller

A. Set-mounted controller, EMCP II, shall be vibration isolated on the generator enclosure. The microprocessor control board shall be moisture proof and capable of operation from -40 F. to 158 F. Relays will only be acceptable in high current circuits.

B. Circuitry shall be of plug-in design for quick replacement. Controller shall be equipped to accept a plug-in device capable of allowing maintenance personnel to test controller

performance without operating the engine. The controller shall include:

1. Digital LCD indication for AC voltage, AC amperage, System diagnosis, Frequency, DC voltage, Coolant Temperature, Oil Pressure, RPM, and hours of run time
2. Controls for Auto start/stop from a remote set of contacts, emergency stop, lamp test, cycle crank, voltage control, cool down timer, and phase selector switch.
3. Enclosure shall be NEMA 1, IP22
4. Indicating lights to signals:
   a. Low oil pressure
   b. High coolant temperature
   c. Over speed
   d. Over crank
   e. Emergency stop
   f. Fault shutdown
   g. Fault alarm

2.05 Accessories

A. The following accessories shall be provided:

1. 400 gallon double wall sub-base mounted fuel tank
2. Battery rack, battery cables, 12 volt battery(ies) capable of delivering the minimum cold-cranking amps required at 0 F for 30 seconds
3. 35 dBA engine exhaust silencer, coated to be temperature and rust resistant, rated for critical applications
4. Automatic float and equalize battery charger with ± 1% constant voltage regulation from no load to full load over ± 10% AC input line variation, current limited during engine cranking and short circuit conditions, temperature compensated for ambients from -10 C to +60 C, 5% accurate voltmeter and ammeter, fused, reverse polarity and transient protected. Optional alarm circuit board for AC voltage fail and high battery voltage.
5. Steel weather-protective sound attenuating enclosure with hinged side panels to allow inspection and maintenance. The enclosure shall be coated with ASA gray primer and two coats of high-gloss, weatherproof, in the manufacturer's standard. The specified exhaust silencer shall be vibra-mounted internal to the enclosure. Vibration isolators shall be provided between the engine-generator and heavy duty steel base or between the base and the floor. Enclosure shall be provided with control panel viewing window, externally mounted emergency stop control, and side mounted Circuit Breaker and control panel.

PART 3 EXECUTION

3.01 Installation

A. The equipment shall be installed as shown on the plans, in accordance with the manufacturer's recommendations and all applicable codes.

3.02 Start-up Service

A. The generator supplier shall furnish a factory trained technician when the contractor calls for start-up. The technician shall start the unit and test it without load and with such load as may be available with repeated starting and stopping to verify that all systems are trouble free and make any adjustments that may be required. The generator shall be operated under emergency load for a minimum of two hours prior to acceptance by the

Engineer and Owner, or his representative.

End of Section 26 32 13

SECTION 26 36 23 - AUTOMATIC TRANSFER SWITCH

PART 1 GENERAL

1.01 Description of Work

A. Provide the automatic transfer switch as specified and as shown on the drawings. All control items shall be UL listed in accordance with UL Standard 1008.

1.02 Approved Manufacturers

A. The basis for this specification is Zenith and shall represent the minimum level of construction. Products manufactured by Kohler and ASCO shall be permitted to bid these specifications.

B. Provide submittals for approval.

PART 2 PRODUCTS

2.01 Ratings

A. The switch shall be Zenith model ZTS Series Open Transition Transfer Switch rated as listed below at 120/208 volt, three phase, 4-wire. The switch shall meet or exceed withstand and closing current ratings per UL Standard 1008. Controls shall be tested in accordance with ANSI C37.90A and IEEE C62.41.

B. Switches shall be as follows:

1. ATS-LS ZTS Open Transition Transfer Switch, 400 amp, 3 pole, solid neutral, 120/208 volt, three phase, 4-wire, NEMA 1 enclosure with auxiliaries as hereinafter listed.

C. All switches shall be provided with the following accessories:

1. A3 Auxiliary Contact, SPST closed to Emergency
2. A4 Auxiliary Contact, SPST closed to Normal
3. C/D Plant Exerciser – Load/no Load selectable (solid state 7 day type)
4. E Engine start contact – 1 normally open and 1 normally closed
5. L1 Pilot light – emergency position
6. L2 Pilot light – normal position
7. L3 Pilot light – normal power available
8. L4 Pilot light – Emergency power available
9. P1 Adjustable time delay to engine start – 0 to 10 seconds with gold contact
10. R50 In-Phase monitor
11. T Adjustable time delay re-transfer to normal – 0 to 60 minutes (30 minute standard setting)
12. U Adjustable time delay for engine cool down – 0 to 60 minutes (5 minute standard setting)
13. W Adjustable time delay transfer to emergency – 0 to 5 minutes (10 second standard setting)
14. YEN Pushbutton bypass of T and W timers

2.02 Operation

A. When the voltage on any phase of the normal source is reduced to 85% of rated voltage for 1 to 3 seconds, a pilot contact shall close to initiate starting the standby generator. Further, upon failure or reduction or the normal source, and the availability of the emergency source, the contacts are moved from the normal position to the open

transition position. .

B. When the standby plant is delivering not less than 90% of related voltage and 95% of rated frequency, and after the adjustable time delay of 10 seconds has elapsed, the contacts are moved to the emergency position

C. When the normal source has been restored to not less than 90% of rated voltage of all phases, and after an adjustable time delay of 10 to 30 minutes, the contacts shall be moved to the normal source. The standby plant shall run for 5 minutes unloaded and then automatically shut down and be ready to start upon the next failure of the normal source.

2.03 Construction

A. The automatic transfer switch shall be a double throw switch operated by a momentarily energized electrical mechanism. The normal and emergency contacts shall be mechanically inter-locked such that failure shall not permit a neutral position. Switch shall be provided with a fully rate solid neutral pole.

B. The contact structure shall consist of a main current carrying contact which is a minimum 50% silver content alloy. The main current carrying contacts shall be protected by arcing contacts or arc tips.

C. The minimum UL Standard 1008 listed withstand and closing ratings shall be 100,000 rms

PART 3 EXECUTION

3.01 Testing

A. Inspection, programming, and operational testing shall be conducted by Factory Authorized Representative in the presence of the Engineer and Owners Representative to assure the switch satisfies the specifications and operational intents.

End of Section 26 36 23

SECTION 26 51 13 – INTERIOR LIGHTING

PART 1 GENERAL

1.01 Description of Work

A. Provide the light fixtures as specified. Material, equipment or services necessary to complete the installation of these fixtures, but not specifically mentioned shall be furnished as though specified.

B. It shall be the duty of the Contractor to check the following fixtures carefully against the wiring plans, and furnish a unit of proper size and type.

C. The manufacturer and number listed in these specifications establish type and quality. Fixtures of similar manufacturer must be pre-approved by the Engineer/Lighting Designer prior to bidding.

D. The contractor shall provide a Lighting control System including lamps/ballasts/drivers that meets all performance requirements in accordance with approved plans and specifications.

E. The “Lighting control system” as referred to in this section of the specifications shall include the following subsystems and components of the subsystems: occupancy sensors, power packs, room controllers, time sweep controls, daylighting controls, architectural dimming controls, and lamps/ballast/drivers.

F. The electrical Contractor shall “commission” the Lighting control system, after its installation, under the observation and direction of the Commissioning Authority. Commission as referred to in this section shall mean verification of operational and functional performance of the Lighting Control System for compliance with the “Design Intent” as described in the Specifications Section 26 01 05 – ELECTRICAL SYSTEMS COMMISSIONING. This process includes System activation and inspection, performance testing, adjustment and orderly transfer of the system to and training of Owner personnel. Ballast Warranty

1.02 LED Driver Warranty

A. Electronic drivers shall be provided with a 3-year warranty. If the driver fails within the warranty period, the driver manufacturer will provide replacement driver free of charge and shall provide a labor allowance to cover the cost of driver installation. This warranty shall be provided direct to the Owner.

1.03 Ballast Warranty

A. Electronic ballasts shall be provided with a 5-year warranty. If the ballast fails within the warranty period, the ballast manufacturer will provide replacement ballast free of charge and shall provide a labor allowance to cover the cost of ballast installation. This warranty shall be provided direct to the Owner.

1.04 Fixture Packaging

A. Packaging of fixtures for the purpose of reducing cost or reducing the burden on manufacturer’s agents, distributors, or contractors shall not be permitted. Contractor shall obtain from manufacturer and distributor unit pricing for each fixture for inspection by Engineer/Lighting Designer. Failure to comply with written specifications shall hold the contractor financially responsible for providing specified fixtures to the Project.

PART 2 PRODUCTS

2.01 Lamps

A. Lamps shall be provided by the electrical contractor with sizes as indicated on the drawings. Lamps shall be as manufactured by Philips Lighting Company or approved equal Sylvania or General Electric.

B. **Light Emitting Diode (LED) lamps** shall be provided as listed below:

1. White LED fixtures for general illumination shall have been tested by the US Department of Energy's CALiPER Program
2. Color Temperature: No greater than 5000k for indoor illumination unless scheduled otherwise.
3. All LED luminaires shall have been designed around the LED Source. LED Lamps marketed as replacements for fluorescent fixtures are not permitted.
4. LED System shall be modular and allow for separate replacement of LEDs and drivers.

C. **Linear Fluorescent** lamps shall be provided as listed below:

1. T5 fluorescent luminaires shall be furnished with Philips, or equal, Silhouette T5. Lamps shall be rated at 3500 degree Kelvin color temperature and a minimum of CRI of 85, unless noted otherwise, in the correct wattage and lamp length as listed on the drawings and required for the specified luminaire.
2. T5HO (High Output) fluorescent luminaires shall be furnished with Philips, or equal, Silhouette T5 lamps. Lamps shall be rated at 3500 degree Kelvin color temperature and a minimum of CRI of 85, unless noted otherwise, in the correct wattage and lamp length as listed on the drawings and required for the specified luminaire.
3. T8 fluorescent luminaires shall be furnished with Philips, or equal, 800 Series T8 Alto II lamps. Lamps shall be rated at 3500 degree Kelvin color temperature and a minimum of CRI of 85, unless noted otherwise, in the correct wattage and lamp length as listed on the drawings and required for the specified luminaire.

2.02 LED Drivers

A. LED drivers shall be electronic-type, labeled as compliant with radio frequency interference (RFI) requirements of FCC Title 47 Part 15, and compliant with NEMA SSL 1 "Electronic Drivers for LED Devices, Arrays, or Systems." LED Drivers shall have a sound rating of "A", have a minimum efficiency of 85%, and be rated for a THD of less than 20% at all input voltages.

B. **Dimmable LED drivers shall be 0-10V type** shall be capable of dimming without LED strobing or flicker across their full dimming range.

C. **Interior Emergency LED drivers** shall be provided as noted in the Light Fixture Schedule.

2.03 Ballasts

A. All indoor fluorescent fixtures shall be furnished with OsramQuicktronic, or equal, Octron compatible instant start, high frequency electronic ballasts with less than 10% harmonic distortion, minimum 97% power factor , minimum of .88 Ballast Factor in 120 or 277 volt as required by system voltage.

B. **Interior Linear Emergency Fluorescent** fixtures as Fixtures designated on plans shall

be provided with Bodine #B-50 ballast to illuminate 1 lamp for 90 minutes at level of 1350 lumens per one T8 lamp. Manufacturers with factory installed emergency features will be allowed to utilize this option in lieu of the Bodine ballast to meet these criteria.

2.04 Light Fixtures

A. Light fixtures shall be as scheduled on plans.

PART 3 EXECUTION

3.01 Installation

A. Install light fixtures at locations and heights as indicated and in accordance with fixture manufacturer's instructions.

B. Install fixtures as recommended by the manufacturer, or as necessary to provide exact horizontal alignment, preventing horizontal or vertical deflection, or angular jointing of fixtures suspended in continuous rows.

C. Where surface mounted fixtures are indicated for installation on ceilings made of combustible materials, provide 1½" ceiling spacers, unless the fixture is UL approved for mounting directly to the ceiling material.

D. Properly support and align all fixtures and provide all necessary steel shapes for support of the fixtures. Fixtures recessed in ceilings shall be securely connected to the ceiling. For fixtures weighing less than 56 pounds, provide a minimum of two (2) 12 gauge wires which are connected to the structure above. These wires are to be extended and attached to the light fixture and may be slack. Fixtures weighing more than 56 pounds shall be supported directly from the structure above. Coordinate complete fixture installation with the building construction.

E. Where fixtures are shown installed end to end, provide suitable connectors or collars to connect adjoining units to appear as a continuous unit.

A. All fixtures shall be provided with T-bar clips, snap on type. Manufacturers with integral clips, in compliance with National Electrical Code requirements, will be acceptable.

3.03 Coordination

A. Refer to Architectural drawings for exact fixture locations.

B. Coordinate the installation and location of light fixtures with other work and all other trades before installation to avoid conflicts. Light fixture locations in mechanical rooms shall be coordinated with final installed piping and ductwork layouts.

C. Unless otherwise indicated, square and rectangular fixtures shall be mounted with sides parallel to building and ceiling lines.

D. Verify all ceiling systems and coordinate fixture type and accessories prior to ordering fixtures. Coordinate and cooperate with ceiling installer in regards to the location and installation of light fixtures.

3.04 Wall Mounted Fixtures

A. All wall mounted fixtures shall be coordinated with the architectural features of the building. Where specific elevations or dimensions are not indicated, verify the correct location with the Architect prior to beginning any work.

B. Unless otherwise noted, all conduit and back boxes for wall mounted fixtures shall be

concealed.

3.05 Multi-Level Switching

A. The lighting design for this project may include multi-level (inboard/outboard) switching. Where indicated, 3 lamp fixtures shall have the center lamp switched from one switch and the outer 2 lamps switched from another switch.

B. Where indicated, 4 lamp fixtures shall have the outer 2 lamps switched from one switch and the center 2 lamps shall be switched from another switch.

C. Fixtures indicated to have multi-level switching shall be furnished with the proper number of ballasts.

3.06 Adjusting

A. Adjust all fixture sockets to match the lamp specified and aim all adjustable fixtures as directed by the Architect.

B. Upon completion of the installation of light fixtures, and after building circuits have been energized, apply electrical energy to demonstrate capability and compliance with the requirements. Where possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

C. Clean light fixtures of dirt and debris upon completion of the installation. Protect installed fixtures from damage during the remainder of the construction period.

D. At the time of substantial completion, aim all track lights, flood lights, spot lights, etc per the Architect's direction. Provide all scaffolds, lifts etc as required.

E. At the time of final acceptance of this project by the Owner, all lamps shall be in working order and all fixtures shall be fully lamped.

End of Section 26 51 13

SECTION 26 81 15 - EMERGENCY RESPONDER RADIO ANTENNA/REPEATER SYSTEM

PART 1 GENERAL

1.01 SUMMARY

A. Furnish, install, and test a complete and operating Emergency Responder Radio Antenna/Repeater System. The system will support only the Fire Department radio system and no others. Provisions for supporting other public safety systems (e.g. police); cell phone carriers; the Owners' private security and/or maintenance personnel radio systems, etc. – now or in the future – shall not be included.

B. This Section includes the requirements for an Emergency Responder Radio Antenna/Repeater System for the purposes of amplifying Emergency Responder radio signals to achieve minimum signal strength in 95% of all areas on each floor of the building.

C. Final acceptance and approval is required from the local Fire Department in writing prior to contract closeout.

D. Section Includes

1. Bi-directional amplifiers (BDA's)
2. Distributed Antenna System
3. Coaxial cables
4. Splitters and direction couplers
5. UPS
6. All other equipment and components necessary for a complete and functioning Emergency Responder Radio Antenna/Repeater System.

1.02 REGULATIONS

A. Codes, regulations and standards referenced in the Section are:

1. NFPA 1 – The National Fire Code (including Annex O from 2009)
2. NFPA 70 – The National Electrical Code
3. NFPA 101, Life Safety Code, and Local Code and Building Authority requirements.
4. NFPA 72-07 National Fire Alarm Code
5. FCC 47 CFR Private Land Mobile Radio
6. 90.219-2007 Services-Use of Signal Boosters
7. ICC 2009 International Fire Code, Code and Commentary
8. ADA "Americans with Disabilities Act"
9. FCC's OET 65 Standards "Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields".
10. FCC Rules Part 22, Part 90 and Part 101.

1.03 DEFINITIONS

A. Definitions:

1. Bi-Directional Amplifier BDA: Device used to amplify band-selective or multi-band RF signals in the uplink, to the base station for enhanced signals and improved coverage.
2. Emergency Responder Radio Coverage System: A two-way radio communication system installed to assure the effective operation of radio

communications systems for fire, emergency medical services or law enforcement agencies within a building or structure. A system used by firefighters, police, and other emergency services personnel.

3. Delivered Audio Quality Definitions (DAQ): This is a universal standard often cited in system designs and specifications.
   a. DAQ 1: Unusable, speech present but unreadable.
   b. DAQ 2: Understandable with considerable effort. Frequent repetition due to noise/distortion.
   c. DAQ 3: Speech understandable with slight effort. Occasional repetition required due to noise/distortion.
   d. DAQ 3.5: Speech understandable with repetition only rarely required. Some noise/distortion
   e. DAQ 4: Speech easily understood. Occasional noise/distortion.
   f. DAQ 4.5: Speech easily understood. Infrequent noise/distortion.
   g. DAQ 5: Speech easily understood. Coupled Bonding Conductor (CBC) – The term "Coupled Bonding Conductor" shall mean a bonding conductor placed, e.g. strapped, on the outside of any technology cable, used to suppress transient noise.
4. FCC: Federal Communications Commission
5. OET 65 Standards: FCC's Bulletin 65 provides Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.
6. Public Safety/First Responder: Public Safety or First Responder agencies which are charged with the responsibility of responding to emergency situations. These include, but are not limited to: law enforcement departments, fire departments, and emergency medical companies.

1.04 SUBMITTALS

A. Submit product data for each type of proposed system component specified, including dimensioned drawings showing minimum clearances and installed features.

B. Layout Drawings

1. Component specification sheets shall be 8.5 inch x 11 inch or greater, scaled or dimensioned, with dimensions or scale clearly noted.
2. Floor plan drawings shall be 24 inch x 36 inch minimum with drawings scaled to legible size.
3. Floor plan drawings may include elevation detail names for each elevation view. Sheet title shall include site name, address, sheet number, floor plan number and north arrow. Include site plan view of the subject buildings and surrounding property to clearly indicate the location and orientation of roof mounted outdoor antennas associated with the proposed system.
   Include a minimum of (1) building elevation depicting the location of any outdoor antennas associated with the proposed system. Include height of antenna centerline above building, orientation, and location of all external grounding connections.
4. Include a detail plan view of all Telecommunications Spaces housing head-end and/or other consolidated equipment, showing the location of the rack(s) and/or enclosure(s) of the Emergency Responder Radio Antenna/Repeater System equipment.

5. Include a separate plan view of each interior floor where indoor antenna systems are proposed. Include antenna numbers, coaxial cable routes, and the locations of any other system components including splitters, couplers, filters, amplifiers, etc. All components shall be named or labeled for reference in power budget calculations tables. Overlay approximated coverage radii indicating –95 dBm downlink (base to mobile) signal strength around each proposed indoor coverage antenna. Include results of any previous coverage testing per grid, if available.
6. Include a minimum of one (1) detail elevation view(s) of all rack(s) and/or enclosure(s) housing the Emergency Responder Radio Antenna/Repeater System equipment. Identify each piece of equipment by brand, model number and equipment type (e.g. Acme BA123 RF amplifier).
7. Specify antenna grounding and surge protection in accordance with NEC Article 810.
8. Specify the backup power source (Life Safety), and include calculations to ensure the backup power requirements as specified in this standard are met.

C. Equipment Specification Sheets

1. Provide copies of manufacturer specification sheets of all system components, including:
   a. Amplifiers
   b. Antennas
   c. Coaxial cable, couplers, splitters, combiners, or other passive components
2. Operation and maintenance data
3. Pass band curves in for the uplink and downlink portions of the NPSPAC band for any amplifiers, if not included in #1. Amplifiers may NOT amplify portions of other licensed services, including Nextel and Specialized Mobile Radio Licensee band, or Cellular A or B bands.
4. Backup battery and charging system.

D. Submit wiring diagrams from manufacturer differentiating clearly between factory and field-installed wiring. Include diagrams for each component of the system with all terminals and interconnections identified. Make all diagrams specific to this Project.

E. Submit product certificates signed by the manufacturer of radio system components certifying that their products comply with specified requirements.

F. Submit agenda for training class and copies of all handouts for the class.

G. Maintenance data for radio system shall be included in the operation and maintenance manual. Include data for each type of product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations that carry stock of repair parts for the system to be furnished.

H. Record of field tests of the radio system shall be included in the operation and maintenance manuals.

I. Design Approval: Plans shall be submitted and approved prior to installation.

The following information shall be provided to the local Fire Department unit representative by the system designer/Contractor:

1. A minimum of three (3) copies of detailed drawings showing the location of the amplification equipment and associated antenna systems which includes a view showing building access to the equipment; and
2. A minimum of three (3) copies of schematic drawings of the electrical system, backup power, antenna system and any other associated equipment relative to the amplification equipment including panel locations and labeling.
3. A minimum of one (1) copy of the Manufacturer's data sheets on all equipment to be installed.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced factory-authorized installer to perform work of this Section.

B. Single-Source Responsibility: Obtain radio system components from a single source who assumes responsibility for compatibility of system components.

C. All equipment shall be UL listed and labeled, and in accordance with applicable NEMA and ANSI Standards. Where copper cabling is routed to an area, either in another building, or with a separate electrical service, the Technology Contractor shall provide primary protective equipment.

D. All racks and enclosures shall be either welded or assembled with paint piercing ground washers, grounding strip and bonding jumper as indicated on the Drawings.

1.06 MANUFACTURERS

A. Subject to compliance with requirements, available Integrators offering products that may be incorporated into the Work include, but are not limited to, the following:

1. CommScope/Andrew
2. Corning
3. Times Microwave
4. Tessco
5. CCI (Communication Components Inc.)
6. Solid Technologies

PART 2 PRODUCTS

2.01 GENERAL PERFORMANCE REQUIREMENTS

A. Compatibility: The equipment, including but not limited to repeaters, transmitters, receivers, signal boosters, cabling, fiber distributed antenna system, etc., shall not interfere with the existing communication systems utilized by the Public Safety and First Responder agencies.

B. Power Supplies: At least two (2) independent and reliable power supplies shall be provided, one primary and one secondary. The primary power source shall be supplied from a dedicated 20 ampere branch circuit and comply with 4.4.1.4 of NFPA 72. The secondary power source shall be a dedicated battery, capable of operating the in-building radio system for at least 12 hours of 100% system

operation. The battery system shall automatically charge in the presence of external power input. The battery system shall be contained in one NEMA 4 or 4X type enclosures. Monitoring the integrity of power supplies shall be in accordance with 4.4.7.3 of NFPA 72.

C. Survivability

1. Physical Protection: All wiring and fiber optics shall be installed in conduit. Refer to Section 26 05 33, "Conduit and Fittings" for type, sizing and installation standards.
2. Fire Performance: All main risers or trunks of the antenna system shall be installed with resistance to attack from a fire using one of the following methods:
   a. A 2-hour fire rated cable or cable system.
   b. Routing the cable through a 2-hour fire rated enclosure(s) or shaft(s).
   c. A system configured in a looped design, routed through 1-hour fire rated enclosure(s) or shaft(s). The circuit shall be capable of transmitting and receiving a signal during a single open or non-simultaneous single ground fault on a circuit conductor.
   d. Performance alternative approved by the authority having jurisdiction.
3. Cabinet: The signal booster and all associated RF filters shall be housed in a single, NEMA 4 certified, painted steel weather tight box. The cabinet shall be large enough to dissipate internal heat without venting the inside of the cabinet to the outside atmosphere. Operating temperatures: –22 degrees F to +120 degrees F (–30 degrees C to +50 degrees C) minimum temperature range, including microprocessors. Equipment installed on the roof of structures shall be rated for the expected extreme temperatures associated with rooftop installations.
4. Passive Equipment: Passband shall be 700-900 MHz, IP rating of 2 GHz.
5. Cable: Passband shall be 700-900 MHz. Cable shall be rated for fire plenum and riser rating.

2.02 SYSTEM COMPONENTS

A. Signal Strength

1. Downlink: A minimum signal strength of -95 dBm shall be provided throughout the coverage area.
2. Uplink: Minimum signal strength of -95 dBm received at the local Fire Department Radio System from the coverage area.
3. A donor antenna must maintain isolation from the distributed antenna system. The donor antenna signal level shall be a minimum of 15 dB above the distributed antenna system under all operating conditions.

B. Permissible Systems

1. Buildings and structures shall be equipped with an FCC Certificated Class B Bi-Directional UHF Amplifier(s) as needed.
2. The distributed antenna system may utilize a radiating cable, fixed antennas or a combination of both.

C. Supported Frequencies: The radio system shall support frequencies in the 700 and 800 MHz public safety bands as utilized by the local Fire Department.

D. Reject Filters: Notch filter sections shall be incorporated to minimize adjacent channel cellular and SMR (Nextel) degradation of the signal booster performance. The minimum downlink band adjacent band rejection shall be 35 dB or greater at 865 MHz and 870 MHz.

E. Band Migration Capability: The signal booster shall include re-tunable or replaceable filters to accommodate rapid and economic passband changes in the event of mandatory FCC changes within the NPSPAC band. The use of non-adjustable and non-replaceable RF input and output filters is prohibited.

F. Output Level Control: An automatic output leveling circuit shall be included for both passbands with a minimum dynamic range of 60 dB, less any gain reduction setting, to maintain FCC out of band and spurious emission compliance.

G. Degraded Performance in Emergencies: The system shall be designed to allow degraded performance in adverse conditions, such as abnormally high temperatures resulting from nearby fires, extreme voltage fluctuations or other abnormal conditions that may occur during an emergency. Circuits that intentionally disable the signal booster in such situations (i.e. under/over voltage, over/under current, over/under temperature, etc.) will not be implemented as the standard mode for public safety applications.

H. Mode of Operation: The system shall be normally powered on and shall continuously provide passing of frequencies within the Public Safety and First Responder bands.

I. All in-building radio systems shall be compatible with both analog and digital communications simultaneously at the time of installation.

2.03 SYSTEM MONITORING

A. The distributed antenna system shall include a connection to the fire alarm system to monitor the integrity of the circuit of the signal booster(s) and power supplies and annunciate this malfunction on the fire alarm system shall comply with 4.4.7.1 of NFPA 72.

B. A sign shall be located at the fire alarm panel with the name and telephone number of the local Fire Department indicating that they shall be notified of any failures that extend past the 2 hour time limit.

PART 3 EXECUTION

3.01 INSTALLATION

A. Distribution System Signal Wires and Cables

1. Wires and cables shall enter each equipment enclosure, console, cabinet or rack in such a manner that all doors or access panels can be opened and closed without removal or disruption of the cables.
2. Routing and Interconnection
   a. Wires or cables routed between consoles, cabinets, racks, and other equipment shall be installed in an approved conduit or cable tray that is secured to building structure.

a. Completely test all of the cables after installation and replace any that are found to be defective.

3. Install cables without damaging conductors, shield, or jacket.
4. Do not bend cables, while handling or installing, to radii smaller than as

recommended by manufacturer.

5. Pull cables without exceeding cable manufacturer's recommended pulling tensions.

B. Product Delivery, Storage, and Handling

1. Delivery: Deliver materials to the job site in OEM's original unopened containers, clearly labeled with the OEM's name and equipment model and serial identification numbers.
2. Store and protect equipment in a conditioned space until installation.

C. System Installation

1. Coaxial antenna cabling shall not be installed in the same conduit, raceway, or cable trays used for other systems.
2. All equipment shall be connected according to the OEM's specifications to insure correct installation and system performance.
3. Coordinate all roof penetrations with Owner and/or roofing contractor.

3.02 LICENSING

A. All fees associated with the licensing shall be paid by the Owner.

B. All testing must be done on frequencies authorized by the FCC.

3.03 GROUNDING

A. Ground cable shields and equipment per Manufacturer's requirements.

B. Antenna mast shall be grounded per NFPA 70 NEC requirements, Section 27 05 26, "Grounding and Bonding for Communications Systems" and antenna manufacturer's requirements. Provide grounding blocks and surge protection for outside coaxial cabling. Bond the antenna mast to the existing lightning protection system.

3.04 APPROVAL TESTING

A. The local Fire Department will review plans and specifications. Upon acceptance, plans will be stamped to indicate approval. Stamped plans are required to be present at the acceptance test. Any field changes that occur during construction shall be incorporated into new As-Built plans, including any manufacturer's data sheets for any equipment changes not submitted in the original submittal. As-Built plans, if required due to system changes, shall be submitted to the local Fire Department for approval.

B. Tests shall be made using frequencies close to the frequencies used by the Fire Department and appropriate emergency services. If testing is done on the actual frequencies, then this testing must be coordinated with the local Fire Department unit. All testing must be done on frequencies authorized by the FCC. A valid FCC license will be required if testing is done on frequencies different from the police, fire or emergency medical frequencies.

C. Testing Procedures

1. Minimum Signal Strength: For testing system signal strength and quality, the testing shall be based on the delivered audio quality (DAQ) system. A DAQ level below 3.0 shall be considered a failed test for a given grid cell.
2. Measurements shall be made with the antenna held in a vertical position at 3 to 4 feet above the floor to simulate a typical portable radio worn on

the belt or turnout coat pocket.

D. Final Acceptance Testing

1. All acceptance testing shall be done in the presence of a local Fire Department representative or by the local Fire Department unit at no expense to the City.
2. Small scale drawings (11 inch x 17 inch maximum) of the structure shall be provided by the Contractor to the Owner. The plans shall show each floor divided into the grids as described above, and the results of the pre-testing. Each grid shall be labeled to indicate the DAQ result from the final acceptance testing.
3. The Contractor shall provide the latest approved plans for the system, including any manufacture's data sheets for any equipment changes not submitted in the original submittal to the Owner.
4. Include testing results of the repeater (output wattage, gain level, etc) and connection to the fire alarm.

3.05 MAINTENANCE AND ANNUAL TESTING

A. Annual tests will be conducted by the local Fire Department unit or authorized company.

2. The re-testing will be done at no expense to the City or the appropriate emergency services departments as required in the original testing procedures.

B. Maintenance Contract

1. Maintenance contract with a Radio Service Provider in place with name of authorized company, who will provide a 24 hour by 7 day emergency response within two (2) hours after notification. The system shall be maintained in accordance with FCC requirements. The contract shall be for 5 years.
2. All tests shall be conducted, documented, and signed by a person in possession of a current FCC General Radio telephone Operator License, or a technician certification issued by the Association of Public-Safety Communications Officials International (APCO) or equivalent as determined by the local Fire Department.
3. Maintain a list of contact personnel with phone numbers at the radio repeater system cabinet. The contact personnel shall have knowledge of the building and the repeater system and be available to respond to the building in the case of an emergency.
4. Radio Service Provider maintenance contract shall include but not limited to:
   a. Annual Test

      - All active components of the distributed antenna system, including but not limited to amplifier, power supplies, and back-up batteries, shall be tested a minimum of once every 12 months.

      - Amplifiers shall be tested to insure that the gain is the same as it was upon initial installation and acceptance. The original

gain shall be noted and any change in gain shall be documented.

- Back-up batteries and power supplies shall be tested under load for a period of 1 hour to verify that they will operate during an actual power outage.
- Active components shall be checked to determine that they are operating within the manufacturer's specifications for their intended purpose.
- Documentation of the test shall be maintained on site and a copy forwarded to the local Fire Department Radio Supervisor upon completion of the test.
- Fire Department Radio personnel, after providing reasonable notice to the Owner or their representative, shall have the right to enter onto the property to conduct field testing to be certain that the required level of radio coverage is present

End of Section 26 81 15

SECTION 28 01 00 - GENERAL SAFETY AND SECURITY REQUIREMENTS

PART 1 GENERAL

1.01 Related Documents

A. The drawings and general provisions of the Contract, including General Conditions, Supplementary General Conditions, General Requirements (Division 1), and Section 23 05 13 - ELECTRICAL PROVISIONS OF HVAC WORK, Section 22 05 13 – ELECTRICAL PROVISIONS OF PLUMBING, and Section 21 05 13 – ELECTRICAL PROVISIONS OF FIRE PROTECTION apply to the work specified in Division 26 - ELECTRICAL.

1.02 Description of Work

A. The Electrical Contract includes all labor, material, and equipment required for the complete electrical systems as shown and specified.

1.03 Quality Assurance

A. Each major component of equipment shall have the manufacturer's name, address, model number, rating, and UL label securely affixed in a conspicuous place.

B. All equipment of one type shall be the product of one manufacturer, unless specified otherwise.

C. In the event of discrepancies between the drawings and specifications, the contractor shall advise the engineer before proceeding with the work in order that correct progress is ensued.

D. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel." Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.04 Shop Drawings and Submittals

A. Shop drawings shall be submitted as specified in Division 1. Product data shall be submitted for all materials and equipment specified in DIVISION 28. Shop drawings and submittals must be submitted in PDF format and emailed to the design team.

B. Shop drawings for equipment ‘Packages” shall be complete and include all items to be provided by a manufacturer’s representative or supply house. No partial submittals will be reviewed or approved without a complete and total equipment submittal.

C. Each shop drawing shall include a letter indicating all deviations from the drawings and/or specifications.

D. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:

1. Product data listing manufacturer, model number, materials, and miscellaneous data as required to describe the equipment.
2. Capacity, pressure drop, rpm, motor horsepower, and other miscellaneous data to quantify the size of the equipment.
3. Dimensional drawings showing layout, connection points, and detailed layout of components.
4. Electrical full load amps and minimum circuit ampacities shall be included for single power connection.
5. Conspicuously mark on each submittal the exact model, fittings, accessories, and

devices to be supplied. When a schedule is shown on the drawings or in the specifications, provide a copy of that schedule with the submittal.

6. Tags for equipment submitted shall match the tags indicated on the design drawings or specifications. Where equipment is noted on the drawings and not scheduled, refer to plan note and sheet number on the submittal.

E. Contractor shall check all shop drawings to verify that they meet the requirements of the drawings and specifications before forwarding to the architect and engineer. All shop drawings submitted shall bear the stamp of the contractor to show that they have been reviewed in detail.

F. No work shall be fabricated and no equipment ordered until the architect and engineer have returned acceptable reviewed shop drawings.

G. Welder certificates, signed by Contractor, certifying that welders comply with requirements specified under "Quality Assurance" article of this section.

1.05 Project Sequencing

A. The contractor shall refer to the architectural plans and specifications for areas of work and general schedules to determine the scope of work required during each phase of the construction.

B. All temporary equipment, etc. not indicated, but required by phasing, shall be included in the base bid.

1.06 Substitutions

A. The materials, products, and equipment described in these specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. Listing of these manufacturers shall in no way be construed as a device intended to limit the bidders to those specifically listed.

B. Reference to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number, shall be interpreted as having established a standard of quality and shall not be construed as limiting competition. Articles, fixtures, etc. of equal quality by manufacturers listed in this specification for the applicable use, shall be acceptable, subject to spatial, structural, and electrical constraints of the project design.

C. No substitution will be considered unless written request for approval has been received by the engineer at least ten working days prior to the date for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and complete description of the proposed substitute including shop drawings, performance and test data, and any other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment, or work that incorporation of the proposed substitute would require, shall be included. The burden of proof of the merit of the proposed substitute is on the proposer. The engineer's approval or disapproval of a proposed substitution shall be final.

D. Approval of a proposed substitution prior to receipt of bids shall be set forth in an Addendum. Approvals made in any other manner shall not be considered binding.

E. The Engineer reserves last opinion as to a product’s equality or superiority to that specified.

1.07 Definitions

A. Furnish: The term “furnish” is used to mean “supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations.”

B. Install: The term “install” is used to describe operations at the project site including the actual “unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.”

C. Provide: The term “provide” means “to furnish and install, complete and ready for the intended use.”

D. Furnished by Owner or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including all items incidental to the Work, including all services necessary for proper installation and operation. The Installation shall be included under the guarantee required by this Division.

E. The design engineer, referred to as “engineer” shall mean the engineering firm, HOSS & BROWN ENGINEERS, INC., Contact person: Casey Steiner.

1.08 Record Drawings

A. During the progress of the work of this section, this Contractor shall maintain an accurate record of all changes made in the installation of the system(s). Upon completion of the work, accurately transfer all record information to an unmarked full-size set with neatly handwritten or typed notes. Scan full-size drawings to PDF at 300 dpi.

1.09 Operation and Maintenance Manuals

A. Three (3) Flash Drives containing PDFs of Operation and Maintenance (O&M) Manuals shall be submitted as described below. Files and folder names shall be clearly labeled. Folder structure and names shall be intuitive and clearly labeled.

B. Before project close-out, submit O&M operating, maintenance instructions, and parts lists for equipment provided. Include in the manual a list of emergency service organizations capable of rendering service for each piece of equipment.

C. Keep in a safe place all keys, wrenches, and other specialty tools furnished with equipment. Present to owner at project close-out and receive a receipt showing he has received the same.

D. At the completion of the project furnish to the Architect for the Owner O&M brochures divided and tabbed, containing all data, diagrams, capacities, spare part numbers, manufacturers service and maintenance data, warranties, guarantees, etc., including local contacts and escalation schedule complete with addresses and telephone numbers, of all equipment, apparatus, and system components furnished and installed under this Division of the specifications.

1.10 Codes and Ordinances

A. All work shall be in accordance with applicable codes, rules, ordinances, and regulations of local, state, and federal governments and other authorities having jurisdiction.

B. Drawings and specifications indicate minimum construction standards, but should any work indicated be sub-standard, to any ordinances, laws, codes, rules, or regulations bearing on work, the contractor shall execute work in accordance with such without increased cost to the owner, but not until he has referred such variances to the engineer.

C. The contractors shall secure and pay for the necessary permits and certificates of inspection for their trade. Keep record of all permits and inspections and submit two copies to the engineer with request for final inspection.

1.11 Owner Training

A. When training is required by any section of these specifications, all training sessions

shall be video taped on a single DVD. Provide four copies of the DVD at the end of construction. The contractor shall prepare a letter of receipt to be signed by the owner when the tapes are delivered.

1.12 Warranty

A. This contractor shall warrant that the complete systems installed under this contract shall be free of defects in workmanship and materials for a period of one (1) year from the date of substantial completion by the arch/owner.

B. If defects occur during the one year guarantee period, this contractor shall repair or replace such defects at no expense to the owner and to the satisfaction of the owner and engineer.

PART 2 PRODUCTS

2.01 General

A. Where the quality of required material is not specified, the Contractor shall furnish a first class standard item as approved by the Architect/Engineer.

B. Capacities of equipment and materials shall not be less than those indicated.

C. All work performed shall provide a neat and workmanlike appearance when completed, to the satisfaction of the engineer.

D. Provide 3-1/2” concrete base for all floor mounted equipment unless shown or noted otherwise. Provide 6x6 welded wire fabric reinforcing minimum or as required by the structural engineer.

E. Adequately protect equipment from damage after delivery to the jobsite. Cover with heavy polyethylene plastic. Elevate equipment when there is danger of water damage. Equipment damaged will be rejected.

F. Any scratches to factory finishes shall be touched up using factory supplied paint before final acceptance. If extensive damage to factory finishes has occurred, equipment panels shall be replaced to the satisfaction of the engineer. If rust has formed, remove as recommended by the manufacturer prior to touch-up.

2.02 Equal Products of Listed Manufacturers

A. In general, the specifications and drawings identify required materials and equipment by naming first the manufacturer whose product was used for the basis of design. The manufacturer’s product, series, model, catalog, and/or identification numbers shall set quality, construction and dimensional requirements for comparing the other manufacturer’s products. The capacity and performance of all equipment shall meet or exceed what is indicated on the drawings and/or scheduled.

B. Where other manufacturer’s names are listed, they are considered approved for the product specified; however, the listing of their names implies no prior approval of any product unless specific model or catalog numbers have been shown.

C. Where other than first named products are used, it shall be the responsibility of the contractor to determine prior to bid time that his proposed materials and equipment selections do not require adjustments in the mechanical or electrical connections as shown on the drawings. The contractor shall include in his bid all costs associated with any required adjustments.

PART 3 EXECUTION

3.01 Installation

A. Install all equipment in strict accordance with the manufacturer's recommendations and the shop drawings reviewed by the Engineer.

B. The complete installation shall function as designed and intended with respect to efficiency, capacity, and noise level, etc. Any abnormal noise caused by rattling equipment or conduits will not be acceptable

C. Locations of equipment, conduit, and other work are indicated diagrammatically on the drawings. Each contractor shall coordinate exact locations subject to structural conditions, work of other contractors, access requirements, and the approval of the architect and engineer.

D. Any item interfering with proper placement of other work shall be removed and relocated without extra cost if reasonable coordination would have eliminated the interference. Damage to other work caused by this contractor shall be restored as specified for new work.

E. Written dimensions are preferred over scaled dimensions. When written dimensions are not available, the contractor shall be responsible for determining the proper installed location.

F. Final acceptance of work shall be subject to the condition that all systems, equipment, apparatus, and appliances operate satisfactorily as designed and intended. Work shall include required adjustment of systems and control equipment installed under this specification.

G. Contractor shall perform initial start-up of systems and shall provide necessary supervision and labor to make the first seasonal change-over of systems. Owner's operating personnel shall be present during this operation.

H. It is the contractor's responsibility to provide materials and trim which fit properly the types of ceiling, wall, or floor finishes actually installed. Model numbers in specifications or shown on drawings are not intended to designate the required trim.

3.02 Connections to Building Structure

A. Any item connecting to building structure shall be done in a manner accepted by the structural engineer.

B. When bar joists are used for steel construction, items shall be supported from angle iron spanning the top chord of the joists.

3.03 Cleaning

A. Periodically during construction and prior to Owner acceptance of the building, Contractor shall remove from the premises and dispose of all packing material and debris.

3.04 Visit to the Site

A. Before submitting his bid, the Contractor shall visit the actual location of the job and shall fully understand the scope of the work to be done and the conditions under which it is to be performed. In no case shall additional compensation be granted when existing conditions could reasonably be determined.

3.05 Existing Utilities

A. Locate and mark all known utilities prior to proceeding with work. Proceed with caution since unmarked utilities may exist on site.

B. Should any existing utilities be damaged or disrupted, immediately notify Owner and repair to existing conditions.

C. The Contractor shall closely coordinate all utility downtime with the Owner and Architect giving a minimum fourteen (14) day notice prior to downtime.

D. Downtimes are to be held to a minimum duration with the Owner being notified as to the extent of said downtime.

End of Section 28 01 00

SECTION 28 01 15 - SAFETY AND SECURITY RELATED WORK

PART 1 GENERAL

1.01 Description of Work

A. The following is the work required by the General Contractor to facilitate the work of the Electrical Contractor.

1. Openings and chases.

B. The following is the work required by this Contractor to facilitate the work of his contract.

1. Cutting and patching.
2. Excavation and backfilling.
3. Conduit sleeves.

1.02 Related Documents

A. Refer to Division 2 for backfilling requirements.

PART 2 PRODUCTS

2.01 Conduit Sleeves

A. Conduit sleeves and supports shall be provided and the Contractor shall be responsible for their proper and permanent location. Conduit will not be permitted to pass through footings or beams without consent of the Architect.

B. Conduit sleeves will be required in all penetrations through new exterior walls, masonry walls, floors and fire rated gypboard walls. Sleeves shall be either Schedule 5 steel pipe, EMT conduit, field fabricated from minimum 16 gauge steel with 2" overlap at the seam, or as required by UL listed fire-stopping system.

C. Conduit sleeves will not be required in existing wall penetrations of masonry construction when such openings are made by "core-drilling."

PART 3 EXECUTION

3.01 General Contractor's Work

A. The General Contractor shall leave such openings and chases in new construction for pipes, cabinets, access doors, and equipment as may be necessary or directed by the Architect to facilitate the work of the this Contractor and to refinish around same. The Electrical Contractor shall properly advise in due time as to the location and sizes of such openings and chases.

3.02 Safety and Security Contractor's Work

A. This Contractor shall be responsible for locating and setting his own sleeves, and be well aware of the job progress to avoid unnecessary delay for setting of same.

B. This Contractor shall be responsible for cutting his own holes in existing construction, unless noted otherwise, and for patching and finishing around same. Any holes left in walls when existing devices or conduit is removed by the Contractor shall be patched and finished by the Contractor.

C. This Contractor shall do all excavation and backfilling necessary to complete work under this contract. Lines shall be used to lay out the trenches for underground work. Trenches shall be of sufficient width and shall be cribbed and braced to prevent cave-in or settlement. Trenches close to walls and columns of the building shall not be excavated without the Architect's prior consent.

D. Hand backfill and tamp into place at sides of conduits until installation has been approved.

E. All sidewalks, street or alley surfaces that have to be broken in connection with this contract shall be patched to the satisfaction of the Architect.

3.03 Conduit Sleeves

A. Space between sleeves and conduit in outside walls shall be filled or tightly caulked with oakum, butyl rubber, link seals or other approved equally effective material to resist the penetration of water. Conduit sleeve shall be sufficient diameter to provide approximately 1/2" clearance around pipe, and in the case of insulated pipe approximately 1/2" around insulation.

B. Space between sleeves and conduits in other wall construction shall be the diameter necessary to provide the clearance required by the UL listed fire stopping method chosen by the contractor. Shop drawings of the fire stopping method shall be approved prior to the setting of any sleeves and shall clearly define the fire stopping method and required sleeve clearances.

C. Sleeves shall be set no closer than two pipe diameters center to center and shall be set 3/4" past all wall surfaces, and be securely anchored to the wall.

End of Section 28 01 15

SECTION 28 01 17 - THROUGH-PENETRATION FIRESTOPPING

PART 1 GENERAL

1.01 Related Documents

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 Definitions

A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire rated wall and floor assemblies.

1.03 General Description of the Work of this Section

A. Only tested firestop systems shall be used in specific locations as follows:

B. Penetrations for the passage of cables, conduit, and other electrical equipment through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.

1.04 References

A. Test Requirements: ASTM E-814, "Standard Method of Fire Tests of Through Penetration Fire Stops" (July 1997).

B. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL Standard 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually. The UL Fire Resistance Directory includes the following:

1. Firestop Devices (XHJI)
2. Fire Resistance Ratings (BXUV)
3. Through-Penetration Firestop Systems (XHEZ)
4. Fill, Voids, or Cavity Material (XHHW)
5. Forming Materials (XHKU)

C. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments

D. Inspection Requirements: ASTM E 2174 – 01, “Standard Practice for On-site Inspection of Installed Fire Stops.”

E. ASTM E-84, Standard Test Method for Surface Burning Characteristics of Building Materials.

F. All major building codes: ICBO, SBCCI, BOCA, UBC, and IBC.

G. NFPA 101 - Life Safety Code.

1.05 Quality Assurance

A. A manufacturer's direct representative shall be on-site during initial installation of firestop systems to train appropriate contractor personnel in the proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.

B. Firestop System installation must meet requirements of ASTM E-814, UL Standard 1479 or UL Standard 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.

C. Proposed firestop materials and methods shall conform to applicable governing codes

having local jurisdiction.

D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.

E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council.

1.06 Submittals

A. Product Data: Submit manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions to comply with Section 1300.

B. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineer judgment must include both project name and contractor's name who will install firestop system as described in drawing.

C. Submit material safety data sheets provided with product delivered to job-site.

1.07 Installer Qualifications

A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

1.08 Project Conditions

A. Do not use materials that contain flammable solvents.

B. Scheduling

1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
2. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.

C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.

E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

1.09 Acceptable Manufacturers

A. Manufacturer's names are intended to establish type and quality of items to be provided via the contract. The materials, products, and equipment described in the specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. Listing of these manufacturers shall in no way be construed as a device intended to limit the bidders to those specifically listed.

B. Manufacturers of equal or superior products consistent with the specifications will be acceptable upon written request and publication via addenda. No oral commitments will be binding.

C. Subject to compliance with through penetration firestop systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:

1. Hilti, Inc., Tulsa, Oklahoma
2. 800-879-8000

PART 2 PRODUCTS

2.01 Firestopping, General

A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.02 Materials

A. Use only firestop products that have been UL Standard 1479, ASTM E-814 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.

B. Cast-in place firestop devices are installed prior to concrete placement for use with non-combustible and combustible plastic pipe (closed and open piping systems), or electrical cable bundles, penetrating concrete floors, the following products are acceptable:

1. Hilti CP 680 Cast-In Place Firestop Device

C. Sealants, foams or caulking materials for use with non-combustible items including rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 620 Fire Foam

D. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including PVC jacketed, flexible cable or cable bundles, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant

E. Foams, Intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti FS-ONE Intumescent Firestop Sealant
2. Hilti CP 618 Firestop Putty Stick

F. Non curing, re-penetrable intumescent sealants, caulking or putty materials for use with flexible cable or cable bundles, the following products are acceptable:

1. Hilti CP 618 Firestop Putty Stick

G. Wall opening protective materials for use with UL listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:

1. Hilti CP 617 Firestop Putty Pad

H. Materials used for complex penetrations made to accommodate cable trays the following products are acceptable:

1. Hilti FS 637 Trowelable Firestop Compound
2. Hilti FS 657 FIRE BLOCK
3. Hilti CP 620 Fire Foam

I. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays the following products are acceptable:

1. Hilti FS 657 FIRE BLOCK

J. Provide a firestop system with a "F" Rating as determined by UL Standard 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.

PART 3 EXECUTION

3.01 Preparation

A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify penetrations are properly sized and in suitable condition for application of materials.
2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 Coordination

A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.

3.03 Installation

A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory.

B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration materials.

1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.
2. Protect materials from damage on surfaces subjected to traffic.

3.04 Field Quality Control

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” or other recognized standard.

D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

3.05 Adjusting and Cleaning

A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

End of Section 28 01 17

SECTION 28 05 15 - FIRE ALARM CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 Description of Work

A. Provide the control and data cables as specified and the cable routing indicated on the plans.

1.02 Location of Cables

A. All cables located in environmental air plenum will be plenum rated cables.

1.03 Approved Manufacturers

A. The basis for this specification is West Penn and shall represent the minimum level of construction. Material manufactured by Belden shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Fire Alarm Wiring

A. Fire alarm wiring shall be solid, unstranded power limited cable as follows:

1. Non-Plenum Mapnet: West Penn D975, 1PR, 18GA shielded
2. Plenum Network and Mapnet: West Penn 60975, 1PR, 18GA shielded
3. 16GA Non-Plenum: West Penn 991, 1PR unshielded
4. 16GA Plenum: West Penn 60990B, 1PR shielded
5. 14GA Non-Plenum: West Penn 994, 1PR shielded
6. 14GA Plenum: West Penn 60993B, 1PR unshielded

PART 3 EXECUTION

3.01 General

A. The circuiting of all devices has been shown on the plans, and this Contractor shall follow this circuiting layout.

B. Fire alarm wiring for this system shall be Fire Alarm plenum rated cable, or run in EMT, or ridged conduit. All wiring in walls shall be in conduit with rough-in boxes.

3.02 Wiring

A. All wiring shall be installed in strict compliance with all the provisions of National Electrical Code, Article 760 A and C, Power-Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with National Electrical Code, Article 760 A and B. All required wiring shall have a minimum insulation rating of 600 volts.

B. All cabling shall be installed in strict compliance with all the provisions of NEC Article 760, Power-Limited Protective Signaling Circuits. Cabling shall have a minimum insulation rating of 300 volts.

C. The contractor shall provide all control equipment with a minimum of a “Dedicated, Insulated GREEN #12" ground wire. Conduit grounding will not be accepted. It shall be properly connected to the building unified ground buss.

End of Section 28 05 15

SECTION 28 05 26 - GROUNDING AND BONDING

PART 1 GENERAL

1.01 Description of Work

A. Supplement the grounded neutral of the electrical distribution system with an equipment grounding system, installed so that metallic enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, portable equipment, etc., operate continuously at ground potential and provide a low impedance path for ground fault currents.

B. All special power systems shall be grounded in accordance with the latest adopted version of the National Electrical Code.

C. Grounding conductors shall be installed in conduits as shown on the drawings. Provide 100% rated, separate grounding conductors per each 120-volt outlet circuit.

D. Grounding conductors shall be installed in all PVC conduits and all conduits.

PART 2 PRODUCTS

2.01 General

A. All materials shall be manufactured by:

1. Burndy
2. B-Line Systems
3. Crous Hinds
4. Gould
5. General Electric
6. Ideal Industries
7. Thomas and Betts
8. Western Electric

B. Unless otherwise indicated, provide electrical grounding conductors for grounding connections matching power supply wiring materials and sized according to NEC requirements and as noted on drawings.

2.02 Mechanical Connectors

A. Provide electrical terminals, connectors, lugs, and clamps as recommended by the manufacturer's for the indicated applications.

1. Use mechanical (removable) clamps for connections to pipes.
2. Provide electrical insulating tape, heat-shrinkable insulating tubing, welding materials, and bonding straps as recommended for the types of services indicated.

PART 3 EXECUTION

3.01 General

A. Examine areas and conditions under which electrical grounding connections are to be made and notify the Architect/Engineer in writing of conditions detrimental to proper completion of the work. Work shall not proceed until unsatisfactory conditions have been corrected.

B. Provide all materials, labor, and equipment for an electrical grounding system in accordance with applicable portions of the NEC and NECA. Coordinate electrical work as necessary to interface installation of electrical grounding systems with other work.

C. Grounding and bonding of electrical installations and specific requirements of systems, circuits and equipment required to be grounded shall be accomplished in temporary and permanent construction.

D. The path to ground from circuits, equipment, and conductor enclosures shall be permanent and continuous and shall have ample current carrying capacity to conduct safely any currents liable to be imposed on it, and shall have impedance sufficiently low to limit the potential above ground and to facilitate the operation of the overcurrent devices in the circuit.

E. Where the size of the grounding conductors are not shown, they shall be sized in accordance with the NEC. All grounding conductors shall be a minimum of #12 AWG.

F. Verify that final backfill and compaction has been completed before driving ground rod electrodes.

3.02 Equipment Grounding

A. All receptacles shall be permanently connected to the grounding system with a green wire ground conductor.

B. The metal frame of all motors shall be permanently connected to the grounding system with a green ground conductor.

3.03 Installation

A. Provide a separate green equipment grounding conductor in all electrical raceways to effectively ground all devices, equipment, and non-current carrying enclosures. Metal conduit shall not be used as the grounding path. The grounding conductors shall be connected to the building electrical system ground.

B. The path to ground from circuits, equipment, and conductor enclosures shall be permanent and continuous and shall have ample current carrying capacity to conduct safely any currents liable to be imposed on it, and shall have impedance sufficiently low to limit the potential above ground and to facilitate the operation of the overcurrent devices in the circuit.

End of Section 28 05 26

SECTION 28 05 33 - ABOVE GROUND RACEWAYS AND BOXES

PART 1 GENERAL

1.01 Description of Work

A. Provide the conduits and raceways as specified and indicated on the plans.

B. Provide all electrical pull, junction and outlet boxes as specified and shown on the drawings, as well as those required for a complete and code acceptable installation.

1.02 Approved Manufacturers

A. The basis for the conduit specification is Allied Tube and shall represent the minimum level of construction. Material manufactured by Republic Conduit, and Western Tube and Conduit shall be permitted to bid these specifications.

B. The basis for the surface raceway specification is Hubbell and shall represent the minimum level of construction. Material manufactured by Wiremold shall be permitted to bid these specifications.

C. The basis for the box specification is Steel City and shall represent the minimum level of construction. Material manufactured by RACO and Hoffman shall be permitted to bid these specifications.

PART 2 PRODUCTS

2.01 Conduits (600 Volt and less)

A. All exterior above grade conduits shall be rigid steel conduit or intermediate metal conduit with threaded couplings and fittings.

1. Rigid metal conduit shall be hot-dip galvanized steel. Threads shall be hot galvanized after cutting. Conduit shall be produced in accordance with UL Safety Standard #6 and ANSI C80.1.
2. Intermediate metal conduit shall be hot galvanized steel OD with an organic corrosion resistant ID coating. Threads shall be hot galvanized after cutting. Conduit shall be produced in accordance with UL Safety Standard #1242 and ANSI C80.6.

B. All other conduit shall be E.M.T. thinwall with compression, or setscrew couplings and fittings.

1. Electrical metal tubing shall be hot galvanized steel OD with an organic corrosion resistant ID coating. Conduit shall be produced in accordance with UL Safety Standard #797 and ANSI C80.3
2. Provide setscrew couplings and fitting for NEMA 1 installations and compression couplings and fitting for NEMA 3R installations as a minimum.

2.02 Metallic Surface Raceway

A. Where shown, or needed for existing renovation work, surface raceway shall be Hubbell Series 4000 two channel raceway with full metal divider for multi-outlet installations as indicated.

B. Raceway system shall be specifically designed for category 5e wiring systems complete with engineered large radius fittings to maintain 1-1/4" heading radius for data cabling as specified by TIA/EIA standards.

C. Provide with all fittings and outlet boxes, on centers indicated, as required for the complete non-metallic raceway system, including but not limited to:

1. 4047BXIV single gang cover for outlets
2. Miscellaneous device bracket for outlets and telecom devices
3. 4047C1IV single gang cover for telecom devices

2.03 Non-Metallic Surface Raceway

A. Surface raceway shall be Hubbell Wall Trak PW2, Model PW2BC5 non-metallic latching, 2 compartment raceway.

B. Raceway system shall be specifically designed for category 5 wiring systems complete with engineered large radius fittings to maintain 1-1/4" heading radius for data cabling as specified by TIA/EIA standards.

C. Provide with all fittings and outlet boxes, on centers indicated, as required for the complete non-metallic raceway system, including but not limited to:

1. PDB12S single gang, standard depth device box for outlets with KP8 covers
2. Wiring devices per Section 26 27 26
3. PDB12S single gang, standard depth data box for computer ports with KP14 blank covers.

D. Non-metallic raceway shall be constructed of off-white rigid PVC material complete with UL listing with self-extinguishing comparable with UL Standard 94VO.

2.04 Junction and Pull Boxes

A. Junction and pull boxes shall be galvanized metal of the knockout type.

2.05 Rough-in Boxes

A. All rough-in boxes for devices shall be of the Steel City, or equal, galvanized knockout type sized per manufacturer’s recommendations.

PART 3 EXECUTION

3.01 Conduits (600 volt and less)

A. Single tubes will be used for all circuits, but more than one circuit may be carried in each conduit, provided the number of conductors and size of conductors are proportioned in accordance with the rules of the NEC, and conduits are amply large to allow for removal and replacement of conductors when necessary. (40% fill rate.)

B. Where conduit is carried in walls, it shall be thoroughly bedded and not visible. In placing conduits, they shall be so located as to not weaken or injure the construction of the building in any way, and the installation of these shall be approved by the Architect.

C. Joints must be made so the ends of the pipes come together in the center of the coupling.

D. All conduit shall be run parallel or perpendicular to the building surfaces.

E. All conduit shall be concealed except in mechanical and electrical rooms and at all electrical panelboards.

F. Before pipes are covered with concrete, they shall be fished by the Contractor with a steel fish tape to insure that there is no obstruction in the pipes.

G. All empty conduit systems shall be provided with pull strings.

3.02 Surface Mounted Raceway

A. Surface metal raceway and fittings shall meet all requirements of the National Electrical Code and shall be UL listed and in full compliance with their standard #UL-5.

3.03 Junction and Pull Boxes

A. Junction and pull boxes shall be provided throughout in accessible locations. Locations shall be approved by the Architect or his representative before installation.

B. All junction boxes in fire alarm system shall be sprayed red and labeled "Fire Alarm".

3.04 Rough-in Boxes

A. Rough-in boxes installed in concrete and masonry construction shall be straight and level. The Electrical Contractor shall work closely with the General Contractor and masons to insure proper installation to the satisfaction of the Architect.

End of Section 28 05 33

SECTION 28 05 53 - SAFETY AND SECURITY IDENTIFICATION

PART 1 GENERAL

1.01 Description of Work

A. Provide all items of identification as specified.

PART 2 PRODUCTS

2.01 Safety and Security System

A. All fire alarm cables and conduits shall be tagged as to what room(s) and/or devices is served at each pullbox, outlet box, and termination point. Provide the Owner with a typewritten schedule clearly denoting tagging system.

B. All CCTV system cables and conduits shall be tagged as to what room(s) and/or device(s) is served at each pullbox, device box, and termination point. Provide the Owner with a typewritten schedule clearly denoting tagging system.

PART 3 EXECUTION

End of Section 28 05 53

SECTION 28 31 03 - FIRE ALARM SYSTEM - VOICE

PART 1 GENERAL

1.01 Scope and Related Documents

A. The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations in connection with the installation of the Fire Alarm System as shown on the drawings and as herein specified.

B. The requirements of the conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.

C. The complete installation is to conform to the applicable sections of the Uniform Building Code (UBC), Uniform Fire Code (UFC), National Fire Protection Association (NFPA), Americans with Disabilities Act Accessibility Guidelines (ADAAG), Local Code Requirements and National Electrical Code (NEC) and these specifications, with the stricter requirements governing in case of possible variance.

D. The work covered by this section of the specifications is to be coordinated with the related work referenced here, or as specified elsewhere under the project specifications.

1.02 Quality Assurance

A. Each and all items of the Fire Alarm System shall be listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "UL" label. All control equipment shall be listed under UL category UOJZ as a single control unit, and the system controls shall be UL listed for Power Limited Applications per NEC 760. All circuits must be marked in accordance with NEC Article 760-23. Partial listings shall not be acceptable.

B. The equipment and related services shall be provided by a manufacturer, independent dealer, or distributor capable of complying with all qualifications specified and to provide required documentation verifying such. The manufacture shall have been engaged in production of this type (software driven) equipment for at least ten (10) years. The services provider shall have a fully-equipped local service organization, established for a minimum of (5) five years (including, but limited to, ample stock of standard service parts, emergency "next flight out" shipping capabilities for non-standard parts, 24-7 emergency service capabilities, and the ability to provide with a maximum response time (service technician ON SITE) of (2) two hours.

C. All control equipment shall have transient protection devices to comply with UL 864 requirements.

D. Provide documentation verifying compliance with the specified certification, that all persons involved with this project shall be NICET Level III certified in the field of "Fire Protection Engineering Technology, 003", and the sub field of "Fire Alarm Systems, 03". This documentation shall be submitted as a part of the submittal package for "approved" suppliers, and shall be submitted as a part of the "request for approval" by all potential suppliers not pre-approved.

1.03 Submittals

A. Provide complete sets of submittals per the general conditions and shall include a minimum of:

1. Verification of NICET certification.
2. Plan size, CAD produced system drawings including:
   a. Wiring diagrams.

b. Locations of all equipment.
c. Individual device addresses, indicated at all addressable device.
d. Interconnection details of all devices, controls and interfaces to equipment supplied by others.
e. Layout dimensions.

3. Manufacturer's installation instructions.
4. Complete product data sheets for equipment proposed, with highlighted, or arrowed identifications of component descriptions, finishes, UL listings, and any other pertinent system information.
5. Complete sequence of operations of all functions of the system.
6. Standby battery sizing documentation. Provide a complete chart, or spreadsheet, listing all components, indicating individual and cumulative power requirements by type, and showing battery standby required, verses actual.
7. Any additional documentation required to properly describe all functions and components needed to configure a complete and operable system.
8. All documentation clarifying interconnections related to coordination between other equipment, or trades and this system, as specified here, or in other portions of the project's specification, or indicated on the drawings.
9. Submit any other pertinent project record documents.

1.04 General

A. Provide a Networked System as described herein and as shown on the plans, which shall:

1. Provide closed loop initiating device circuits with individual device supervision, individual indicating appliance circuit supervision, incoming and standby power supervision.
2. Include network control panels, manual pull stations, automatic fire/smoke and/or thermal detectors, remote annunciators, remote control devices, all wiring, and/or cable (reference Section 26 05 23- Control and Data Transmission Cable Requirements), conduit, terminations of devices, standard and special boxes, junction boxes, cabinets and miscellaneous hardware, to be wired, connected, and left in first class operating condition.
3. Provide all necessary system development and engineering services necessary to make a complete and functioning fire alarm system as hereinafter specified and shown on plans.
4. Provide any equipment not specifically mentioned in this specification or not shown on the drawings, but required for the operation of the system proposed. All required components shall be furnished and installed within the contract covering this project. Any needed additions, or alterations to system components, shall be noted as such on the appropriate system information documentation, and shall be made part of the submittal package.
5. Upon completion of the project, provide required documentation, drawings, operational and maintenance training (with required video tapes), and owners manuals.
6. Provide qualified laborers to install, supervise, certify proper operation and demonstrate the complete system operation, as requested, to all persons designated to accept it.
7. Provide completion to the entire system within the designated contract period.

B. Equipment descriptions and/or catalog numbers specified under this section are those of Simplex and constitute the type, product quality, material, and desired operating

features.

C. All equipment provided shall be the standard product of an approved manufacturer and shall display the manufacturer's name on EACH component.

D. Approved equipment manufacturers and suppliers:

1. Simplex Time Recorder Co.
2. Electronic Contracting Company, with Cerberus Pyrotronics, Faraday and Honeywell manufactured equipment
3. Ted Systems, LLC with Notifier
4. Global Fire Control, Inc.

E. Equipment manufacturers, suppliers, distributors and/or representatives not shown as "approved", shall be evaluated for approval by the engineer and special systems consultant. To gain approval the contractor shall submit full system detailed documentation, in writing, a minimum of ten (10) working days prior to the bid date. These documents shall include a minimum of:

1. Detailed equipment data/cut sheets, documenting complete and accurate information on each component specified, shown on the drawings, or required by the supplier, to provide a fully operational system for this project. Documentation shall be detailed, with ALL details highlighted, arrows pointing to, or in some other format, clearly identified, and shall include additional descriptions to clarify any detail which could be misunderstood during the review process. All descriptions, and explanations shall provide the reviewer clear and concise information of how the submitted equipment meets or exceeds each item specified and/or shown on the construction documents. Also provide a reference list, documenting a minimum of (5) five projects completed within the last (3) three years and include the following items for EACH reference:
   a. Name/Address/Owner of Project
   b. Contact Person/Title/Phone Number
   c. Completion Date of Project
   d. Complete Equipment List (BOM)
   e. Length of time the manufacturer, supplier, dealer, or representative has actively provided the type of equipment installed.
   f. Details of each project's configuration and operation.
2. Documentation verifying compliance with all other non-equipment qualifications in this specification and other construction documents.
3. Any of the required documentation that is deemed to be unclear, misleading, or incomplete, will cause the request for approval will be rejected in total.
4. If the applicant has any questions about the above requirements, or if allowance of time for a second submittal to request approval is desired, it is the responsibility of the requester to allow ample time to have ALL FINAL information to the engineer and/or special systems consultant within the (10) ten working day deadline.

F. Systems equipment shall be jointly guaranteed by the Electrical Contractor and the Systems manufacturer for a period of one year from date of substantial completion of the entire project.

G. The system be a Fire Alarm Network, including a Network Display Unit Voice Status Command Center (NDU), and remote Network Voice Universal Transponders (UT) controls, monitoring addressable True Alarm detection and other addressable initiating appliances, indicating throughout through audio and visual alarm indicating appliances,

annunciating remotely, within the buildings and at the audio and visual indications, transmitting system alarm, trouble and test conditions to the local fire department through a UL listed central station facility, operate emergency auxiliary control functions, and monitor alarm initiations from, and transmit alarm indications to the existing student union fire alarm control panel.

H. Install the NDU control in a supervised area, as indicated of the drawings.

I. Network components shall consist of:

1. A Network Display Unit (NDU) Voice Status Command Center (mounted in a public location as indicated on the drawings).
2. Network Voice Universal Transponders (UTs) (mounted remotely throughout the complex as indicated on the drawings).
3. Network control equipment shall include all needed control circuiting, PC boards, software, onboard programming, power supplies, amplifiers, Mapnet communication, configurable control circuits, adequate relay hard points, batteries and adequate cabinet space to properly operate all interconnected equipment, plus each shall have unused cabinet to allow installation of 10% additional control equipment for future expansion.
4. Wiring interconnections of the network control panels (NDU and UTs), “Signaling Line Circuits, (SLC)”, shall be interconnected in a “Token Ring” configuration “Class A (Style 7)”, to provide a high quality communications survivability, with alarm, trouble and alarm receipt capability during abnormal conditions, NFPA 72, 3-6.

1.05 Operation

A. Fire alarm system shall be electrically supervised, master coded, selective signaling, device indicating, automatic alarm type, operating from break glass stations, True Alarm type fire/smoke sensing devices (some with audible alarm devices located within the base), and/or thermal detectors, and signaling through audible and visual alarm indicating devices.

B. Special Alarm Operations - required within building One (1) Suites (A suite includes the two sleeping rooms and the adjoining common area, with lavatory and bathroom and exiting to the hallway):

1. Smoke sensors: Program to alarm at Two (2) levels of Smoke Density:
   a. Level One (1), at 1.5% obscuration.
   b. Level Two (2), at 2.5% obscuration.
2. Alarm Indicating Appliances installed within suites (which shall include smoke sensor base mounted audio alarm devices in standard suites, and combination audio/visual units in handicapped suites):
   a. On a level “One (1)” alarm, from a single sensor in a sleeping room, or the common lavatory/entry area:

      - Alarm all indicating appliances within that suite.
      - Activate the “Supervisory” audio and visual indicating appliances on the NDU, and all remote annunciation equipment.
      - Do Not:

      .1.05.B.2.a..1. Activate the general alarm indicating devices.

      .1.05.B.2.a..2. Transmit the alarm to the local fire department.

.1.05.B.2.a..3. Cause any auxiliary emergency control functions to operate.

b. On a level “One (1)” alarm, from multiple sensors, or on a level “Two (2)” alarm, from any single sensor, located within a suite:

- Operate all alarm indicating appliances within that suite.
- Operate all alarm indicating appliances in other suites and in the common hallway areas, in that wing and on that level of the building.

3. Activate the “Fire Alarm” audio and visual indicating appliances on the NDU, and remote annunciation equipment.
4. Immediately transmit the alarm to the local fire department.
5. Operate all auxiliary emergency control functions, associated with that wing and level of the building.

C. General Alarm Operations - on an alarm from any initiating appliance within a “common area” (hallway, stairwell, connecting lobby, etc.) shall cause the following:

1. All alarm indicating appliances to operate throughout the appropriate building grouping, depending on the alarmed device(s).
2. Activate the “Fire Alarm” audio and visual indicating appliances on the NDU, and remote annunciation equipment.
3. Immediately transmit the alarm to the local fire department.
4. Operate all auxiliary emergency control functions throughout the appropriate building grouping, depending on the alarmed device(s).

D. The fire alarm control panel shall allow for loading or editing special instructions and operating sequences as required. The system is to be capable of on site programming to accommodate and facilitate expansion, building parameter changes or changes as required by national and/or local codes.

1. All software operations are to be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory.
2. The ability for selective input/output control functions based on ANDing, ORing, NOTing, timing and special coded operations is to also be incorporated in the resident software programming of the system.
3. To accommodate and facilitate job site changes, addressable and non-addressable initiation circuits shall be individually configurable on-site to provide either alarm and trouble operation, alarm only, trouble only, current limited alarm, no alarm, normally closed device monitoring, a non-latching circuit, or alarm verification circuit.

E. Provide a “Six Unit” fire alarm control cabinet, the largest single sized control equipment cabinet available, at each designated UT and at the NDU locations, and if required, a second cabinet of the same size, to provide adequate space for current control equipment and batteries, and the ability to add a minimum of 10% additional control equipment, as future needs may require. The “Six Unit” fire alarm control cabinet indicated, has dimensions of 52 1/8” H, x 25 ¾” W, x 6 ¾” D., and are specified with the intent to provide uniformity throughout these controls, space for potential expansion or alterations, due to future code requirements, or equipment updates, without requiring replacement of these cabinets.

F. Peripheral devices shall be programmed by the selection of an Eight (8) dip switch type switch assembly (of the common type used in the computer industry), to set the binary

address of each addressable device. Rotary switches, or jumper wires used to set the address of peripheral devices shall not be allowed, due to the probability of loosening, or accidental movement, causing programming changes, or loss. Solid state peripheral programming will be acceptable when the following parameters are meet in full. The equipment supplier shall include within this project:

1. Provide to the customer, or his designee, all required hardware, software, needed licensing and complete technical training.
2. Continue to provide provided these items and services, throughout the time this system and the supplied peripheral devices are in operation within the facility, and/or throughout the time they meet applicable UL standards.
3. Provide two certified letters documenting agreement to continue providing all services, equipment, software, licensing, and any other items needed to provide this customer the ability to program peripheral devices, as required, without the need to have on site technical services provided be the equipment supplier. One letter shall be signed by the equipment manufacturer and the second letter shall be signed by the local factory representative, distributor, or dealer supplying this equipment.
4. The signed letters shall be submitted as a part of the submittal package for this project. By not providing such documentation shall cause rejection of the total submittal, with no opportunity for reconsideration of that equipment for the project.
5. The above hardware, software and training shall be provided within (30) thirty days of the project's completion date. The supplier shall receive a letter, signed by the customer and, if used, the customer's designated service provider, confirming the completion and acceptance of this portion of the project.

G. Control panel and any remote annunciator status indications shall:

1. Be displayed on a minimum of an 80 character LC Display, located on the front plate of the control panel and visible through the locked door and on the face of any remote annunciator(s). They shall be capable of displaying alphanumeric letters in upper and lower case fonts. A minimum of 40 characters each, shall provide normal operation on the control panel's standby batteries, during any loss of normal operating power, and the display shall indicate:
   a. The custom point location label, (i.e. North hallway at Room 101).
   b. The device type identifier (i.e. smoke, pull station, initiating or indicating circuit, or status of any other supervised component of the system), and point status (i.e. alarm, trouble).
   c. These characteristics relative to any condition of a point shall be displayed simultaneously on the LC Display.
   d. Systems not capable of such a display on the panel faceplate shall provide a CRT display meeting the above requirements, which shall include battery standby, adequate to provide full operation during a normal power failure, for the same time required for the fire alarm control panel.
   e. The following shall all display in the above formats:

      - In a system normal condition, display a "SYSTEM NORMAL" message and the current time and date.

      - In a system abnormal condition, display the custom point location label, the type of device and the point status.

- The total number of alarms, supervisory, and trouble conditions shall be displayed along with a prompt to review each list chronologically. The end of the list shall be indicated.

f. The LC Display shall be to identify the system information, but shall not cause a false alarm to be sounded.

2. Light the appropriate LED:
   a. In an Alarm or Supervisory mode, the appropriate Red LED shall light.
   b. In an Abnormal (Trouble) mode the appropriate Amber LED shall operate. Each in a flashing mode, before the condition is properly acknowledged.
   c. After all the points have been properly acknowledged, the appropriate LED (s) shall glow steady.
3. Sound audible signal
   a. In a Pulsing arrangement, for alarm conditions.
   b. In a steadily arrangement, for trouble and supervisory conditions.
   c. Silence the audible signal by pressing the appropriate acknowledge button.
   d. Resound the audible trouble signal at preprogrammed time intervals to act as a reminder that the fire alarm system is not 100% operational. Both the time interval and the trouble reminder signal duration, shall be programmable (as approved by the local AHJ), to suit the owner's application.
4. Provide the capability to protect all acknowledge functions with Passcodes to block the user from acknowledging functions it they have insufficient privilege to acknowledge such conditions. Systems not capable of such password protected manual command operations, shall provide key operated switches for these functions. Function key switches shall be keyed differently from any other keyed switches or locks used within the system.

H. Alarm initiating and indicating device wiring shall be electrically supervised against open circuit faults. Individual visual annunciation shall be provided for electrically supervised alarm initiating devices.

I. Alarm initiation controls shall be equipped with resound capabilities, which shall provide a means of silencing audible alarm signals originated by one device or multiple initiating devices, but allows the alarm indicating circuits to operate again should a subsequent device(s) be actuated.

J. Alarm Silencing.
   1. When the Audible "Alarm Silence" button is pressed, all audible alarm indicating appliances shall be deactivated.
   2. Notification appliances shall not be deactivated during the "Alarm Silence Inhibit" mode, when programmed.

K. System Resetting
   1. System Reset button shall be pressed to return the system to its normal state after all alarm conditions have been remedied.
   2. The LC Display shall step the user through the reset process with simple English language messages. Messages shall provide operator assurance of the sequential steps (i.e. "IN PROGRESS", "RESET COMPLETED", and "SYSTEM NORMAL") as they occur, should all alarm conditions be cleared.
   3. Should an alarm condition continue to exist, the system will remain in an abnormal state. System control relays shall not reset unless overridden manually.

The panel audible signal and the Alarm LED shall be on. The display will indicate the total number of alarms and troubles present in the system along with a prompting to review the points. These points will not require acknowledgment if they were previously acknowledged.

4. If any alarm condition remains for more that Five (5) minutes after being acknowledged and the audible signals have been silenced, but without the cause of the alarm being remedied and the system being completely reset, the fire alarm control panel shall sound all alarm notification devices again.
5. Should the Alarm Silence Inhibit function be active, the “System Reset” key press will be ignored and a “RESET INHIBITED” message will be displayed for a short time to indicate the action was not taken. For operator assurance, a “RESET NO LONGER INHIBITED” message will be displayed when the inhibit function times out.

L. Function Keys, Display of System Detail Information shall be provided on the NDU to access status data for all system points. As a minimum, the status data shall include Disable/Enable Status, Verification Tallies of Initiating Devices, Acknowledge Status.

M. Alarm verification operation shall be optional, and if in effect, upon the activation of any system smoke sensor, whereby the panel will reset the activated detector and wait for a second alarm activation. If, within one (1) minute after resetting, a second alarm is reported from the same or any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within one minute the system shall resume normal operation. The Alarm Verification shall operate only on smoke sensor that has communicated the level of smoke density programmed in the control panel, which will cause an alarm. Other activated initiating devices shall be processed immediately. The alarm verification operation shall be selectable by group of devices. The Control panel shall have the capability to display the number of times a sensor has gone into a verification mode.

N. History Logging shall be in addition to any required printer output, the control panel shall have the ability to store a minimum of three hundred (300) events in an alarm log plus a minimum of three hundred (300) events in a separate trouble log. These events shall be stored in a battery protected random access memory (RAM). Systems not having discrete alarm and trouble logging memory shall include an alternate supervised (eg: floppy drive, tape cassette) historic recording method with battery backup. Real time and date shall accompany all history event recording.

O. Walk Test with History Logging:

1. The system shall be capable of being tested by one person. While in testing mode, the testing shall be programmable for an audible, or silent test. Upon the alarm activation of an initiating device the action shall be silently logged as an alarm condition in the historical data file. The panel shall automatically reset itself after logging of the alarm.
2. The momentary disconnection of an initiating or indicating device circuit shall be silently logged as a trouble condition in the historical data file. The panel shall automatically reset itself after logging of the trouble condition.
3. Optionally, the walk test sequence will have the capability of activating the alarm indicating appliances for a maximum of 2 seconds to signal a unique code associated to the alarm zone. If this option is selected, any momentary opening of an initiating or indicating appliances to sound for 4 seconds to indicate the trouble condition. Should the walk test feature be on for an inappropriate programmable amount of time, it shall revert to the normal mode automatically.

4. The actuation of the enable “Walk Test” program at the control panel shall activate the “Walk Test” mode of the system which shall cause the following to occur:
   a. The city connection circuit shall be disconnected.
   b. Control relay functions shall be by passed.
   c. The control panel shall show a trouble condition.
   d. The alarm activation of any initiation device shall cause the audible signals to pulse one round of code identifying the initiation circuit (e.g.: an activated smoke detector connected to Zone 4 shall pulse the audible signals 4 times in rapid succession.
   e. The panel shall automatically reset itself after signaling is complete.
   f. Any momentary opening of an initiating or indicating appliance circuit wiring shall cause the audible signals to sound for 4 seconds to indicate the trouble condition.
5. The control panel shall have the capability of 8 distinctive “Walk Test” groups, whereby one group of points may be in a testing mode and the other (non-testing) groups may be active and operate as programmed per normal system operation. After testing is considered complete, testing data may be retrieved from the system in chronological order to ensure device/circuit activation.
6. Should an alarm condition occur from an active point, not in walk test mode, it shall perform all standard programmed alarmed sequences. Suppliers of systems not having this feature as functionally specified above shall include a two (2) year testing agreement meeting the requirements of NFPA-72H in their base bid quotation.

P. LED Supervision: LED Supervision shall be for all network control panels and slave module LED’s, supervised for burnout or disagreement. Should a problem occur, the panel shall display the module and the LED location numbers to facilitate location of that LED.

Q. Access Levels
1. The fire alarm control panel shall support a minimum of Four (4) access levels. Passcodes shall consist of up to Ten (10) digits. Changes to Passcodes shall only be made by authorized personnel.
2. In order to maintain security when entering a passcode, the digits entered will not be displayed. All key presses will be acknowledged by a local audible momentary tones.
3. When a correct passcode is entered, an “ACCESS GRANTED” message shall be displayed. The new access level shall be in effect until the operator leaves the keypad inactive for ten (10) minutes or manually logs out.
4. Should an invalid code be entered, the operator shall be notified with a message and shall be allowed up to three chances to enter a valid code. After three unsuccessful tries, an “ACCESS DENIED” message shall be displayed.
5. Access to a level will only allow the operator to perform all actions within that level and all actions of lower levels, not higher levels.
6. The following keys/switches shall have access levels associated with them:
   a. Alarm Silence
   b. System Reset
   c. Set Time/Date
   d. Manual Control
   e. On/Off Auto Control
   f. Disable/Enable

g. Clear Historical Alarm Log
h. Clear Historical Trouble Log
i. Walk Test
j. Change Alarm Verification

7. Acknowledge keys shall also, if requested by the customer, or required by the AHJ, be capable of being programmed to require privileged access to acknowledge points. If the operator presses an acknowledge key with insufficient access, an error message will be displayed. The points will scroll with each key press to view the points on the list, but the points will not get acknowledged in the database.
8. The acknowledge functions may be passcode protected if the user has insufficient privilege to acknowledge such conditions. A message shall indicate insufficient privilege but allow the user to view the points without acknowledging them. Should the user sufficient privilege to acknowledge, a message will be displayed informing the user that the condition has been acknowledged.
9. Systems not capable of password protected manual command operations shall provide key operated switches for these functions. Function key switches shall be keyed differently from any other keyed switches or locks used within the system.

R. Detection Operation

1. Photoelectric smoke sensors shall be smoke density measuring devices having no self contained alarm set point (fixed threshold). The alarm decision for each sensor shall be determined by the control panel. The control panel shall determine the condition of each sensor by comparing the sensor value to the stored values.
2. The control panel shall maintain a moving average of the sensors' smoke chamber value to automatically compensate (move the threshold) for dust and dirty conditions that could affect proper detection operations. The system shall automatically maintain a constant smoke obscuration sensitivity for each sensor (via the floating threshold) by compensating for environmental factors. Smoke sensor obscuration sensitivity shall be adjustable from .2% to 3.7% / ft. obscuration. This shall be set in percentage of smoke obscuration, not a voltage, or other indication.
3. The system shall automatically indicate when an individual sensor needs cleaning. When a sensor's average value reaches a predetermined value, a "DIRTY SENSOR" trouble condition shall be audibly and visually indicated at the control panel for the individual sensor. Additionally, the LED on the sensor base shall glow steady giving a visible indication at the sensor location. If a "DIRTY SENSOR" is left unattended, and its average value increases to a second predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control panel for the individual sensor. To prevent false alarms, these "DIRTY" conditions shall in no way decrease the amount of smoke obscuration necessary for system activation. For scheduling of maintenance, the control panel shall be able to generate an "ALMOST DIRTY" indication for any sensor approaching a "DIRTY" trouble condition. A "DIRTY SENSOR" audible indication shall be able to be silenced at the control panel, but the visual indication shall remain in operation. An "EXCESSIVELY DIRTY SENSOR" audible trouble condition shall NOT allow be able to be silenced, until the device is replaced, or properly cleaned.
4. The control panel shall automatically perform a daily self-test routine on each

sensor which will functionally check sensor electronics and ensure the accuracy of the values being transmitted to the control panel. Any sensor that fails this test shall indicate a “SELF TEST ABNORMAL” trouble condition with the sensor location at the control panel.

5. An operator at the control panel, having a proper access level, shall have the capability to manually access the following information for each sensor:
   a. Primary status
   b. Device type
   c. Present average value
   d. Present sensitivity selected - Values shall be in “percent of smoke obscuration” format so that no interpretation is required by the operator.
   e. Peak detection values *
   f. Sensor range (normal, dirty, etc.)
6. An operator at the control panel, having a proper access level, shall have the capability to manually control the following for each sensor:
   a. Clear peak detection values
   b. Enable or disable the point
   c. Clear verification tally
   d. Establish alarm sensitivity
   e. Control a sensor’s relay driver output
7. If the proposed system does not have the capabilities defined in the above paragraphs, it will not be approved.
8. It shall be possible to program the control panel to automatically change the sensitivity settings of each sensor based on time-of-day and day-of-week (for example, to be more sensitive during unoccupied times and less sensitive during occupied periods). There shall be seven (7) sensitivity settings available for each sensor.
9. The control panel shall have the capability of being programmed for a pre-alarm or two-stage function. This function allows an indication to occur when, for example, a 2.5% sensor reaches a threshold of 1.5% smoke obscuration.
10. For increased smoke detection assurance, all individually addressed smoke sensors shall be provided with the capability of programmable alarm verification. Only a verified alarms, when programmed, and when approved be the local AHJ, shall initiate the alarm sequence operation. This function shall be able to be activated or deactivated at the control panels with the proper level of password.
    a. The activation of any system smoke detector shall initiate an Alarm Verification operation whereby the panel will reset the activated detector and wait for a second alarm activation. If, within one (1) minute after resetting, a second alarm is reported from the same or any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within one (1) minute the system is to resume normal operation. The Alarm Verification is to operate only on smoke detector alarms. Other activated initiating devices shall be processed immediately, The alarm verification operation is to be selectable by device.
    b. The control panel shall have the capability to display the number of times a device has gone into a verification mode.
11. A minimum of 1000 individually identified sensors as well as programmable conventional initiating devices and/or indicating appliance circuits shall be supported within a single control panel.
12. Sensor BASES shall be addressed, with a unique address for each unit, set by

positioning the proper sequence of (8) eight dip switches to properly communicate with the control panel. This shall allow interchanging of smoke sensors after cleaning, without having to readdress individual units, if sensors are reinstalled at a different location after it has been cleaned. Systems having the smoke sensor (head) addressable will not be allowed, unless other portions of this specification addressing this issue is met or exceeded. Sensor design shall provide compatibility with other normally open fire alarm detection loop devices (heat detectors, pill stations, etc.)

13. Sensor bases noted as such on the drawings or in other areas of this specification, shall include integral piezoelectric sounders, or supervised auxiliary relays. Either device shall be individually programmable, and capable of operating separately from the sensing device, but not requiring a separate and distinct address, to operate as specified and indicated. Both the sounder and relay devices shall have separate power from the control panel
    a. The piezoelectric sounders shall produce 88 dBA minimum @ 10', with a low current draw of 17 mA.
    b. The supervised auxiliary relay units shall control devices indicated. The relays shall have DPDT contacts, rated at 2 A @ 28 V DC, for transient suppressed loads.
14. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.

S. Audible alarm indicating appliances shall be speakers capable of producing quality voice and tone reproduction, with control equipment capable of automatically outputting digitized tone and voice messages.

T. Visual alarm indicating devices shall be visible from any point where they are installed, and shall produce adequate light intensity to be detected by persons not facing directly toward a device. Devices shall be installed in a configuration within each area requiring a visual alarm indication device as required by ADAAG requirements. Visual alarm cabling shall be shielded throughout to prevent electrical interference with other circuits installed in close proximity.

U. Include a Fire Alarm Network, as described within other portions of this specification, it shall monitor addressable True Alarm detection and other addressable devices, indicate throughout the buildings as detailed elsewhere in this specification, indicate all conditions at the Network Display Unit (NDU) and on each remote LC Display annunciator through audible and visual indications. Alarm and Trouble conditions, indicated by building, shall be annunciated on the existing Honeywell monitoring system at the campus power center, and transmit alarm, trouble and required tests with the DACT to the approved central station facility in the configuration specified.

V. RS-232-C Output: The Fire Alarm Control Panel shall be capable of operating remote CRT's and/or printers. The output shall be serial ASCII from an EIA RS-232-C connection with an adjustable baud rate of 300, 1200, 2400, 4800 or 9600 to allow use of compatible UL864 listed CRT/Keyboard or printer.

W. One Way Voice Communications

1. The network shall incorporate one-way voice communication and tone generating capabilities.
2. A central audio control module shall be provided for the necessary alarm message/tone generation, main and remote microphone connections, music inputs, and mixer/pre-amplifier circuits. Continuous supervision shall be provided along with specific information as to the type of failure should a problem occur

(eg. main microphone trouble, tone trouble, etc.). Audio outputs shall have individual gain control.

3. Audio power amplifiers shall be furnished with a self-contained filtered 24VDC power supply, transformer, and amplifier monitor circuits. The amplifiers shall provide a 25 Volt RMS output with a frequency response of 120 Hz to 12,000 Hz. Provide sufficient amplification to operate all system speakers simultaneously plus ten (10) percent spare capacity.
4. The speaker circuits shall be capable of supplying 25 Volt RMS audio power from the system amplifiers. Supervision for open, short, or ground fault conditions shall be provided. Individual and distinct trouble indications shall be provided for each fault.
5. Provide, as a minimum, the quantity of the speaker circuits indicated by the wiring shown on the drawings.
6. Digitized tones for alarm (slow whoop) and auxiliary requirements (wail, horn, chime, etc.) shall be provided.
7. Pre-recorded digitized voice messages shall be provided for automatic transmission to building occupants during alarm, or weather emergency conditions. Provide:
   a. Two (2) messages under this contract, one indicating a “FIRE” emergency, one a “Weather” emergency.

      - Messages shall be pre-recorded digitized P.N.I.S. (Positive Non-Interfering Successive) "voice coded", with automatic transmission to building occupants during alarm conditions.

      - Messages shall be a separate "voice code" Fire and Weather alarm conditions. Examples of "voice code" messages are as follows:

      - Fire – “An emergency has been reported, please walk to the nearest exit and leave the building”.

      - Weather – “A weather emergency has been reported, please walk to your designated shelter area”.
   b. Automatic Voice Evacuation Sequence: The audio alarm signal shall consist of an alarm tone sounding from between 3 and 10 seconds, followed by the appropriate “Evacuation”, or “Take Cover” message, with the message being repeated at least Three (3) times. At the end of the voice message, the alarm tone shall resume. The alarm tone shall sound until the alarm silence switch at the fire alarm control panel has been operated. The message player shall be capable of transmitting a custom message of up to five (5) minutes long.
   c. The automatic message player shall not rely on a tape or other mechanical means of transmitting the evacuation message. Systems that use tape players must provide, as a minimum, a backup tape player designed to automatically operate (within 2 seconds) if the primary tape player jams or otherwise fails to operate.
   d. All audio alarm operations (speaker circuit selection and alarm tone/voice message timing variations) shall be activated by the system software so that any required future changes to the evacuation sequence can be facilitated by authorized personnel without any component rewiring.
   e. A self-contained speaker mounted on the front of the control panel, shall

provide the ability to test the messages without activation any alarm indicating appliance circuits and disturbing the occupants of the facility.

X. Manual Voice Paging Sequence

1. The system shall be configured to allow selective voice paging. Upon activation of any speaker manual control switch, two (2) attention getting beeps shall sound over the speakers indicating an impending voice message will occur.
2. If any speaker manual control switches are activated, the control panel operator shall be able to make announcements via the push-to-talk paging microphone over the pre-selected speakers.
3. Facility for total building evacuation and paging shall be provided to allow for activation of all speakers. This shall be accomplished by the means of an "All Circuit" switch.

Y. The NDU shall incorporate all network annunciation and controls required to properly monitor and control the system, including but not limited to:

1. An 80 character LCD display which shall indicate all alarms, supervisory service conditions and any troubles, in the format detailed in other portions of this specification.
2. A hand held, push-to-talk microphone shall be provided, recessed within a protective panel-mounted enclosure. The microphone shall be a noise-canceling communication type with a frequency range of 200 Hz to 4000 Hz and shall be equipped with a self-winding five foot coiled cable. An LED indicator shall be provided to indicate the microphone push-to-talk button has been pressed and speaker circuits are ready for transmission. The microphone shall be supervised for disconnection.
3. An audio control switch module, to provide manual access of audio operations for authorized personnel. The module shall include an "ALL Circuits" switch, "Aux Tone 1" switch, "Aux Tone 2" switch, tone generator stop switch, and "Audio Trouble Reset" switch. These switches and associated LED indicators shall be supervised for disarrangement or failure.
4. Individual speaker circuit switch modules, to provide manual access to each speaker circuit for authorized personnel. These switches and associated LED indicators shall be supervised for disarrangement or failure.

1.06 Alarm Sequence

A. The system alarm operation subsequent to the activation of any manual station, automatic detection device, or sprinkler flow switch, alarm shall operate as follows:

1. All audible alarm indicating appliances shall sound in a “Temporal Coded” fire alarm signal until silenced by the alarm silence switch at the control panel.
2. All visible alarm notification appliances (Xenon Strobes) shall display a continuous synchronized pattern until the system is reset.
3. All programmed auxiliary functions are to operate, any controlled air handling units to shut down, fire/smoke dampers, fire shutters, and any magnetically held smoke doors to close.

B. The DACT communicator shall transmit the alarm, (identified by type of alarm and the building in the alarm condition), digitally through the use of existing customer provided voice grade phone lines, to a UL listed central station facility. Configure and provide this feature as directed by the owner and approved by the local AHJ. The equipment supplier shall provide all needed documentation, as a part of the submittal package, to verify UL compliance of the central station to be used.

C. A manual evacuation switch shall be provided to operate the systems alarm indicating appliances. Other control circuits shall not be activated. However, an actual alarm take place during this operation, it shall be processed as described previously.

D. Alarm and trouble conditions shall be immediately displayed on the control panel and remote annunciators Alphanumeric LC Display.

E. If more alarms or troubles are in the system the operator may scroll to display new alarms.

F. Activation of an auxiliary bypass switch(s), shall override the automatic functions either selectively or throughout the system. The functions performed by these switches shall be decided between the owner, the local AHJ and the supplier, and shall be programmed as decided as a part of the project.

G. Alarms shall remain locked in until the alarm initiating device registering the alarm has been restored to normal and the fire alarm control panel has been reset by means of a reset switch located inside the fire alarm control panel, except that an acknowledge (silencing) switch to silence audible alarms without resetting the fire alarm control panel shall be provided inside the fire alarm control panel and at the remote annunciator.

1.07 Supervision

A. All auxiliary manual controls shall be supervised so that all switches must be returned to the normal automatic position to clear system trouble.

B. Capability for sprinkler system flow indicators and tamper switches (N/O contacts) being monitored individually by initiation device IAMS. These independent initiation circuits shall be labeled Supervisory Service and shall differentiate between water flow, tamper switch activation and wiring faults.

C. Each independently supervised device and circuit shall include a discrete LCD readout to indicate disarrangement conditions per circuit.

D. The incoming power to the system shall be supervised so that any power failure must be audible and visually indicated at the control panel.

E. A green “power on” LED shall be displayed continuously while incoming power is present.

F. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel.

G. The System Expansion Modules shall be electrically supervised for module placement. Should a module become disconnected from the CPU, the system trouble indicator must illuminate and audible trouble signal must sound.

H. The system shall have provision for disabling and enabling all dedicated/addressable circuits and/or addressable devices individually for maintenance or testing purposes.

PART 2 PRODUCTS

2.01 Network Control Panels

A. Where shown on the plans, provide and install Fire Alarm Control Panels. Construction shall be modular with solid state, microprocessor based electronics. The NDU shall incorporate:

1. An 80 character LCD display which shall indicate alarms, supervisory service conditions and any troubles,
2. A microphone for one way voice communication,
3. Manual switches with individual LED status indicators for alarm indicating

circuits, auxiliary controls required. Provide 10% extra such switches.

4. Programmable action keys for programmed to be able to return normal functionality to controlled devices after an alarm has been acknowledged and an acceptable password is entered, or for the bypassing of auxiliary functions, (i.e.: AHU, elevator, central station and door holder by-pass, to allow auxiliary functions to be operated normally, during repair, or testing functions).
5. Individual and independently supervised circuits each having a discrete panel readout to indicate disarrangement conditions per circuit.

B. Each network control panel shall:

1. Supply all required power, from internally mounted power supplies, at 24 volt DC power output.
2. Shall contain any additional components needed to meet the projects design criteria.
3. Provide adequate quantities of 2 amp, independently supervised, independently fused, and function selectable circuits installed within each network control cabinet. These circuits shall be individually configurable as alarm indicating appliance, monitor, or relay control circuits. Disarrangement conditions of any circuit shall not affect the operation of other circuits. Each indicating appliance circuits shall be configured Class B (Style Y), with audio and visual circuits separated.
4. Provide supervised auxiliary manual controls so that all switches must be returned to the normal automatic position to clear system trouble.

C. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel. A green “power on” LED shall be displayed continuously while incoming power is present.

D. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel. Batteries shall be located within each network control cabinet, NOT in separate enclosure(s).

2.02 Equipment Enclosures

A. Provide cabinets of the minimum size specified elsewhere in this specification, aforementioned equipment, including standby batteries (No separate battery shall be required, for up to 33 amp hour battery standby units). Submit sizing and control equipment layout configuration to the Engineer and special systems consultant in the submittal process, for approval. All control cabinets shall be equipped with locks (keyed alike with other components of the system). The NDU shall be equipped with a transparent door panel providing freedom from tampering yet allowing full view of the various lights and controls, and all remote control cabinets equipped with solid metal doors.

2.03 Power Requirements

A. The control panel shall receive 120 volt AC power from a dedicated circuit.

B. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 volt AC power in a normal supervisory mode for a period of Sixty (60) hours, with 5 minutes of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.

C. All circuits requiring system operating power shall be 24 volt DC and shall be individually fused at the control panel.

2.04 Mapnet Network

A. Communication with addressable devices: The system must provide communication with all initiating and control devices individually. All of these devices are to be individually annunciated at the control panel.

B. Annunciation shall include the following conditions for each point:

1. Alarm
2. Trouble
3. Open
4. Short
5. Ground
6. Device Fail/or Incorrect Device

C. All addressable devices are to have the capability of being disabled or enabled individually at the NDU's keyboard, with proper access clearance.

D. Up to 127 addressable devices may be multi-dropped from a single pair of wires. Systems that require factory reprogramming to add or delete devices are unacceptable.

E. The communication format must be a poll/response protocol to allow T-tapping of the wire to addressable devices and be completely digital. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address codes and check sum routines for the data transmission protocol. Systems that do not utilize full digital transmission protocol (i.e. that may use time pulse width methods to transmit data, etc.) will not be acceptable since they are considered unreliable and prone to errors.

F. Each addressable device must be uniquely identified by an address code entered on each device at time of installation. The use of jumpers to set address will not be acceptable due to the potential of vibration and poor contact.

G. Wiring type, distances, survivability and configurations shall be approved by the equipment manufacturer. The system must allow up to 2,500 feet wire length to the furthest addressable device. Class B (Style Y Signaling Line Circuit as defined by NFPA-72) communications will be provided where shown on the drawings. To minimize wire routing and to facilitate future additions, T-tapping of the communications channel will be supported for initiating devices. Indicating Appliance Circuits shall be Style Y, "Series/Parallel" with End of Line Supervision on each circuit.

2.05 Peripheral Devices

A. Addressable Devices:

1. The system control panel, over its two wire multi-drop channel, must be capable of communicating with all types of addressable devices specified. Addressable devices will be located as shown on the drawings.
2. All detectors shall be individual base and sensor type. Sensors shall be a twist-lock type base, and it shall be lockable, to prevent removal of the sensor by unauthorized persons. Addresses shall be set in the vase. They shall contain an LED that will flash each time it is scanned by the control panel (once every 4 seconds). When the control panel determines that a sensor is in an alarm or a trouble condition, the control panel shall command the LED on that sensor's base to turn on steady indicating the abnormal condition. Sensors which do not provide a visible indication of an abnormal condition at the sensor location shall not be acceptable.
3. Duct Smoke Detector Housings shall:

a. Be of the solid state and shall utilize the detector and base units specified above.

b. Utilize duct housing(s) shall utilize sampling tubes sized properly to have the “Intake” tube extend at least ¾ the width of the duct section, when the duct is less than three (3) feet, and to extend at least 2” longer than the width of the duct section, when it exceeds three (3) feet, and shall extend through a properly sized hole directly opposite it, to provide proper support for the sampling tube. All intake tubes shall be properly sealed with rubber stoppers while exhaust tubes must remain open. Sampling tube couplings shall be slotted to insure proper alignment of the sampling intake and exhaust tubes.

c. Duct detectors installed for smoke damper operation shall operate at no flow conditions.

d. Be installed before any “Temperature Control” devices are installed on ducts.

e. Be installed ONLY after having the supplier determines the proper location of each detector housing and the Engineer and/or the special systems consultant has approved the location.

f. Be in weather protected locations, not in exterior ductwork, or on exterior AHUs.

g. Have an alarm and power on LED visible through a transparent front cover.

h. Obtain their operating power from the supervised current in the fire alarm loop. Installation shall comply with NFPA-90A.

i. Be installed in a location, to allow for proper maintenance of the unit, to allow cleaning of the housing, smoke sensor and sampling tubes, by accessing them through the housing front cover.

j. Be possible to alarm any duct housing by using a test switch.

k. Install any required auxiliary relays, remote LED alarm indicators, and/or key operated test stations in an accessible location and in close proximity to unit it is connected to

l. Perform a “Air Differential Pressure Test” on each duct detector for proper airflow through the housing. Testing and documentation shall:
   - Be performed, with AHU’s operating normally, with all filters installed and dampers in place.
   - Have air flow measurements read in “Feet Per Minute” (FPM), NOT cubic feet per minute and shall be conducted using a “Dwyer Instrument Co., Michigan City, IN, Model 20026” (or equal), having a range of, 0 to 2” H2O differential pressure gauge.
   - Have airflow of 400 FPM minimum, and 4000 FPM. Maximum. Detectors used at smoke dampers shall operate down to 0 FPM.
   - Have all testing completed and having the required airflow obtained, before conducting the final test and certification of the system, or requesting acceptance of the system. It is the responsibility of this contractor, and at no extra cost to others involved in the project, to make any alterations or relocations of these devices required to obtain the air flow readings specified. To avoid such expense, it is also the responsibility of this contractor to raise any issue of concern regarding these devices to the proper persons in a time frame which would allow alterations to be made.
   - Test results shall be logged on the system working drawings at each

device location and transferred to the “As Built” drawings, which will become a part of the project documentation package.

4. Manual Pull Stations shall be addressable, double action (break glass) type, manufactured from high impact “Red” Lexan. Lettering shall be raised and painted “White”. Stations shall require the ‘T” shaped operating handle to be pulled out and down to mechanically latch the handle in the down position causing an alarm. Upon operation, the handle shall “Lock” in the alarm position and remain so until manually reset by opening the front of the station with a key common to all system locks. Stations which use Allen wrenches or special tools to reset, will not be accepted. There shall be no limit to the number of stations, detectors, or (ZAM), which may be activated or “in alarm” simultaneously. Mount semi-flush on a 4" flush box with a two gang trim ring.
5. Zone Adapter Modules (ZAM) shall be used for control of alarm indicating appliances and AHU systems shutdown, or other required operations. ZAM’s will be capable of mounting in a 4 11/16” square electrical outlet box 2 1/8” deep, with a 4 11/16” square extension ring 1 ½” deep. ZAM’s will include cover plates to allow surface or flush mounting. ZAM’s will receive their 24 volt DC power from a separate two wire pair running from an appropriate power supply. ZAM’s shall provide double pole double throw relay switching that can be used to connect through easily replaceable 2 amp fuses; a circuit of alarm indicating appliances to a power controlled devices requiring remote interfacing due to extended wiring distances. Controlled wiring requiring electrical supervision shall be Class B, Style Y version, and shall be supervised by an end-of-line device, or a “Power normally ON” type circuit. ZAM’s shall communicate the supervised wiring status (normal, trouble) to the fire alarm control panel and will receive a command to transfer the relay from the fire alarm control panel. ZAM’s shall be supervised and uniquely identified by the control panel. Device identification shall be transmitted to the control panel for processing according to the program instructions. Should a ZAM become non-operational, tampered with, or removed, a discrete trouble signal, unique to the device, shall be transmitted to, and annunciated at, the control panel. ZAM’s shall be capable of being programmed for its “address” location on the addressable device signaling line circuit. ZAM’s shall be compatible with addressable manual stations and addressable detectors residing on the same addressable circuit.
6. Individual Addressable Modules (IAM), shall be used for monitoring of normally open waterflow and valve tamper switches. IAM’s shall be provided for interfacing normally open direct contact devices to an addressable signaling line circuit. IAM’s shall be capable of mounting in a standard 4" electric outlet box with standard blank cover plate.
7. The remote serial annunciators shall provide an alphanumeric, 80 Character Liquid Crystal Display (LCD) that provides clear language information as to the point status (alarm, trouble, etc.), type of alarm (smoke detector, pull station, etc.), number of alarms on the system, and a custom location label. The annunciator(s) shall have a beige enamel finish. The annunciator shall communicate to the control panel over one twisted, shielded pair of wire and operating power shall be 24VDC and be fused at the control panel. Point-wired annunciators will not be considered as equal. Status information of each device may be individually displayed to investigate specific point detail. Four programmable control switches with associated LED’s are available for custom control functions.
   a. The annunciator shall indicate each alarm initiating device graphically.

Alarm and trouble conditions shall be indicated for each alarm initiating device.

b. Manual Control Switches shall be provided for the following:
   - Off Duty Function (silence audible alarm indications at that annunciator).
   - Future
   - Future
   - Future
   - Future

8. Other peripheral devices:

a. Visual indicating appliances (Xenon Strobe) shall be comprised of a Xenon flashtube, be entirely solid state and have shock-mounting arrangement to resist bulb failure due to vibration. These devices shall be UL listed and be capable of either ceiling or wall mounting. The polycarbonate lens shall be pyramidal in shape, having a multi-surface reflector used to provide symmetrical light output in key axis directions, visible from a 180 field of view. The front panel or bezel which is constructed of UL Listed Noryl, shall be “White” on all units mounted in finished locations, and the bezel may be inverted so that the lens, normally to the side of the audio device, can be mounted below the audible device. Visual units shall be of the stand alone type or be incorporated as part of the audio indicating appliance. Visual units shall be 4 wire connection type to insure properly supervised in/out system connections. Visual indicating appliances shall each flash at a minimum of 75 Candela on-axis. All visual signaling devices shall provide intensity so that the viewer can discern when they have been illuminated in ALL building areas when in alarm, regardless of the viewer’s orientation. Visual indicating appliances shall mount as an integral part of the audio alarm indicating appliance when “Audio/Visual” combination devices are indicated. When mounted individually, mount on a 4" flush box with a single gang trim ring.

b. Audible alarm indicating appliances shall be voice type speakers as indicated. They shall be polarized and shall be operated by a 25V RMS circuit. Speakers shall be 4" cone type UL/ULC listed, speaker/transformer baffle assembly and shall be usable for both emergency, background music and general paging applications. They shall be moisture repellant, fire retardant, designed for smooth frequency response of 400 - 4000 Hz (UL listed frequency response for fire alarm use), 125 - 12,000 Hz (frequency response for general signaling and auxiliary input uses), with minimal distortion. Power taps shall be 1/4, 1/2, 1, and 2 watts RMS, producing from 79 to 88 dBA (at respective taps, at 10 ft., with 1000 Hz input), as measured with conventional sound level meters. Units shall provide 4 wire connection to insure properly supervised in/out system connections. Housings shall be square, White color (in all finished locations), Red color (in all non-finished areas), shall be constructed of high impact flame retardant PC/ABS thermoplastic, and shall allow mounting individually, or be an integrated part of a “Audio/Visual combination alarm indicating appliance housing and shall mount semi-flush horizontally, directly to a standard 4" square 1 ½” deep flush mounted back box, with a 1 ½” extension ring. All audible alarm indicating appliances shall provide a minimum sound level of 15 dBA

above ambient sound levels in ALL building areas when in alarm.

c. Handicapped suite audio/visual alarm indicating appliances shall be combination 110 candela xenon strobe unit, a 1Hz flasher and with a polar distribution of the light (complying with UL 1971/ADA), and a Piezo type mini horn producing 90 dB @ 10 feet. These shall mount as a unit, on a Red trim plate. Units shall be wall mounted and shall mount at a height to the top of the lens of greater than or equal to 24" below the finished ceiling. These units shall operate with 24VDC, with diodes for electrical supervision of wiring. Semiflush mount on 4” square flush back boxes, with proper sized trim ring.

d. The exterior mounted audio/visual alarm indicating appliance shall be connected to a dedicated signal circuit, shall operate on any sprinkler system alarm condition, shall be mounted at the fire department connection point, as indicated on the drawings. This device shall be a red, vibrating type horn, producing a minimum of 87 dB (measured reverberant) output at 10’, and a 110 candela xenon strobe which shall flash at the UL 1971/ADA required speed, and shall have diodes for electrical supervision of wiring, operating on 24V DC, and shall include the proper adapter plate, gasket kit and shall be mounted on a weather-proof 2-gang surface box, with a fitted protection guard.

e. Provide waterflow switches, consisting of a cast aluminum pipe saddle which houses an electromechanical device to which is attached a corrosion-free, flexible, low-density polyethylene paddle. The paddle shall conforms be properly sized, conform to the inside diameter of the sprinkler pipe and shall sense all water movements. To prevent false alarms, the flow switch shall incorporate an adjustable retard mechanism between the paddle-operated stem and the alarm initiating contacts of (0-60 seconds). A tapped ½" conduit connection shall be provided. Verify proper size of the switches required with sprinkler system contractor. The sprinkler contractor shall properly install each flow switch and the electrical contractor shall properly wire the switch to the fire alarm system. Flow switch shall be UL listed for its intended purpose.

f. Provide sprinkler valve tamper switches. They shall be OSYS, or PIV type, depending on proper application, consisting of an acid treated cast aluminum housing with nickel plated parts to resist corrosion. Cover removal shall be supervised. Switch shall be provided with two sets of SPDT, N/O micro switch contacts. The sprinkler contractor is to properly install on each system tamper switches and the electrical contractor is to wire the switch. Tamper switches shall be UL Listed for its intended purpose.

g. Provide semi-flush wall mounted magnetic door holders. They shall have a minimum holding force of 25 lbs. The door portion shall have a stainless steel pivotal mounted armature with shock absorbing nylon bearing. Unit shall be semi-flush mounted on a standard single gang flush mounted back box provided by this contractor. These units shall allow a minimum of securely fasten both the magnet and armature to withstand 85 lbs. pulling force, to prevent pulling loose when the door is pulled away from the magnet while the magnet is energized. Door holders shall be UL Listed for their intended purpose.

h. Auxiliary relays shall be 24VDC operation, designed for constant duty with power applied, shall be mounted in a surface cabinet, with an LED

indicator, visible through an opening in the front, indicating when relay is energized. These relays shall be controlled and powered from ZAMs, a control panel, or as otherwise indicated. Contacts shall be SPDT, rated at 10 amps resistive 28 VDC/120VAC. Relays shall be mounted within required distance of controlled device, when "Unsupervised" control points are used.

i. All peripheral devices shall be electrically supervised for trouble conditions. The system control panel will be capable of indicating the type of trouble condition (open, short, device missing/failed). Should a device fail, it will not hinder the operation of other system devices. Should a problem occur on a particular wire run, it will not affect other wire runs.

j. Provide proper transient suppression equipment on ALL conductors installed exterior to any structure the buildings. Provide units for each conductor, both when it leaves, and when it enters a structure. Provide transient suppression on each mapnet, RUI and 24 V DC power circuit and ZAM type Initiating device circuits (ie: Water Flow and Tamper circuits). Conform to the maximum number of such devices per device type.

k. End-of-Line Resistor(s) for alarm indicating appliance circuits shall be sized as required to properly supervise needed circuits. They shall be properly installed by this contractor across terminals of last device on needed circuits, Each EOL resister location shall be accurately indicated on the "As Built Drawings".

l. Provide know box as indicated. This unit shall be able to be opened by the Fire Department using an authorized key. Flush mount this unit and supervise the door position with a monitor. IAM connected to the internal contact provided as a part of this unit. Color shall be finished in black. Provide all required paperwork to Fire Department for signature and authorization. Provide this unit as part of this Fire Alarm system peripheral equipment.

2.06 Addressable relays shall be provided for smoke and combination fire/smoke dampers. Smoke dampers shall close upon signal from fire alarm system.

PART 3 EXECUTION

3.01 Installation

A. Provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations.

B. Upon completion, the Contractor shall so certify in writing to the General Contractor.

C. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.

D. The contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.

E. The manufacturer's authorized representative shall provide onsite supervision of installation.

F. Job Site Responsibilities

1. Manufacturer shall provide:

a. Technical installation support during construction, to provide needed with

regular on job-site visits by sales, engineering and service staff.

b. Power-up all control equipment, program, perform required testing and documentation of all control and peripheral devices, test and document other required items ie: duct detector air flow, audible alarm appliance dB levels, etc., and a complete system test, by a qualified Technical Representative.

c. Final letter of completion and complete and proper operational certification, with detailed inspection report.

d. Provide a One (1) year warranty repair of all equipment, from the date of final acceptance of the system, by the Architect/Engineer and/or special systems consultant, owner and AHJ.

e. Customer operational and maintenance training, on sit and in video tape form..

f. Detailed “As Built” CAD generated drawings (including all required test results included), and O&M manuals, of the total system.

2. This Contractor shall Provide:

a. Enough skilled supervision and labor to complete the project on schedule.

b. The reviewing and understands the submittal, drawings, and other instructions provided by manufacturer.

c. Properly install all wire and cable, mount panels and peripheral devices in accordance with specifications, applicable codes and the manufacturer’s directions.

d. Test all circuits for continuity, and ground faults (to the limits required by the equipment provided), with an OHM Meter of the proper quality to properly read tolerances required, troubleshoot and correct ground faults, shorts, and opens, and terminate all wires in peripheral devices and control panels using provided wiring diagrams.

e. Follow procedures defined by the manufacturer to protect equipment from damage during construction or installation.

f. Energize system only in presence of factory personnel.

3.02 Testing

A. The completed fire Alarm system shall be fully tested in accordance with NFPA-72 jointly, by the contractor and equipment supplier, and at the final test and acceptance meeting, test devices and controls as required, in the presence of the Engineer and/or special systems consultant, the Owner, or Owner’s designated Representative and the Local Fire Marshal. Upon completion of a successful acceptance test, the contractor shall so certify in writing to the General Contractor.

3.03 Warranty

A. The contractor shall warrant the completed fire alarm system wiring and equipment, to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the acceptance test and/or from the date of first beneficial use.

3.04 Service

A. The equipment manufacturer shall provide, as part of the submittal package and prior to the acceptance of this construction contract, to the Architect/Engineer and/or special systems consultant, written proof of having, a local service organization, under his Full-Time employ, factory trained technicians, an adequately stocked parts supply to provide prompt regular services and emergency services, within the specified Two (2) hour response time, on the specified system.

B. The equipment manufacturer shall make available a One (1) year maintenance contract to the Owner covering a 100% Test Only during the ninth month of the first year following the acceptance of the project, and offer an option of a contract the second year, providing all parts, peripherals, labor and travel, during normal working hours (8 a.m. Through 5 p.m., Monday through Friday). This contract shall provide a minimum of one (1) inspection and test per year, in compliance with NFPA-72, and/or the guidelines governing the customer, and all emergency service as specified above.

End of Section 28 31 03

SECTION 31 10 00 – SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Protecting existing vegetation to remain.
   2. Removing existing vegetation.
   3. Clearing and grubbing.
   4. Stripping and stockpiling topsoil.
   5. Removing above- and below-grade site improvements.
   6. Disconnecting, capping or sealing site utilities.
   7. Temporary erosion- and sedimentation-control measures.

1.2 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.3 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

B. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   1. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

D. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

F. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.

5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
   1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. General: Protect trees and plants remaining on-site.

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Design Professional.

3.4 EXISTING UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. Arrange with utility companies to shut off indicated utilities.

B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Design Professional not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Design Professional's written permission.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below exposed subgrade.
2. Use only hand methods for grubbing within protection zones.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of 6 inches (150 mm) in a manner to prevent intermingling with underlying subsoil or other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION

SECTION 31 20 00 – EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Excavation for paving and grading.
2. Excavation for building foundations, slabs-on-grade, paving, and grading.
3. Excavation for Site structures.
4. Site filling and backfilling.
5. Drainage course for slabs-on-grade.
6. Consolidation and compaction.
7. Excavation for trenches for utilities and footings.
8. Consolidation and compaction of bedding under utilities.
9. Rough grading.

B. Related Sections:
1. Section 015713 – Temporary Erosion and Sediment Control.
2. Section 311000 – Site Clearing.
3. Section 331100 - Water Utility Distribution Piping
4. Section 333100 – Sanitary Utility Sewerage Piping
5. Section 334100 – Storm Utility Drainage Piping.

1.2 DEFINITIONS

A. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials, and bottom of over excavation areas if required by the contract document.

B. Subbase Course: Aggregate layer placed between the subgrade and hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

E. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill, when sufficient approved soil material is not available from excavations.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated, regardless of the character and density of materials, including reuse or disposal of materials removed.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Design Professional. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Design Professional. Unauthorized excavation, as well as remedial work directed by Design Professional, shall be without additional compensation.

G. Fill: Suitable materials used to raise existing grades.

H. Finish Grade: The top surface of sod, top surface of topsoil where sod is not indicated or exposed rock surface where indicated on the drawing.

I. Trench Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

L. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed **1 cu. yd. (0.76 cu. m)** for bulk excavation or **3/4 cu. yd. (0.57 cu. m)** for footing and trench excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
1. Equipment for Footing and Trench: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) maximum-width, short-tip-radius rock bucket; rated at not less than 138-hp (103-kW) flywheel power with bucket-curling force of not less than 28,700 lbf (128 kN) and stick-crowd force of not less than 18,400 lbf (82 kN) with extra-long reach boom.
2. Equipment for Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp (172-kW) flywheel power and developing a minimum of 47,992-lbf (213.3-kN) breakout force with a general-purpose bare bucket.

1.3 SUBMITTALS

A. Submit in accordance with Division 1 unless otherwise indicated.

B. Product Data: For each type of material indicated in Part 2 of this section.

C. Contract Closeout Submittals: Submit in accordance with Division 1.
1. Project Record Documents.

a. Accurately record location of underground utilities remaining, rerouted utilities, and new utilities by horizontal dimensions from above grade permanent fixtures, elevations or inverts, and slope gradients.

1.4 QUALITY ASSURANCE

A. Installer's Qualifications: Firm experienced in installation of systems similar in complexity to those required for this Project, plus the following:
   1. Not less than 3 years experience with systems.
   2. Successfully completed not less than 5 comparable scale projects using this system.

B. Testing Agency: A qualified independent geotechnical engineering testing agency shall classify proposed on-Site and borrow soils to verify that soils comply with specified requirements and to perform specified field and laboratory testing.

C. Pre-excavation Conference:
   1. Convene pre-excavation conference under provision of Division 1, one week prior to commencing Work of this Section.
   2. Contractor shall be presiding officer at conference.
   3. Conference shall be attended by Contractor, Owner's Representative, testing agency, and earthwork subcontractor.
   4. Purpose of conference will be to review contract requirements and discuss schedules, work procedures, acceptable materials specified under this Section, locations where specified materials may be incorporated, and quality control.

1.5 PROJECT CONDITIONS

A. Existing Conditions:
   1. Locate existing underground utilities in areas of excavation Work.
      a. Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by Owner's Representative and then only after acceptable temporary utility services have been provided.
      b. Provide not less than 72 hours notice to Design Professional and Owner's Representative and receive written authorization to proceed before interrupting any utility.

1.6 MAINTENANCE

A. Where settling is measurable or observable at excavated areas during correction period required by General Conditions, remove surface (pavement, lawn, or other finish), add backfill material, compact as specified in this Section for location of material, and replace surface treatment.
   1. Restore appearance, quality, and condition of surface or finish to match adjacent materials.
   2. Eliminate evidence of restoration.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:
1. Provide approved borrow soil materials from off-Site when sufficient approved soil materials are not available from excavations, at no increase in Contract Sum or extension of Contract Time.
2. Dispose of any excess materials legally off site at no increase in contract sum or extension of contract time. On site disposal of suitable materials may only be permitted where shown on the drawings.
3. Fill and backfill materials shall be subject to the approval of testing agency and the Owner's Representative.
4. For approval of fill and backfill materials, notify testing agency and Owner's Representative at least 5 working days in advance of intention to import material.
   a. Designate proposed borrow area and excavate test pits to permit testing agency to sample as necessary from borrow area for the purpose of making acceptance tests to confirm quality of proposed material.

B. General Fill Materials
1. Definition: That material used to obtain finish subgrade levels at locations specified under this section.
2. Acceptable material: Excavated on-Site material or off-Site borrow material which is free from debris, organics, decomposable, and corrodible materials, and containing the proper moisture content, liquid limit, and plasticity index to obtain specified compaction requirements.
   a. Existing on-Site material proposed for reuse, and off-Site borrow material shall be approved by testing agency.

C. Low Volume Change Material:
1. Definition: That material used to obtain the upper 18 inches of finish subgrade beneath granular base in building areas, and material used as trench backfill material in building areas.
2. Acceptable material:
   a. On-site or Off-Site borrow material which is free from debris, organics, decomposable, and corrodible materials with a liquid limit of less than 45 percent and a plasticity index less than 25, or another material acceptable to the testing agency.
      1) Existing on-Site material proposed for reuse, and off-Site borrow material shall be approved by testing agency.
   b. Excavated on-site or off-site borrow high plasticity clay material blended with lime or ASTM C618 Class C fly ash to produce a low volume change material.
      1) Blending rate shall be approved by testing agency, with estimated rates as follows.
         a) Hydrated lime: 5 percent on a dry weight basis.
         b) Fly ash: 15 percent on a dry weight basis.
      2) Blending procedures shall be as directed by testing agency.

D. Granular Fill:
   1. Definition: Free-draining granular base used beneath building slabs-on-grade and used as backfill behind foundation and retaining walls.
   2. Acceptable materials: Clean crushed stone or gravel, free of Shale, clay, friable material, and debris, complying with ASTM C33 Size No. 57.

E. Pavement Subbase Course:
   1. Definition: Aggregate layer used beneath concrete pavement and other pavements indicated on Drawings.
   2. Acceptable materials: Comply with APWA Street Construction and Material Specifications, Division II.

F. Bedding Materials: Type 1 aggregate per MoDOT Standard Specification for Highway Construction, Section 1007.

G. Trench Backfill Materials:
   1. Pavement areas: Flowable fill or lean mix concrete per City of Kansas City, Missouri requirements.
   2. Other areas: General Fill Material or other materials specified under this Section at locations specified or indicated on Drawings.

H. Manual Backfill Material
   1. Definition: Material requiring placement and compaction with manual procedures because of restricted spaces or new construction.
   2. Acceptable materials: Either General Fill Material, Granular Fill Material, or other materials specified under this Section at locations specified or indicated on Drawings.

I. Unsuitable material
   1. Definition: That excavated material which does not meet the consistency requirements of any other defined materials in this Section, including muck, frozen material, organic material, top soil, rubbish, and rock within the limits defined for General Fill Material
   2. Dispose of unsuitable material off-Site, at no increase in Contract Sum or extension of Contract Time.
      a. Submit an acceptable agreement with the property owner on whose property the unsuitable material is placed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper and timely completion.
   1. Verify location and elevations of existing building foundations.
   2. Verify location and elevations of existing underground utilities.
   3. Verify erosion control systems are in place.
   4. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection:
   1. Protect trees, shrubs, lawns, other plant growth, and other features indicated on Drawings to remain.
   2. Protect bench marks, monuments, existing structures, existing fences, existing roads, existing sidewalks, existing paving, and existing curbs from damage caused by settlement, lateral movement, undermining, washout, and other hazards caused by Work of this Section.
      a. If damaged or displaced, notify Owner's Representative and correct defects as directed by Owner's Representative.
   3. Protect above and below grade utilities which are to remain.
   4. Protect adjacent and downstream properties from pollution, sedimentation, or erosion caused by the work of this Contract.

B. Precautions:
   1. Use all means necessary to control dust on and near the Work, and on and near off-Site borrow storage, and spoil areas, if such dust is caused by performance of the Work of this Section, or if resulting from the condition in which Project Site is left by Contractor.
   2. Moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other Work on Project Site.
   3. Identify required lines, levels, contours, and datum.
   4. Identify above and below grade utilities.
   5. Provide and maintain positive surface drainage.

3.3 WATER CONTROL

A. Provide berms or channels to prevent flooding of subgrades.

B. Prevent infiltration of water into excavations from whatever sources as may exist.

C. Prevent ponding of water on finish subgrades.

D. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

E. Prevent flooding of Project Site and surrounding areas.

F. Promptly remove water collection in depressions.
   1. Provide and maintain ample means and devices with which to remove and dispose of water entering excavations.
   2. Ensure dry excavations and preservation of final lines and grades of bottoms of excavations.

3.4 EXCAVATION, GENERAL

A. Use of explosives is not permitted.

B. Excavation above subgrade as defined in paragraph 1.2 of this section is unclassified and includes excavation of any material encountered regardless of its character including rock, soil materials, debris, and other obstructions and shall be included in the base bid.

C. Perform excavation to the lines and grades indicated on Drawings within a tolerance of 0.10 foot.
   1. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, installing services and other construction, and for inspections.

D. Perform Excavation Work in compliance with applicable requirements of authorities having jurisdiction, including United States Department of Labor, Occupational Safety and Health Administration (OSHA) “Construction Standards for Excavations, 29 CFR Part 1926”.

E. Perform Work in a manner and sequence that will provide drainage at all times and that will prevent surface water from draining into excavations.

F. Protect subgrades and foundation soils against freezing temperatures and frost.
   1. Provide protective insulation materials as necessary.

G. When excavating through roots, perform Work by hand cutting roots with sharp axe.

H. Excavation cut shall not interfere with normal 45 degree bearing splay of foundations.

I. Machine slope banks to comply with local codes, ordinances, and requirements of agencies having jurisdiction.
   1. Provide materials for shoring and bracing.
      a. Maintain shoring and bracing in excavations regardless of time period excavations will be open.
      b. Extend shoring and bracing as excavation progresses
   2. Control surface drainage down slopes.
   3. Cover slopes to prevent loss of moisture content of soil and to prevent raveling.

J. When materials encountered at subgrade are determined to be unacceptable for use by testing agency, remove such material to depths and limits determined by testing agency.
   1. Backfill with material acceptable to testing agency and compact to density equal to the specified requirements for subsequent fill material.

K. Where depressions result from, or have resulted from the removal of surface or subsurface obstructions, open depressions to equipment working width, and remove debris and soft material as directed by testing agency, at no increase in Contract Sum or extension of Contract time.
   1. Backfill with material acceptable to testing agency and compact to density equal to the specified requirements for subsequent fill material, at no increase in Contract Sum or extension of Contract Time.

L. Backfill and compact unauthorized over-excavations as specified for the area at which it occurs, at no increase in Contract Sum or extension of Contract Time.
   1. Backfill with material acceptable to testing agency and compact to density equal to the specified requirements for subsequent fill material, at no increase in Contract Sum or extension of Contract Time.

M. Stockpile excavation material which testing agency has approved for reuse.
   1. Stockpile soil materials without intermixing soil materials with different consistencies and gradation.
   2. Place, grade, and shape stockpiles to drain surface water.
   3. Do not stockpile within drip line of trees which are to remain.
   4. Cover stockpiles to prevent wind-blown dust.

N. Remove unacceptable excavation material from Site, at no increase in Contract Sum or extension of Contract Time.

O. Hand trim excavations.
   1. Remove loose matter.

P. Excavation for Footings and Foundations:
   1. Do not disturb bottom of excavation.
      a. Excavate by hand to final grade immediately prior to placement of concrete reinforcement.
      b. Trim bottom of excavations to required lines and grades to leave solid base to receive other work.
   2. Drill probe holes at exposed bottom of excavations as directed by testing agency.

3.5 TRENCH EXCAVATIONS

A. Use of explosives is not permitted.

B. Trench excavation is unclassified and includes excavation to required exposed subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, debris, and other obstructions.

C. Excavate trenches to gradients, lines, depths, and elevations indicated on Drawings, within a tolerance of 0.10 foot.

D. Perform excavation Work in compliance with applicable requirements of authorities having jurisdiction, including United States Department of Labor, Occupational Safety and Health Administration (OSHA) "Construction Standards for Excavations, 29 CFR Part 1926”.

E. Do not perform trench excavation in areas to receive fill until fill operations are complete to an elevation of not less than 24 inches above the top of the proposed pipe or conduit for which the trench is to receive.

F. Perform Work in a manner and sequence that will provide drainage at all times and that will prevent surface water from draining into trenches.

G. Protect subgrades against freezing temperatures and frost.

H. Provide protective insulation materials as necessary.

I. When excavating through roots, perform Work by hand cutting roots with a sharp axe.

J. Excavation cut shall not interfere with normal 45 degree bearing splay of foundations.

K. Excavate trenches to uniform width, sufficiently wide to enable installation of utilities and to allow safe inspection of installed utilities.

L. Excavate trenches 6 inches deeper than bottom of pipe elevation to allow for bedding course
   1. Hand excavate for bell of pipe.
   2. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
   3. Comply with local codes, ordinances, and requirements of agencies having jurisdiction.
   4. Provide materials for shoring and bracing.
      a. Maintain shoring and bracing in trenches regardless of time period trenches will be open.
      b. Extend shoring and bracing as excavation progresses.
   5. Control surface drainage down slopes.
   6. Cover slopes to prevent loss of moisture content of soil and to prevent raveling.
   7. Hand trim trenches.
      a. Remove loose matter.

M. When subgrade materials are encountered which testing agency determines to be unacceptable for use, remove such material to depths and limits determined by testing agency:
   1. Backfill with material acceptable to testing agency and compact to density equal to the specified requirements for subsequent fill material.
   2. Removal and replacement of unacceptable material will be paid on basis of Unit Prices included in the Contract Documents.

N. Where depressions result from, or have resulted from the removal of surface or subsurface obstructions, open depressions to equipment working width, and remove debris and soft material as directed by testing agency at no increase in Contract Sum or extension of Contract Time.
   1. Backfill with material acceptable to testing agency and compact to density equal to the specified requirements for subsequent fill material, at no increase in Contract Sum or extension of Contract Time.

O. Stockpile excavation material which testing agency has approved for reuse.
   1. Stockpile soil materials without intermixing soil materials with different consistencies and gradations.
   2. Place, grade, and shape stockpiles to drain surface water.
   3. Do not stockpile within drip line of trees which are to remain.
   4. Cover stockpiles to prevent wind-blown dust.

P. Remove unacceptable excavation material from Site, at no increase in Contract Sum or extension of Contract Time.
   1. Submit an acceptable agreement with the property owner on whose property the unsuitable material is placed.

3.6 SUBGRADE PREPARATION AT PAVEMENTS

A. General:
   1. Excavation for subgrade preparation is unclassified and includes excavation to required subgrade elevations regardless of the character of surface and subsurface conditions encountered, including rock, soil materials, debris, and other obstructions.
   2. Testing agency shall be present to observe proof-rolling of subgrades in pavement and sidewalk areas prior to placement of fill and shall be present during placement and compaction of fill materials in pavement and sidewalk areas. Testing agency shall also be present to observe proof-rolling of finished subgrades prior to installation of pavement and sidewalk sections.
   3. Fill material shall not be placed, spread, or rolled while the material is frozen or thawing, or during unfavorable weather conditions.
   4. Moisture condition or dry fill material as required to obtain specified moisture content limits.
      a. Material which is too wet to allow proper compaction, as determined by testing agency, may be spread and permitted to dry assisted by disking, harrowing, or pulverizing.
   5. Place fill material using spreading equipment capable of obtaining uniform loose lift thickness.
   6. Compact fill material using equipment appropriate to the material being compacted, as determined by testing agency.
   7. When Work is interrupted by rain, do not resume Work until testing agency indicates that moisture content and density of previously placed fill area is as specified.
   8. Where soil has been softened or eroded by flooding or placement during unfavorable weather conditions, remove damaged areas and recompact to required density.
   9. In excavations where testing agency determines that subgrade material is unacceptable, remove unacceptable material and backfill in accordance with procedures determined by testing agency.
   10. Minimize construction traffic, including foot traffic, from pavement finished subgrades in order to prevent unnecessary disturbances of subgrade materials.
      a. If testing agency determines that finished subgrades have been disturbed, remove disturbed areas and replace and recompact to required density as directed by testing agency.
      b. If testing agency determines that rutting has occurred, excavate 6 inches, or other depth as directed by testing agency, of subgrade material and recompact as specified for affected area.
      c. Testing agency shall be present during compaction of material.

B. In cut areas below pavements requiring less than 12 inches of fill to obtain finish subgrade elevations, and a lateral distance of 5 feet outside pavement areas, excavate

existing material to a depth of not less than 6 inches below bottom of pavement subbase course.

1. Proof-roll subgrade and repair as required in paragraph 3.6.E below, then scarify to a depth of 6 inches to result in a surface free from ruts, hummocks, and other uneven features which, in the opinion of the testing agency, would prevent uniform compaction by the equipment proposed for use.
    a. Moisture condition subgrade to achieve moisture content specified in this Section.
    b. Compact to a minimum of 95 percent of the material's maximum Standard Proctor dry density with a moisture content between 0 and +4 percent above optimum moisture content in accordance with ASTM D698.
        1) Field density tests shall be taken after the compaction of each layer of fill by testing agency.
        2) When tests indicate that any layer of fill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.
2. After scarifying, moisture conditioning, and recompacting, backfill areas using approved materials placed in loose lifts not exceeding 8 inches.
    a. compact each lift to a minimum of 95 percent of the material's maximum Standard Proctor dry density with a moisture content between 0 and +4 percent above optimum moisture content in accordance with ASTM D698.
        1) Field density tests shall be taken after the compaction of each layer of fill by testing agency.
        2) When tests indicate that any layer of fill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.
3. Protect excavations from excessive wetting and drying during construction.
    a. Remove water entering excavation, and remove disturbed or softened soil.
4. Maintain subgrade moisture content within specified range until pavements are installed.
    a. Rework non-complying area as required to achieve specified requirements as directed by testing agency.
    b. Recompact and retest until required density and moisture content is obtained.

C. In areas below pavements requiring 12 inches or more of fill to obtain finish subgrade elevations, and a lateral distance of 5 feet outside pavement areas, proofroll existing subgrade in presence of testing agency using a fully loaded tandem axle dump truck or similar type of pneumatic tired equipment with a minimum gross weight of 20 tons.
    1. Remove soft areas as directed by testing agency and recompact in loose 9 inch lifts to a minimum of 95 percent of the material's maximum Standard Proctor dry density with a moisture content between 0 and +4 percent above optimum moisture content in accordance with ASTM D698.
        a. Field density tests shall be taken after the compaction of each layer of fill by testing agency.
        b. When tests indicate that any layer of fill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.
    2. After proofrolling operations are performed and observed soft areas repaired, place approved material in loose lifts not exceeding 8 inches.

a. Compact each lift to a minimum of 95 percent of the material's maximum Standard Proctor dry density with a moisture content between 0 and +4 percent above optimum moisture content in accordance with ASTM D698.
   1) Field density tests shall be taken after the compaction of each layer of fill by testing agency.
   2) When tests indicate that any layer of fill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.

3. Fill operations shall continue in compacted layers until finish subgrade elevations have been obtained.
   a. Compact each lift to a minimum of 95 percent of the material's maximum Standard Proctor dry density with a moisture content between 0 and +4 percent above optimum moisture content in accordance with ASTM D698.
      1) Field density tests shall be taken after the compaction of each layer of fill by testing agency.
      2) When tests indicate that any layer of fill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.
4. Protect excavations from excessive wetting and drying during construction.
   a. Remove water entering excavation, and remove disturbed or softened soil.
5. Maintain subgrade moisture content within specified range until pavements are installed.
   a. Rework non-complying area as required to achieve specified requirements as directed by testing agency.
   b. Recompact and retest until required density and moisture content is obtained.

D. Tolerances
   1. Top surface of finish subgrade under paved areas: Plus or minus ¼ inch from required elevations.

E. Immediately prior to placement of pavement subbase course and pavements, proofroll subgrade in presence of testing agency using a fully loaded tandem axle dump truck or similar type of pneumatic tired equipment with a minimum gross weight of 20 tons.
   1. Remove soft areas as directed by testing agency and recompact in loose 9 inch lifts to a minimum of 95 percent of the material's maximum Standard Proctor dry density with a moisture content between 0 and +4 percent above optimum moisture content in accordance with ASTM D698.
      a. Field density tests shall be taken after the compaction of each layer of fill by testing agency.
      b. When tests indicate that any layer of fill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.

3.7 GENERAL SITE FILL

A. General:
   1. Testing agency shall be present during placement and compaction of fill material.

2. Fill material shall not be placed, spread, or rolled while the material is frozen of thawing, or during unfavorable weather conditions.
3. Moisture condition or dry fill material as required to obtain specified moisture limits.
4. Material which is too wet to allow proper compaction, as determined by testing agency, may be spread and permitted to dry assisted by dishing, harrowing, or pulverizing.
5. Place fill material using spreading equipment capable of obtaining uniform loose lift thickness.
6. Compact fill material using equipment appropriate to the material being compacted, as determined by testing agency.
7. When Work is interrupted by rain, do not resume Work until testing agency indicates that moisture content and density of previously placed fill area is as specified.
8. Where soil has been softened or eroded by flooding or placement during unfavorable weather conditions, remove damaged areas and recompact to required density.

B. Perform grading to the contours and elevations indicated on Drawings:
   1. Uniformly grade areas to a smooth surface, free from irregular surface changes.
   2. Provide a smooth transition between existing adjacent grades and new grades.

C. Place general fill material in systematic and uniform horizontal lifts not exceeding the following loose-depth-measurements:
   1. For fill material to be compacted with heavy compaction equipment: 9 inches.
   2. For fill material to be compacted with hand operated tampers: 4 inches.

D. Under sidewalks and ramps compact each lift of material to a minimum of 95 percent of the material's maximum Standard Proctor dry density with a moisture content between 0 and +4 percent above optimum moisture content in accordance with ASTM D698
   1. In other areas, compact each lift of material to a minimum of 90 percent of the material's maximum Standard Proctor dry density with a moisture content between 0 and +4 percent above optimum moisture content in accordance with ASTM D698
      a. Field density tests shall be taken after the compaction of each layer of fill by testing agency.
      b. When tests indicate that any layer of fill or portion thereof does not meet the required compaction density or moisture content, rework on-complying area as required to achieve specified requirements.

E. Bench existing slopes horizontal sections equal in width to equipment used.

F. Where embankments, regardless of height, are placed against hillsides or existing embankments having a slope of steeper than 1 vertical to 5 horizontal, bench or step existing slope in approximately 24 inch rises:
   1. Place fill in lifts not exceeding 9 inches in loose-depth-measurement
   2. Compact material bladed out, bottom area which was cut to form benches, and fill material being placed, to a minimum of 95 percent of the material's maximum Standard Proctor dry density with a moisture content between 0 and +4 percent above optimum moisture content in accordance with ASTM D698.

a. Field density tests shall be taken after the compaction of each layer of fill by testing agency.
b. When tests indicate that any layer of fill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.

G. Remove surplus materials from Site, at no increase in Contract Sum or extension of Contract Time.
1. Submit an acceptable agreement with the property owner on whose property the material is placed.

H. Tolerances:
1. Top surface of finish subgrade under paved areas: Plus or minus ¼ inch from required elevations.
2. Top surface of finish subgrade under unpaved surfaces: Plus or minus ½ inch from required elevations.

3.8 INSTALLATION OF GRANULAR FILL

A. Immediately prior to placement floor slab granular base, testing agency will evaluate subgrade to determine whether moisture content is within specified range, and whether subgrade has been disturbed.
1. In areas where testing agency determines subgrade is not within specified moisture content range, remove non-complying areas and replace and recompact to required density, within specified moisture content range, as directed by testing agency.
a. Field density tests shall be taken after the compaction of each layer of fill by testing agency.
b. When test indicate that any layer of fill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.
2. If testing agency determines that rutting has occurred or other detrimental conditions exist, excavate 6 inches, or other depth as directed by testing agency, of subgrade material and recompact as specified for affected area.
a. Field density tests shall be taken after the compaction of each layer of fill by testing agency.
b. When tests indicate that any layer of fill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.

B. Place granular fill in equal continuous layers not exceeding 6 inches.
1. Compact granular fill using heavy vibrating equipment, in 3 passes, to achieve a total compacted thickness of 4 inches in presence of Owner’s representative or testing agency.
2. Compact granular fill in confined areas using a combination of manually operated vibratory plates and “wacker” compaction equipment.

C. Tolerances:

1. Top surface of finish subgrade under slabs-on-grade: Plus or minus ¼ inch from required elevations.

3.9 INSTALLATION OF PAVEMENT SUBBASE COURSE

A. Place pavement subbase course in equal continuous layers not exceeding 6 inches.
   1. Compact granular fill for pavement and sidewalk subbase course to a minimum of 95 percent of the material's maximum standard proctor dry density in accordance with ASTM D698.
   2. Compact granular fill in confined areas using a combination of manually operated vibratory plates and "wacker" compaction equipment.
   3. Qualitative tests shall be taken after the compaction of each layer of fill by testing agency.

B. Tolerances:
   1. Top surface of finish subgrade under paved areas: Plus or minus ¼ inch from required elevations.

3.10 BEDDING

A. Place and compact bedding course on trench bottoms and where indicated on Drawings.
   1. Install materials in continuous layers not exceeding 6 inches compacted depth.

B. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Install bedding to a depth of 6 inches below bottom of pipe bell or conduit, to an elevation of 6 inches above pipe or conduit.

D. Compact bedding materials by slicing with a shovel and compacting with vibratory plate and "wacker" compaction equipment.

E. Support pipe and conduit during placement and compaction of bedding fill.

3.11 INSTALLATION OF BACKFILL

A. Backfill excavations promptly, but not before completion of the following:
   1. Surveying location of underground utilities for Record Documents
   2. Testing, inspecting, and approval of underground utilities
   3. Removal of concrete forms
   4. Removal of lumber, rock, paper, and other debris from areas to be backfilled
   5. Removal of temporary shoring, bracing, and sheeting

B. Backfill areas to contours and elevations indicated on Drawings, using unfrozen backfill material
   1. Do not backfill over porous, wet, frozen, thawing, or spongy surfaces

2. Do not backfill during unfavorable weather conditions
3. Moisture condition or dry backfill material as required to obtain specified moisture content limits
   a. Material which is too wet to allow proper compaction, as determined by testing agency
4. Place backfill material using equipment capable of obtaining uniform loose lift thickness
5. Compact backfill material using equipment appropriate to the material being compacted, as determined by testing agency
6. When Work is interrupted by rain, do not resume Work until testing agency indicates that moisture content and density of previously laced backfill areas is as specified
7. Where soil has been softened or eroded by flooding or placement during unfavorable weather conditions, remove damaged areas and recompact to required density

C. Backfilling of curbs, slabs-on-grade, and other structures whose foundation is unprotected from water shall be accomplished as soon as forms are removed, to eliminate possibility of softening of subbase below structure

D. Backfill foundation walls with granular material, not less than 24 inches in width, to an elevation of 2 feet below finish grade.
   1. Backfill simultaneously on each side of unsupported foundation walls.
   2. Backfill upper 2 feet using General Fill Material.

E. Backfill trenches to contours and elevations indicated on Drawings, using unfrozen backfill material.
   1. Do not backfill over porous, wet, frozen, or spongy surfaces.
   2. Do not backfill during unfavorable weather conditions.
   3. Moisture condition or dry backfill material as required to obtain specified moisture content limits.
      a. Material which is too wet to allow proper compaction, as determined by testing agency, may be spread and permitted to dry assisted by disking, harrowing, or pulverizing.
   4. Place backfill material using equipment capable of obtaining uniform loose lift thickness.
      a. Employ a placement method of backfill operations which does not disturb or damage utilities in trenches.

F. Compaction of General Backfill
   1. Maintain optimum moisture content of backfill materials to attain required compaction density.
   2. General Fill Materials used for backfill shall be placed in lifts not exceeding 9 inches in loose-depth-measure and compacted as specified for General Site Fill
   3. Granular Fill Materials used for backfill shall be placed in lifts not exceeding 6 inches in loose-depth-measure and compacted as specified for Granular Fill.
   4. Field density tests shall be taken after the compaction of each layer of backfill by testing agency.

a. When tests indicate that any layer of backfill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.

G. Compaction of Trench Backfill
1. Compact backfill material using equipment appropriate to the material being compacted, as determined by testing agency.
2. Maintain optimum moisture content of backfill materials to attain required compaction density.
3. When Work is interrupted by rain, do not resume Work until testing agency indicates that moisture content and density of previously placed backfill area is as specified.
4. Where soil has been softened or eroded by flooding or placement during unfavorable weather conditions, remove damaged areas and recompact to required density.
5. General Fill Material used for backfill shall be placed in lifts not exceeding 4 inches in loose-depth-measure with each lift compacted as specified in this section.
6. MoDOT Standard Specification for Highway Construction Type 5 aggregate used for backfill shall be placed in lifts not exceeding 6 inches in loose-depth-measure and compacted to a minimum of 97 percent of the material's maximum Standard Proctor dry density with a moisture content near optimum in accordance with ASTM D698.
7. Field density tests shall be taken after the completion of each layer of backfill by testing agency.
   a. When tests indicate that any layer of backfill or portion thereof does not meet the required compaction density or moisture content, rework non-complying area as required to achieve specified requirements.

H. Slope grade away from building not less than 12 inches in 10 foot for a distance of not less than 6 feet outside of building lines.
1. Make grade changes gradual.
2. Blend slopes into level areas.
3. Remove surplus materials from Site, at no increase in Contract Sum or extension of Contract Time
4. Submit an acceptable agreement with the property owner on whose property the material is placed

I. Tolerances:
1. Top surface of finish subgrade under paved areas: Plus or minus ¼ inch from required elevations
2. Top surface of finish subgrade under unpaved areas. Plus or minus ½ inch from required elevations

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Geotechnical Engineer.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 6938, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
   2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet or less of wall length, but no fewer than two tests.
   3. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.13 PROTECTION

A. Protect newly graded areas from freezing and erosion.

B. Repair and reestablish grades in settled, eroded, and rutted areas to specified tolerances.

C. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.
   1. Testing agency shall be present during compaction of material.

END OF SECTION

SECTION 32 12 16 - ASPHALT PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Asphaltic concrete base course
   2. Asphaltic concrete paving wearing surface

B. Related Sections:
   1. Section 312000 – Earth Moving
   2. Section 334100 – Storm Utility Drainage Piping
   3. Section 321313 – Concrete Paving
   4. Section 321723 –Pavement Markings

1.2 SUBMITTALS

A. Submit in accordance with Division 1 unless otherwise indicated

B. Asphaltic Concrete Design Mix: Submit for each class of mix
   1. Include description of method by which mix design was formulated and supporting backup data.

C. Manufacturer: Submit asphalt plant name, address, and contact person

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Not less than 5 years experience in the actual production of specified products, plus the following:
   1. Asphalt mixing plant shall comply with APWA Street Construction and Material Specifications, Division 11, Section 2205.4.

B. Installer's Qualifications: Firm experienced in installation of systems similar in complexity to those required rot his Project, plus the following:
   1. Not less than 3 years experience with systems
   2. Successfully completed not less than 5 comparable scale projects using this system

C. Product/Material Qualifications: All materials shall comply with APWA Street Construction and Material Specifications, as adopted by the City of Kansas City, Missouri Public Works Department.

D. Regulatory Requirements.
   1. Comply with applicable requirements for paving work on public property.

1.4 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping:
   1. Comply with APWA Street Construction and Material Specifications, Division II, Section 2205, Paragraph 2205.5.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Do not apply prime or tack coats when ambient temperature is less than 50 degrees F. or has been below 35 degrees F. for 12 hours immediately prior to time of application
   2. Do not place asphalt when ambient air temperature or base surface temperature is less than 40 degrees F.
   3. Do not place asphalt when base surface is wet or frozen, or contains an excess amount of moisture.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Asphalt Cement:
   1. Comply with performance-graded system indicated in APWA Construction and Material Specification Section 2205.2A.

B. Aggregate: Comply with APWA Street construction and Material Specifications, Division II, Section 2205.2B.

C. Mineral Filler: ASTM D242 finely ground particles of limestone, hydrated lime, or other mineral dust.

D. Tack Coat: Per APWA Section 2204

2.2 EQUIPMENT

A. Paving Equipment: Comply with APWA Street Construction and Material Specifications, Division II, Section 2205.7.

2.3 ASPHALT PAVING MIXES

A. Base Course: Comply APWA Street Construction and Material Specifications, Division II, Section 2205.3, RC-Type 1-01.
   1. Recycled shingle is not allowed in mix design.

B. Wearing Course: Comply with APWA Street Construction and Material Specifications, Division II, Section 2205.3, Type 3-01.

1. Marshall stability: Not less than 1,800 pounds.
2. All surface course shall be virgin material.

C. Comply with applicable requirements for asphalt paving mixes on public property.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper and timely completion.
   1. Verify subgrade has been proofrolled immediately prior to placement of pavements as specified under Section 312000.
   2. Verify compacted subgrade has required moisture content and is ready to support paving and imposed loads.
   3. Verify gradients and elevations of subgrade are correct.
   4. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation:
   1. Remove loose and foreign material from surface to receive asphaltic concrete paving.

3.3 INSTALLATION

A. Apply tack coat to previously constructed asphalt and portland cement concrete surfaces abutting or projecting into asphalt pavement, at a rate of 0.05 to 015 gallons per square yard of treated surface.
   1. Do not soil adjoining surfaces which will remain exposed after completion of asphalt placement.
   2. Allow tack coat to dry to proper condition to receive paving.

B. Install asphalt paving in accordance with APWA Street construction and Material Specifications, Division II, Section 2205.8.

C. Place asphalt within 24 hours of applying tack coat.

D. Weather limitations shall be per APWA Section 2205.8.
   1. Place asphalt in strips not less than 10 feet in width per APWA Section 2205.8
      a. Place areas inaccessible by equipment by hand.
   2. Place asphalt in compacted thickness indicated on Drawings, to required grade and cross-section.

E. Compact asphalt by rolling to required density per APWA Section 2205.8

1. Begin rolling operations when placed mixture will bear roller weight without excessive displacement of mixture.
2. After first strip has been placed and compacted, place succeeding strips and extend rolling to overlap previous strip.
3. Compact areas inaccessible to rolling equipment using hot hand tampers or vibrating plate compactors.
4. Perform rolling with consecutive passes to achieve even and smooth finish without roller marks.
5. Continue rolling operations to attain the following laboratory Marshall densities when tested in accordance with ASTM D3549:
   a. Base course: 95 percent.
   b. Wearing course: 97 percent.

F. Immediately correct surface irregularities in finish course
   1. Remove excess material forming high spots.

G. Joints: Make joints between existing and new pavement, and between successive days' Work, to ensure continuous bond between adjoining areas.
   1. Construction joints shall have same texture, density, and smoothness as other sections of asphalt paving.

H. Tolerances:
   1. Flatness: Ponding of water in any depth shall not be acceptable.
   2. Compacted thickness: Plus or minus ¼ inch of specified thickness.

3.4 FIELD QUALITY CONTROL

A. Tests: Owner will retain the services of an engineering inspection and testing firm. Contractor will be responsible for coordinating and scheduling inspection.
   1. Field testing shall be taken by testing agency as follows for compliance with tolerances specified in this Section.
      a. Thickness: ASTM D3549.
      b. Wearing course flatness: Test using 10 foot straight-edge applied parallel with and at right angles to centerline of pave areas.
      c. Crowned surface flatness: Test with crowned template centered and at right angle to crown.
      d. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to APWA.
         1) Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to APWA requirements, and compacted according to job-mix specifications.
         2) In-place density of compacted pavement will be determined by testing core samples according to latest ASTM standards.
            a) One core sample will be taken for every 3000 sq. yd. or less installed base pavement.
            b) One core sample shall be taken for every 5000 sq. yd. of installed surface. Cores shall be located on paint and stripe lines.

c) Field density of in-place compacted pavement may also be determined by nuclear method according to latest ASTM standards.

e. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

f. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 PROTECTION

A. Immediately after placement, protect pavement from traffic and mechanical injury until pavement has hardened and surface temperature is less than 140 degrees F.

END OF SECTION

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SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Driveways.
   2. Roadways.
   3. Parking lots.
   4. Curbs and gutters.
   5. Walks.

B. Work in public right-of-way: All work in public right-of-way shall be performed per City Standards and Specifications.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each exposed product and for each color and texture specified.

C. Other Action Submittals:
   1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.3 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [**25**] <**Insert number**> percent.

B. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A, plain steel.

C. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 (Grade 420) deformed bars.

D. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A; coated, deformed.

E. Epoxy-Coated, Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified.

2.2 CONCRETE MATERIALS AND MIXTURES

A. For work within public right-of-way, comply with City Standards and Specifications.

B. For work on private property: comply with KCMMB as follows:

1. The 28-day compressive strength for concrete shall be 5,000 psi and designated as "KCMMB 5K". Mixes for High Early Strength Concrete shall meet the same requirements as stated below for standard 5K mixes (designated as "KCMMB HE"), and any additional requirements noted below specific to High Early Strength Concrete. Compressive strength shall be determined in accordance with ACI 318. All mix designs shall have a unique number designated by the concrete supplier. This unique name must match the name on the concrete delivery ticket or the concrete will be rejected.
2. Coarse aggregate shall be entirely granite, calcite cemented sandstone, quartzite, basalt, diabase, rhyolite, or trap rock. All coarse aggregate shall come from a large, accessible, uniform geological formation and be easily field identifiable in concrete. All coarse aggregate test results shall not exceed the following percentages by weight:

AASHTO T103 Soundness by Freeze/Thaw 50 cycles	Max. Allowable %
3/4 - 3/8	1.0%
3/8 - #4	2.0%
ASTM C127	
Absorption %	0.5%
ASTM C123 Lightweight Pieces	
% Light Weight Pieces	0.5%
ASTM C142 Clay Lumps and Friable	
% Deleterious	0.3%
Coal and Lignite	
% Coal and Lignite	0.05%

ATM C117 Material Finer than #200 by washing	
% Passing	0.5%
Sum of all deleterious	
% Total deleterious	1.0%
ASTM C88 Sulfate Soundness (MgSO4) Weighted % loss	
3/4 - 3/8	0.5%
3/8 - #4	4.0%
ASTM C131 LA Abrasion	
% Loss	28.0%

3. Coarse aggregates shall meet the gradation requirements of the current ASTM C33. The acceptable gradation sizes shall be number 1 through 7, 56, 57, 67, 357 or 467. Mix designs shall specify the gradation designation.
4. Limestone found in concrete mixes, delivered from centrally batched concrete plants shall not exceed 3% by weight of the coarse aggregate fraction. Limestone found in all other concrete mixes shall not exceed 2% by weight.
5. Fine aggregate shall meet the requirements set forth in the current ASTM C33. The percentage by weight of clay lumps and friable particles shall not exceed 0.25%. The percentage by weight of material passing the no. 200 sieve shall not exceed 2%. The percentage by weight of coal and lignite shall not exceed 0.25%. Soundness shall be determined using magnesium sulfate.
6. Aggregates in mixes must be proportioned to have a minimum of 55% coarse aggregate by weight.
7. Cementitious Materials: The total mass of cementitious materials shall be a minimum of 600 pounds per cubic yard of concrete and consist of one of the following options:
    a. A minimum of 450 pounds per cubic yard of ASTM C 150 Type I, II, I/II, or III portland cement combined with one of the following:
        1) ASTM C 989 Grade 100 or 120 Ground Granulated Blast Furnace Slag (GGBFS) at a maximum of 25% of the combined total cementitious weight.
        2) ASTM C 618 Class F fly ash at a maximum of 25% of the combined total cementitious weight. In addition Loss on Ignition is limited to a maximum of 3.0%.
    b. Manufactured ASTM C 595 Blended Hydraulic Cement Type IS or IP with the following limitations:
        1) Type IS – The slag constituent shall not exceed 25% of the mass of the combined portland cement and slag.
        2) Type IP – The pozzolan constituent shall not exceed 25% of the mass of the combined portland cement and pozzolan.
    c. The total alkali content of the concrete shall be limited to the sum of the acid soluble alkali content of portland cement plus either one-sixth the alkali content of fly ash or one-half of the alkali content of slag, to a maximum of 5 lb/yd3.
        1) Note: Mortar Bar Expansion tests are required if the cementitious combination contains less than 25% GGBFS or Class F fly ash. If a

mix design with less than 25% GGBFS of Class F fly ash is submitted, the mortar bar expansion shall be a maximum of 0.10% at 16 days when tested according to ASTM C 1567. The C 1567 test shall be performed on cementitious combinations submitted as noted above and include aggregate combinations from one of the three following options:

a) Test each coarse aggregate and percentage submitted with Missouri River sand obtained from the Holliday Sand Riverside Dredge. (For each cementitious combination tested, this option only allows this specific coarse aggregate source and percentage to meet the Mortar Bar Expansion test.)

b) Test with 55% Pink Quartzite from the Dell Rapids Pit, Dell Rapids, South Dakota and 45% Missouri River sand obtained from the Holliday Sand Riverside Dredge. (For each cementitious combination tested, this option allows any approved coarse aggregate at 55% to meet the Mortar Bar Expansion test.)

c) Test using 100% Missouri River sand obtained from the Holliday Sand Riverside Dredge. (For each cementitious combination tested, this option allows any aggregate combination to meet the Mortar Bar Expansion test.)

2) Regardless of which option above is used, all aggregate combinations must meet the rest of the KCMMB Specification. The Mortar Bar Expansion shall be a maximum of 0.10% at 16 days.

8. Water cement ratio shall not exceed 0.44. Only potable water shall be used. The minimum water cement ratio shall be 0.25.

9. Air Entrainment shall meet the requirements set forth in the current ASTM C260. The percentage of air content by volume shall be 6.5% plus/minus 1.5%. Mixes shall be designed for 6.5% air content. For precast manufacturing facilities that utilize dry cast concrete, air contents will be determined by taking three separate cores at random intervals throughout the KCMMB year. If submitting for the first time, drycast suppliers can receive conditional approval by submitting a mix design that meets all the KCMMB specifications except for air content. They will be conditionally approved until receiving results from the first air content test. The core locations will be specified by the participating KCMMB member after the project has been constructed. The cores shall be 4" diameter partial depth through walls of finished concrete products. Provide a Linear-Traverse Test (ASTM C457), Procedure A, on each core using the proposed mix design. Provided, for each mix design submitted, the average of the three tests is above 5% total air content, with no single sample being less than 4%, the facility will be approved to dry cast concrete structures using that mix until April 1st of the following year. Test results for each ASTM C457 test should include the total air content and the corresponding specific surface in square inches per cubic inch, the spacing factor in inches, and a recalculation of the air content, specific surface and spacing factor using bubbles with a size of 0.04" and less. If submitting the same mix design for the following year, the last three air test can be submitted for conditional air content approval.

10. All concrete delivery tickets shall include the plant name, design w/c ratio, batch weights per cubic yard, total batched weight of all materials for quantity delivered, time batched, design slump, water withheld (2 gal/yd maximum, no water shall be

withheld from HE concrete), allowable slump range, moisture correction for aggregates, and dosages of all approved admixtures. Pre-cast concrete manufactures shall keep concrete delivery tickets on file for one year. Certifications for the pre -cast concrete shall be provided when the product is delivered to the job site.

11. For High Early mix designs, test results for the ASTM C 1074 shall be submitted. Compression tests may be performed at times other than those in ASTM C 1074 provided the tests occur within the time limits of ASTM C 1074 and give the majority of data points early in the time frame. Control of Slump, time of set, and workability shall be controlled by use of admixtures only, NO water shall be withheld from a high early mix.

2.3 CURING MATERIALS

A. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.4 RELATED MATERIALS

A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.5 WHEEL STOPS

A. Wheel Stops: Precast, air-entrained concrete.
   1. Dowels: Galvanized steel, 3/4 inch (19 mm) in diameter, 10-inch (254-mm) minimum length.
   2. Adhesive: As recommended by wheel stop manufacturer for application to concrete pavement.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

B. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.3 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.4 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, to match jointing of existing adjacent concrete paving.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

A. Moisten subbase to provide a uniform dampened condition at time concrete is placed.

B. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, placing, and consolidating concrete.

C. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

D. Screed paving surface with a straightedge and strike off.

E. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.6 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
   1. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
   2. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 COLD AND HOT WEATHER CONCRETE PLACEMENT

A. Cold Weather Concrete:
   1. Unless authorized in writing by the Engineer, mixing and concreting operations shall be discontinued when the descending air temperature in the shade and away from artificial heat reaches thirty-five (35°) degrees F. Concrete operations may be resumed when the ascending air temperature in the shade and away from artificial heat reaches thirty five (35°) degrees F.
   2. When concrete work is authorized during cold weather, the concrete may be heated in accordance with ACI specifications. The temperature of the concrete shall be not less than sixty (60°) degrees F and not more than eighty (80°) degrees F at the time of placement in the forms.
   3. No concrete shall be placed on frozen subgrade. Sudden cooling of concrete shall not be permitted. Concrete exposed to frost action or freezing weather shall be removed and replaced at the Contractor's expense.
   4. A sufficient supply of approved blanketing material shall be provided and placed on all concrete placed between November 1 and April 1 and at other times when the ambient air temperature is expected to drop below forty (40°) degrees F. Blanketing materials shall protect the concrete and maintain a minimum temperature of forty (40°) degrees F in the concrete as measured on the surface. Concrete shall be covered for at least four days.

B. Hot Weather Concrete:
   1. The provisions of this section shall apply to all concrete work, which is done when the air temperature is above eighty (80°) degrees F at the time of placement. The temperature of the concrete, when placed, shall not be high enough to cause excessive loss of slump, flash set or cold joints. Forms, reinforcing and sub-grade surfaces against which the concrete is to be placed shall be wetted down immediately before placement. In no case shall the temperature of the concrete, when placed, exceed ninety (90°) degrees F.
   2. When the air temperature exceeds ninety (90°) degrees F and as soon as practicable without causing damage to the surface finish, all exposed concrete shall be kept continuously moist by means of fog sprays, wet burlap, cotton mats,

or other means acceptable to the Engineer at no expense to the Owner. This cooling with water shall be in addition to the initial sealing by membrane curing compound.

3. **No concrete shall be placed when the air temperature is above ninety-five (95º) degrees F.**

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by curing compound.

3.9 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:
1. Elevation: 1/8 inch (3 mm).
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).
4. Joint Spacing: 3 inches (75 mm).
5. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
6. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.10 WHEEL STOPS

A. Install wheel stops in bed of adhesive applied as recommended by manufacturer.

B. Securely attach wheel stops to paving with not less than two galvanized-steel dowels located at one-quarter to one-third points. Install dowels in drilled holes in the paving and bond dowels to wheel stop. Recess head of dowel beneath top of wheel stop.

3.11 OPENING TO TRAFFIC

A. The concrete pavement shall not be opened for light traffic until the concrete is at least 72 hours old and has attained a minimum compressive strength of 3000 pounds per square inch. The pavement shall not be opened to all types of traffic until the concrete is at least 72 hours old and has attained a minimum compressive strength of 3500 pounds per square inch. If high early strength concrete is used, the pavement may be opened to all types of traffic when the concrete has attained a minimum compressive strength of 3500 pounds per square inch. Pavement shall be cleaned prior to opening to traffic

3.12 FIELD QUALITY CONTROL

A. Testing Agency: The Owner will engage a qualified independent testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.

B. Testing Services: Testing shall be performed according to the following requirements:
   1. Sampling Fresh Concrete: Representative samples of fresh concrete shall be obtained according to ASTM C 172, except modified for slump to comply with ASTM C 94.
   2. Slump: ASTM C 143; one test at point of placement for each compressive-strength test, but not less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
   3. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test, but not less than one test for each day's pour of each type of air-entrained concrete.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive-strength specimens.
   5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
   6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 100 cu. yd., plus one set for each additional 100 cu. yd. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
   7. In-place pavement thickness will be determined by test core samples. One core sample will be taken for every 1,000 square yard or less of installed pavement, with no fewer than 3 cores taken.
   8. When frequency of testing will provide fewer than five compressive-strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.
   10. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive compressive-strength test results equal or exceed specified

compressive strength and no individual compressive-strength test result falls below specified compressive strength by more than 500 psi.

C. Test results shall be reported in writing to Owner, Design Professional, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in pavement, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Design Professional but will not be used as the sole basis for approval or rejection.

E. Additional Tests: Testing agency shall make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by Design Professional. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.13 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Design Professional.

B. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 13 73 - CONCRETE PAVING JOINT SEALANT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Cold-applied joint sealants.

B. Related Sections:
   1. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Pavement-Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of joint sealant and accessory, from manufacturer.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for joint sealants.

C. Preconstruction Compatibility and Adhesion Test Reports: From joint-sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility with and adhesion to joint sealants.

2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each type of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C)
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Design Professional from manufacturer’s full range color.

2.2 COLD-APPLIED JOINT SEALANTS

A. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.
1. Products: Subject to compliance with requirements provide the following:

a. Pecora Corporation: Urexpan NR-200.
b. Sika Corporation: Sikaflex-2C SL and Sikaflex-2C NS TG.
c. BASF: Sonolastic SL2.

2.3 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
   1. Do not leave gaps between ends of joint-sealant backings.
   2. Do not stretch, twist, puncture, or tear joint-sealant backings.
   3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place joint sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
   1. Remove excess joint sealant from surfaces adjacent to joints.
   2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING

A. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged

or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION

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SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Pavement markings for parking areas and roadways.
   2. Accessible parking symbols.
   3. Traffic direction arrows.

1.2 SUBMITTALS

A. Submit in accordance with Division 1 unless otherwise indicated.

B. Product Data: Manufacturer's specifications and technical data including the following.
   1. Product data sheet on each product.
   2. Material safety data sheet on each product.
   3. Manufacturer's installation instructions.

C. Quality Control Submittals:
   1. Manufacturer's certificate and test reports indicating that traffic marking material complies with requirements of this Section.
   2. Manufacturer's certificate indicating that glass beads comply with requirements of this Section, including test reports indicating roundness, refractive index, flow characteristics, and gradation.

D. Color Samples: Two sets of samples of the following.
   1. 2 inch by 3 inch sample of pavement marking material illustrating manufacturers full range of standard colors.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Not less than 5 years experience in the actual production of specified products.

B. Installer's Qualifications: Firm experienced in installation of systems similar in complexity to those required for this Project, plus the following.
   1. Not less than 3 years experience with systems.
   2. Successfully completed not less than 5 comparable scale projects using this system.

1.4 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping: Deliver products in original unopened packaging with legible manufacturer's identification.

B. Labeling: Include manufacturer's name, type of material, brand name, brand code, date of manufacturer, surface preparation, color designation, analysis of contents, instructions for application, and instructions for cleanup.

C. Storage and Protection: Comply with manufacturer's recommendations.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 degrees F for oil-based materials, 50 degrees F for water-based materials, and not exceeding 95 degrees F.
   2. Do not apply materials during rain or snow, or when relative humidity is above 50 percent, unless required otherwise by manufacturer's instructions.

1.6 SEQUENCING

A. Sequence Work of this Section to occur immediately prior to Substantial Completion, except as otherwise approved by Design Professional.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II.
   1. Color: As determined by Owner from manufacturer’s full range.

B. Glass Beads: AASHTO M247, Type 1, including packaging and marking requirements.

C. Thermoplastic pavement markings shall be per current version of APWA Section 2306 as adopted by the City of Kansas City, Missouri.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper and timely completion.
   1. Verify surfaces to receive traffic markings is dry and pavements are free of moisture.
   2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protection: Protect surfaces not being marked and finished Work of other Sections.

B. Surface Preparation:
   1. Prepare surfaces in accordance with manufacturer's instructions.
   2. Clean surfaces to receive pavement markings free of dust, dirt, concrete curing compounds, and other surface contaminants which may adversely affect adhesion or appearance.

3.3 APPLICATION

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Design Professional.

B. Allow paving to age for 30 days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer’s recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).
   1. Broadcast glass spheres uniformly into wet pavement markings at a rate of 6lb/gal. (0.72 kg/L).

3.4 PROTECTION

A. Protect installed markings from damage until Substantial Completion.

3.5 DEFECTIVE TRAFFIC MARKINGS

A. Traffic markings which, in the opinion of the Design Professional, do not provide initial nighttime reflectivity or do not have the specified thickness shall be repaired and replaced at no increase in Contract Sum or extension in Contract Time.

B. Traffic markings which, in the opinion of the Design Professional, do not conform to required dimensions or specified requirements shall be completely removed and replaced at no increase in Contract Sum or extension in Contract Time.

END OF SECTION

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SECTION 33 11 00 – WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
   1. Site potable water lines
   2. Site fire protection water lines
   3. Related accessories.

B. Related Sections:
   1. Section 312000 – Earth Moving.

1.2 SYSTEM DESCRIPTION

A. Performance Requirements;
   1. Minimum working pressures:
      a. Underground piping: 150 pounds per square inch gage.
      b. Underground piping downstream of fire department connection: 200 pounds per square inch gage.

1.3 SUBMITTALS

A. Product Data: Manufacturer's specification and technical data on the following.
   1. Piping.
   2. Water Meters.
   3. Valves.

B. Quality Control Submittals:
   1. Field Quality Control submittals are specified under PART 3.

C. Contract Closeout Submittals.
   1. Project Record Documents.
      a. Contractor to provide X, Y and Z as-built coordinates, prepared by Registered Land Surveyor, at 25-foot intervals of installed water line, as well as all valves, fittings, and appurtenances prior to backfill of the water line.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Not less than 5 years experience in the actual production of specified products.

B. Installer's Qualifications: Firm experienced in installation of systems similar in complexity to those required for this Project, plus the following.
   1. Not less than 3 years experience with systems.
   2. Successfully completed not less than 5 comparable scale projects using this system.

C. Regulatory Requirements:
   1. Comply with NFPA 24 for fire service mains.
   2. Comply with requirements of Kansas City Missouri Water Department.

1.5 DELIVERY, STORAGE AND HANDLING

A. Packing and Shipping: Deliver products in original unopened packaging with legible manufacturer's identification.

B. Storage and Protection: Comply with manufacturer's recommendations.
   1. Store valves indoors.
   2. Protect pipes from moisture and dirt.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Ductile Iron Pipe: ANSI/AWWA C151/A21.51, Class 52.
   1. Lining: ANSI/AWWA C104/A21.4, cement mortar, seal coated.
   2. Jackets: ANSI/AWWA C105/A21.5 polyethylene wrapped.
   3. Fittings: ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 with ANSI/AWWA C104/A21.4, cement mortar, seal coated.
   4. Joints:
      a. Push-on joints: ANSI/AWWA C111/A21.11 rubber gaskets and lubricant.
      b. Mechanical joints: ANSI/AWWA C111/A21.11 ductile-iron or gray-iron glands, with high strength steel bolts and nuts, and rubber gaskets.

B. PVC Pipe (Open Trench Construction)
   1. 4 inches to 12 inches: AWWA C900; Pressure Class 235 (DR 18); Cast Iron O.D. equivalent; with bell end and elastomeric gasket.
   2. 14 inches to 48 inches: AWWA C905; Pressure Rating 165 (DR 25) Cast Iron O.D. equivalent; with bell end and elastomeric gasket.
   3. Gaskets: ASTM F477, elastomeric seal.

C. Copper Pipe: ASTM B88, Type K.
   1. Fittings: Cast copper or wrought copper.
   2. Joints: Compression or flared couplings.

D. Gate Valves: ANSI/AWWA C500 or ANSI/AWWA C509, with cast iron or ductile iron body, non-rising bronze stem with nut, epoxy coated disc. Single wedge, mechanical joint ends, control rod, extension box, and valve key.

1. Working pressure: Not less than 200 pounds per square inch gage.

E. Valve Boxes: Cast iron type.
1. Diameter: 6 inches.
2. Lids and Cover: Valve lids and covers shall be Clay & Bailey No. 2193, 2193NS or an approved equal. Valve lids shall have "Water" cast in the lid.

2.2 ACCESSORIES

A. Anchorage:
1. Clamps, straps and washers: ASTM A575, steel.
2. Rods: ASTM A575, steel.
3. Rod couplings: ASTM A 197, malleable iron.
4. Bolts: ASTM A307, steel.
5. Cast-iron washers: ASTM A 126 gray iron.
6. Thrust blocks: Comply with requirements of concrete material in this section.

B. Underground Warning Tape: Polyethylene plastic tape with magnetic detectable conductor, 6 inches wide by 4 mils thick.
1. Imprint warning tape with "CAUTION – WATER SERVICE LINE BURIED BELOW" in large black letters.

C. Water Meter: Type required by utility company.
1. Size: As indicated on Drawings.

D. Water Meter Box: Precast type as required by utility company.
1. Top: Reinforced to comply with H-20 traffic loading.

E. Bedding Materials:
1. Trenches with trench bottom sloping towards building and pipes penetrating foundation walls: Low Volume Change Materials as specified under Section 312000.
2. Other areas: As specified under Section 312000.

F. Backfill Materials: As specified under Section 312000.

G. Concrete:
1. Concrete Mixes: Concrete shall be MCIB Mix Number A564-3/4-4 or A543-1-4 at the Contractor's option; except concrete used for soil stabilization, pipe cradles, filling, leveling courses, and other similar purposes may be either MCIB Mix Number A440-3/4-4 or A473-1/2-4. Using a mechanical mixer, concrete may be prepared on-site to construct inverts only for pre-cast structures having developed bases. Concrete may be either MCIB Mix Number 495-3/4-4 or 527-1/2-4 at the Contractor's option. A maximum of 7 gallons of water per sack of cement is in the design for both of these mixes.
2. Concrete Materials:
   a. Concrete materials shall conform to MCIB Section 1 Concrete Materials, except that total shale, coal, and lignite content shall not exceed 0.5 percent by weight, and clay content shall be zero.

b. Concrete shall conform to all requirements of MCIB and the compressive strength of each mixture shall be as designated therein.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper and timely completion.
   1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Trenching: Comply with requirements of Section 312000.
   1. Grade trench bottom to provide smooth, firm, stable, and rock free foundation throughout length of pipe.
   2. Remove unstable, soft, and unsuitable materials from surface upon which pipe is to lay.
      a. Backfill with clean sand or pea gravel.
   3. Shape bottom of trench to fit design of pipe.
      a. Fill unevenness with bedding material.
      b. Dig bell holes at each pipe joint to assure continuous bearing of pipe.

B. Install bedding material at trench bottom in accordance with Section 312000.
   1. Install bedding materials in continuous layers not exceeding 6 inches compacted dept.
   2. Compact bedding materials as specified under Section 312000.
   3. Where trench bottom is rock material, install bedding materials in continuous layers not exceeding 6 inches in compacted dept, to total of 6 inches.

C. Pipe Installation: comply with pipe manufacturer’s instructions.
   1. Install at slopes indicated in Drawings.
   2. Install pipe with top of pipe at a depth of not less than 42 inches below final finish grades.
   3. Install ductile iron pipe in accordance with ANSI/AWWA C600.
   4. Install grooved and shouldered pipe in accordance with ANSI/AWWA C606.
   5. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
   6. Install pipe to allow for expansion and contraction without stressing pipe or joints.
   7. Install components having pressure ratings equal to or greater than system working pressure.
   8. Install fittings for changes in direction and branch connections.
      a. Provide restraints at fittings and joints.
   9. Install dielectric fittings to connect dissimilar metal pipes.

D. Pipe Joining:
   1. Ductile-iron pipe gasketed joints: Comply with ANSI/AWWA C600.
   2. Flange joints:

a. Align flanges and install gaskets.
b. Assemble joints by sequencing bolt tightening using lubricant on bolt threads.
3. Threaded joints: Install using joint tape or joint compound.
4. Ductile-iron, grooved-end, and fitting joints:
a. Cut-groove pipes.
b. Assemble with couplings, gaskets, lubricant, and bolts in accordance with coupling and fitting manufacturer's instructions.

E. Provide joint retainers to each elbow or change of pipe direction.
1. Provide fitting restraints with retainer type packing glands.

F. Valve Installation:
1. Comply with ANSI/AWWA C600, with buried valves installed with stem pointing upward and within valve box.
2. Set valves on solid bearing.
3. Center and plumb valve box over valve.
a. Set box cover to permit full access to pipe and pipe accessories.

G. Install water meter box and water meter in accordance with utility company's requirements

H. Form and place concrete for thrust restraints at each elbow or change of pipe direction.
1. Place concrete to permit full access to pipe and pipe accessories.

I. Install underground warning tape continuous buried 6 inches below finish grade, above pipe line.
1. Coordinate with Section 312000.

J. Backfilling: Comply with requirements of Section 312000.

3.3 FIELD QUALITY CONTROL

A. Tests:
1. Hydrostatic tests: Test at not less than 1.5 times working pressure.
a. Increase pressure in 50 pounds per square inch increments, inspection each joint between increments.
b. Maintain test pressure for 1 hour, then decrease to 0 pounds per square inch gage.
c. Increase to test pressure again and maintain test pressure for 1 additional hour.
d. Maximum allowable leakage: 2 quart per hour per 100 gaskets or joints.

3.4 CLEANING

A. Clean and disinfect system as follows.
1. Purge new and existing system and parts of existing system which have been altered, extended, or repaired.

2. Clean and disinfect potable water lines in accordance with ANSI/AWWA C651.
3. Clean fire protection water lines in accordance with NFPA 24.

3.5 PROTECTION

A. Protect installed system from damage of displacement until backfilling operation is complete.

END OF SECTION

SECTION 33 31 00 - SANITARY UTILITY SEWERAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Sanitary sewage piping.
   2. Manholes.
   3. Connection of building sanitary drainage system to municipal sewers.
   4. Related accessories.

B. Related Sections:
   1. Section 312000 – Earth Moving.

1.2 SUBMITTALS

A. Product Data: Manufacturer's specifications and technical data on the following:
   1. Piping.
   2. Fittings.
   3. Cleanouts.

B. Shop Drawings: Indicate dimensions, description of materials, general construction, specific modifications, component connections, anchorage methods, and installation procedures, plus the following specific requirements.
   1. Include manholes, frames, and covers.

C. Concrete: Laboratory name, aggregate testing and gradation, and design mix.

D. Contract Closeout Submittals:
   1. Project Record Documents.
      a. Contractor to provide as-built survey, prepared by Registered Land Surveyor, that indicates the exact location, top elevations, flow lines and pipe sizes of all structures.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Not less than 5 years experience in the actual production of specified products.

B. Installer's Qualifications: Firm experienced in installation of systems similar in complexity to those required for this Project, plus the following:
   1. Not less than 3 years experience with systems.
   2. Successfully completed not less than 5 comparable scale projects using this system.

C. Regulatory Requirements:
   1. Comply with requirements of American Public Works Association.
   2. Comply with requirements of City.

D. Certificates: Certification from precast manufacturer that Con^{mic}Shield® with CONTINT was used in the fabrication of sewer manhole.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Deliver products in original unopened packaging with legible manufacturer's identification.

B. Precast concrete sections shall not be delivered to the job until the concrete control cylinders have attained a strength of at least 80 percent of the specified minimum.

C. Precast concrete sections shall be handled carefully and shall not be bumped or dropped. Hooks shall not be permitted to come in contact with joint sections.

D. Precast concrete sections shall be inspected when delivered. All cracked or otherwise visibly defective units will be rejected. City reserves the right to inspect the production of the units at the manufacturing plant.

E. Storage and Protection: Comply with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Polyvinyl Chloride (PVC) Pipe and Fittings: ASTM D3034, SDR 26.
   1. Joints: Pipe and fittings shall have elastomeric gasket joints providing a watertight seal when tested in accordance with ASTM D3212. Gaskets shall conform to ASTM F477. Solvent welded joints shall not be permitted.

B. Cement: Cement shall conform to ASTM C150, Type I, unless high early strength is required in which instance Type III shall be used. Cement may be bagged or bulk. Cements shall be used from only one mill throughout the entire project.

C. Fine Aggregate: Fine aggregate, clean natural sand, shall conform to ASTM C33 and have the following gradation:

Sieve	% Passing	% Retained
3/8"	100	0
#4	95-100	0-5
#8	80-100	0-20
#16	50-85	15-50
#30	25-60	40-75

#50	10-30	70-90
#100	2-10	90-98

D. Coarse Aggregate: Clean crushed rock, washed gravel, or other inert granular material, except that clay and shale particles shall not exceed one percent. Coarse aggregate shall conform to ASTM C33 and have the following gradation:

Sq. Sieve	% Passing	% Retained
3/4"	90-100	0-10
3/8"	20-55	45-80
#4	0-10	90-100
#8	0-5	95-100

E. Water: Treated and filtered water from a municipal or other public water supply district shall be used.

F. Reinforcing Steel: All bars shall conform to ASTM A615, Grade 60. Bending details shall conform to ACI 318.

G. Forms: The forms shall be true and rigid and conform to shape, line and dimensions as shown on the drawings. All forms shall be rigidly constructed, braced and tied to prevent any deflection or displacement during placing of concrete. All exposed corners and edges shall have 1" fillets. All joints shall be mortar tight; open joints shall be sealed as required.

H. Concrete Mix:
1. Proportioning: Concrete shall conform to the following:
   a. Cement: 6 sacks per cubic yard, minimum.
   b. Water shall be kept to an absolute minimum to maintain slump as specified.
   c. Aggregate: The sand factor shall be as required to give the best workable mix within the range of 46 to 52 percent of total aggregate by weight.
   d. Strength: Minimum 4000 psi at 28 days.
2. Slump: The maximum slump shall not exceed 4 inches. Determination of slump shall conform to ASTM C143.
3. Mixing: Contractor shall use ready-mixed concrete, mixed and delivered in conformance with ASTM C94.
4. Admixtures: Air entraining agents shall be added to the concrete to provide 4 to 6 percent entrained air when placed, in conformance with ASTM C185.
5. Con^{mic}Shield® with CONTINT
   a. Con^{mic}Shield® with CONTINT shall be added to all precast and cast-in-place manholes in accordance with the manufacturer’s recommendations.
   b. Cast-in-place concrete invert fill and collars inside the manhole shall contain Con^{mic}Shield® with CONTINT per manufacturer's recommendation.

2.2 MANHOLES

A. Precast Concrete Manholes
   1. Precast concrete manholes risers, base sections and tops shall conform to ASTM C478.
   2. The inside diameter of the manhole shall be as follows:

Maximum Pipe Size (inches)	Manhole Diameter (feet)	Min. Manhole Frame Clear Opening (inches)
12 to 24	4.0	24.0
27 to 36	5.0	30.0
42 to 48	6.0	30.0

   3. When connecting pipe sizes exceed 48 inches in diameter, manholes shall be specially designed.
   4. Reducing sections may be used at six (6) feet or more above the invert.
   5. Minimum wall thickness for risers not less than one-twelfth (1/12) of inside diameter plus one inch, or five (5) inches, whichever is greater.
   6. The diameter of the base pad shall be a minimum of eight (8) inches greater than outside diameter of the manhole.
   7. Precast concrete manholes shall be constructed with developed bases in accordance with City standards.
   8. Con^{mic}Shield® with CONTINT shall be added to all precast manholes in accordance with the manufacturer's recommendations.
   9. Cone Sections shall be eccentric unless otherwise specified. The minimum wall thickness shall be as specified for riser sections.
   10. All required pipe openings shall be plant cast unless otherwise noted.
   11. Resilient Connectors: Pre-cast base sections shall be provided with circular openings, with continuous, circular, resilient connectors cast into the wall. Resilient connectors shall be installed in accordance with the manufacturer's recommendations, except that connectors shall be positioned so that sealing or resealing operations may be accomplished from inside the manhole.
   12. Pre-cast sections may be provided with lifting notches on the inside faces of the walls to facilitate handling. Lifting notches shall be not more than 3 inches deep; holes extending through the wall will not be acceptable.
   13. If precast base sections are provided with integral concrete invert fill, a roughened surface shall be provided to improve the bond with the final invert fill. A minimum of 2 inches of the concrete invert fill shall be installed in the field.

B. Manhole Adjustment Rings.
   1. Adjusting rings shall be designed to withstand the wheel loading requirements of AASHTO HS20.
   2. Adjusting rings shall be designed and fabricated to withstand deterioration and degradation when exposed to hydrogen sulfide.
   3. Acceptable Manufacture's include the following:
      a. Cretex Pro Ring
      b. EJ Infrariser

C. Resilient Manhole/Pipe Connectors.
   1. Pipe openings shall contain flexible gaskets conforming to the requirements of ASTM C923.
   2. Mortar connections will be allowed only if prior approval has been given by the CITY.

3. Acceptable Manufacturer's include the following:
   a. Press-Seal Gasket Corporation
   b. A-Lok Products Inc.
   c. CITY approved equal.
4. When RCP is used with A-Lok gasket, the barrel of the RCP shall be lubricated to prevent damage to the gasket during insertion. When PSX gaskets are used, the take-up screws for the gasket clamps shall be positioned a minimum of 90° apart. The specific type of gasket approved for each diameter is referenced in the table below.

Pipe Diameter (in.)	PSX	A-LOK	A-LOK: X-CEL
8	Yes	Yes	Yes
10	Yes	Yes	Yes
12	Yes	Yes	Yes
15	Yes	Yes	No
18	Yes	Yes	No
21	Yes	Yes	No
24	Yes	Yes	No
27	Yes	Yes	No
30	Yes	Yes	No
36	Yes	Yes	No
42	Yes	Yes	No
48	Yes	Yes	No

D. Joint Sealants.
   1. Joints shall be sealed using preformed flexible joint sealants conforming to ASTM C990. The minimum bead dimension shall be an inch.

E. External Manhole Joint Seal
   1. External manhole seals shall be used on new manhole installations, replacements, or when project conditions allow for excavation of the manhole sections and shall be minimum of 9"wide .
   2. Heat Shrinkable Wrap-around Sleeves: Acceptable products include the following:
      a. CCI Pipeline Systems: WrapidSealTM
      b. City approved equal.
   3. External Joint Banding Systems
      a. Infi-Shield®: External Gator Wrap
      b. Mar Mac Construction Products, Inc.: MacWrap External Sealing Band
      c. Cretex Specialty Products: Cretex Wrap
      d. CITY approved equal.
   4. Materials for external manhole seals shall be able to withstand hydrogen sulfide and other corrosive gases found in sewers.

F. Internal Manhole Seal

1. Internal manhole seals shall be used when project conditions prevent the use of external manhole seals, or at the direction of the City.
2. Acceptable products for internal manhole seal shall include the following:
   a. Cretex: Internal Joint Seal
   b. CITY approved equal.
3. Materials for internal manhole seals shall be able to withstand hydrogen sulfide and other corrosive gases found in sewers.

G. Frame and Chimney Sealing System
1. External Frame Chimney Seal
   a. CCI Pipeline Systems: Wrapid Seal
   b. Infi-Shield: Uniband
   c. City pre approved equal
2. Internal Seal: Internal sealing system for manhole frames and chimneys shall be as specified in above paragraph 2.2.F.
3. Grade Ring Liner:
   a. WaterLOK Grade Ring Liners as manufactured by ALOK Products, Inc.,
   b. I&I Barriers as manufactured by Strike Tool Inc.
   c. City pre approved equal.
   d. Refer to details below for Paved and Un-Paved Areas.
4. (NOTE) Manholes in paved areas shall be sealed with an Approved External Chimney seal and an Approved Grade Ring Liner.

H. Frames, Covers and Gratings For Manholes. Shall Conform to Manhole Castings indicated in this section.

I. Non-Shrink Grout
1. Non-shrink grout shall conform to ASTM C1107, Grades B and C.
2. Non-shrink grout shall be in the plastic state and show no expansion after set as tested in accordance with ASTM C827 and shall develop compressive strength not less than three thousand (3,000) psi with a trowelable mix within twenty-four (24) hours per ASTM C109. The placement time shall be not less than forth-five (45) minutes based on initial set per ASTM C 191.
3. Acceptable Manufacture's
   a. Conshield Joint Set

J. Waterproofing Additive. Waterproofing additive shall be added at concrete plant and shall be:
1. Crystal-X as manufactured by Conshield.
2. Xypex as manufactured by Xypex Chemical

K. Castings.
1. Ductile Iron Castings. Shall conform to ASTM A536.
2. Workmanship and Finish.
   a. Castings shall be of uniform quality, free from sand holes, gas holes, shrinkage, cracks and other surface defects. Castings shall be ground smooth and well cleaned by shot blasting. Runners, risers, fins, and other cast-on pieces shall be removed.
   b. A draft angle of 2° to 5° will be accepted provided it does not interfere with the fit of the assembly.

c. For traffic service castings, bearing surfaces between manhole rings and covers or grates and frames shall be cast or machined with such precision to prevent rocking.
d. Entire ring and cover bearing surface shall be machined.
e. In other matters of workmanship and finish, the castings shall conform to any points agreed upon by the manufacturer and the purchaser.

3. Manhole Frames and Covers: Frames and covers shall be as indicated or shall be of type suitable for the application, circular, without vent holes.
   a. Markings: The type of utility shall be stamped or cast into the cover and wording shall be per City Approved Drawings.
   b. Frames shall be circular.
   c. The minimum clear opening for frames shall be 24 inches for manholes having a diameter of 4.0 feet.
   d. The minimum clear opening for frames shall be 30 inches clear opening for manholes having a diameter greater than 4.0 feet and shall be Composite as manufactured by GMI Composites.
   e. All covers shall have provisions for opening, such as concealed pick holes.
   f. Special Requirements for Paved Areas
      1) Definition: Areas subject to vehicular traffic. Includes, but is not limited to, all paved areas.
      2) At a minimum, frames and covers shall be “Traffic Rated” in accordance with AASHTO M306.
      3) All manhole frames and covers shall be adjustable and self- leveling. Frames and covers shall be adjustable to meet any slope and grade of the roadway (from 0 to 17%) and shall be able to be raised or lowered in ¼ inch increments, up to 2¼ inches. Ring height shall be adjustable after installation without disturbing the surrounding pavement.
      4) Cam Locks will not be allowed in Traffic Areas unless shown on the plans or directed by the City. In Traffic Areas the Contractor shall install NON-Cam Lock Castings.
      5) Acceptable manufactures include the following (or approved equal):
         a) Self-Level Manhole Frame and Cover with 1040AGS “T” Gasket Cover as manufactured by East Jordan Iron Works.
         b) PAMREX VIATOP (reference #CDVT6OQG) as manufactured by CertainTeed.
   g. Special Requirement for Un-Paved Areas:
      1) Definition: Areas that are not subject to vehicular traffic. Includes, but is not limited to, greenways and easements.
      2) At a minimum, frames and covers shall be rated “Medium Duty” ductile iron
      3) frame and cover and able to withstand AASHTO H-20/HS-20 loading.
      4) Covers shall be hinged with drain and incorporate 90 degree blocking system to prevent accidental closure. Hinged covers shall incorporate a spring bar locking system that automatically activates when closed. Casting shall have lifetime warranty for all components.
      5) Flange shall incorporate bedding slots and bolt holes.
      6) Acceptable manufacturers include the following (or pre approved equal):
         a) REXUS models as manufactured by CertainTeed

b) Hingeco as manufactured by EJIW

h. Bolt-down manhole rings and their covers shall be Hinged Ductile Iron, O-ring or T- ring gaskets and cam lock. Cam lock bolt head shall fit flush or below the top of the cover. The O-ring or T-ring rubber gasket shall be neoprene or other synthetic material.

1) Acceptable Manufactures include the following (or approved equal):

a) Pamrex model as manufactured by CertainTeed

b) Ergo as manufactured by EJIW

2.3 ACCESSORIES

A. Cleanouts: Cast-iron ferrule and countersunk brass cleanout plug, with round cast-iron access frame and heavy-duty, secured, scoriated cast-iron cover.

B. Underground Warning Tape: Polyethylene plastic tape with magnetic detectable conductor, 6 inches wide by 4 mils thick.

1. Imprint warning tape with “CAUTION – SEWER SERVICE LINE BURIED BELOW” in large black letters.

C. Bedding Materials: As specified under Section 312000.

D. Fill Materials: As specified under Section 312000.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper and timely completion.

1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Trenching: Comply with requirements of Section 312000.

1. Grade trench bottom to provide smooth, firm, stable, and rock free foundation throughout length of pipe.
2. Remove unstable, soft, and unsuitable materials from surface upon which pipe is to lay.
   a. Backfill with bedding materials.
3. Shape bottom of trench to fit design of pipe.
   a. Fill unevenness with tamped bedding materials.
   b. Dig bell holes at each pipe joint to assure continuous bearing of pipe.

B. Install bedding material at trench bottom in accordance with Section 312000.

1. Install bedding materials in continuous layers not exceeding 6 inches in compacted depth, to total depths indicated on Drawings.

2. Compact bedding materials as specified under Section 312000.

C. Pipe Installation: Comply pipe manufacturer's instructions.
1. Install pipe beginning at low point of system, true to grades and alignment indicated on Drawings and unbroken continuity of invert.
2. Install PVC pipe in accordance with ASTM D2855 and ASTM F477.
3. Place bell ends or groove ends of piping facing upstream.
4. Install gaskets in accordance with manufacturer's instructions.
5. Install bedding at sides and over top of pipe to minimum compacted thickness of 12 inches.
6. Clean interior of piping as Work progresses.
7. Maintain swab or drag line and pull past each joint as it is completed.
8. Install plugs in ends of incomplete piping at end of each day and whenever Work stops.

D. Install manholes complete with accessories indicated on Drawings.
1. Comply with ASTM C891.
2. Form continuous concrete channel and benches between inlets and outlets.
3. Install top of frames and covers flush with adjacent paved surfaces.
   a. Install top of frame 3 inches above adjacent landscaped surfaces.

E. Install clean-outs and extension from sewer pipe to clean-out at grade at locations indicated on Drawings.
1. Set cleanout frame and cover in concrete pad, 18 inches by 18 inches by 12 inches deep, except at where location is in concrete paving.
2. Set top of cleanout 1 inch above surrounding grade.
3. Set top of cleanout flush with surrounding pavement.

F. Tap Connections:
1. Make connections to existing sanitary sewer and underground to comply with requirements of this Section, as indicated on Drawings.

G. Install underground warning tape continuous buried 6 inches below finish grade, above pipe line.
1. Coordinate with Section 312000.

H. Backfilling: Comply with requirements of Section 312000.

3.3 CLEANING

A. Flush piping between manholes and other structures if required by authority having jurisdiction.
1. Remove collected debris.

3.4 FIELD QUALITY CONTROL

A. Tests:

1. Perform testing of completed system in accordance with local authorities having jurisdiction.
2. Perform the following tests in accordance with APWA Street Construction and Material Specifications, Division II, Section 2509.
   a. Infiltration-exfiltration air test.
   b. Deflection test.

B. Inspections:
1. Perform inspections in accordance with APWA Street Construction and Material Specifications, Division II, Section 2509.
2. Inspect interior of piping to determine whether line displacement or other damage has occurred.
3. Make inspections after pipe between manholes and manhole locations has been installed and approximately 2 feet of backfill material in place.
   a. Reinspect at completion of Project.
4. If inspections indicate poor alignment, debris, displaced pipe, infiltration, or other defects, correct such defects and reinspect.
   a. Defects requiring correction include the following:
      1) Alignment: Less than full diameter of inside of pipe is visible between structures.
      2) Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
      3) Crushed, broken, cracked, or otherwise damaged piping.
      4) Infiltration: Water leakage into piping.
      5) Exfiltration: Water leakage from or around piping.

3.5 PROTECTION

A. Protect installed sewage system from damage and/or displacement until backfilling operation is complete.

END OF SECTION

SECTION 33 41 00 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Storm sewage piping.
   2. Junction boxes.
   3. Inlets.
   4. Yard drains.
   5. Related accessories.

B. Related Sections:
   1. Section 312000 – Earth Moving.
   2. Section 334613 – Foundation Drainage.

1.2 SUBMITTALS

A. Submit in accordance with Division 1 unless otherwise indicated.

B. Product Data: Manufacturer's specifications and technical data on the following:
   1. Piping.
   2. Fittings.
   3. Yard Drains.
   4. Cleanouts.

C. Shop Drawings: Indicate dimensions, description of materials, general construction, specific modifications, component connections, and installation procedures, plus the following specific requirements:
   1. Include junction boxes, inlets, frames, covers, and grates.

D. Contract Closeout Submittals: Submit in accordance with Division 1.
   1. Project Record Documents.
      a. Contractor to provide as-built survey, prepared by Registered Land Surveyor, that indicates the exact location, top elevations, flow lines and pipe sizes of all structures.

1.3 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Not less than 5 years experience in the actual production of specified products.

B. Installer's Qualifications: Firm experienced in installation of systems similar in complexity to those required for this Project, plus the following:

1. Not less than 3 years experience with systems.
2. Successfully completed not less than 5 comparable scale projects using this system.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping: Deliver products in original unopened packaging with legible manufacturer's identification.

B. Storage and Protection: Comply with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforced Concrete Pipe: ASTM C76, Class III, Wall B.
   1. Fittings: Same strength of adjoining pipe.
   2. Joints:
      a. Gaskets: Contractor has option of the following:
         1) ASTM C443, flat gaskets cemented to pipe tongue or spigot.
         2) ASTM C443 O-ring gaskets.
         3) ASTM C443 roll-on gaskets.

B. Polyvinyl Chloride (PVC) Pipe and Fittings: ASTM D3034, SDR 26.
   1. Solvent cement: ASTM D2564.

C. High Density Polyethylene (HDPE) pipe and fittings.
   1. Pipe Requirements: ADS N-12 WT IB pipe (per AASHTO) shall have a smooth interior and annular exterior corrugations.
      a. 4- through 10-inch (100 to 250 mm) pipe shall meet AASHTO M252, Type S.
      b. 12- through 60-inch (300 to 1500 mm) pipe shall meet AASHTO M294, Type S or ASTM F2306.
   2. Joint Performance: Pipe shall be joined using a bell & spigot joint meeting the requirements of AASHTO M252, AASHTO M294, or ASTM F2306. The joint shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly. 12- through 60-inch (300 to 1500 mm) diameters shall have an exterior bell wrap installed by the manufacturer.
   3. Fittings: Fittings shall conform to AASHTO M252, AASHTO M294, or ASTM F2306. Bell and spigot connections shall utilize a welded bell and valley or saddle gasket meeting the watertight joint performance requirements of AASHTO M252, AASHTO M294, or ASTM F2306.

D. Concrete:
   1. Concrete Mixes: Concrete shall be MCIB Mix Number A564-3/4-4 or A543-1-4 at the Contractor's option; except concrete used for soil stabilization, pipe cradles, filling, leveling courses, and other similar purposes may be either MCIB Mix Number A440-3/4-4 or A473-1/2-4. Using a mechanical mixer, concrete may be prepared on-site to construct inverts only for pre-cast structures having developed bases. Concrete may be either MCIB Mix Number 495-3/4-4 or 527-1/2-4 at the Contractor's option. A maximum of 7 gallons of water per sack of cement is in the design for both of these mixes.
   2. Concrete Materials:
      a. Concrete materials shall conform to MCIB Section 1 Concrete Materials, except that total shale, coal, and lignite content shall not exceed 0.5 percent by weight, and clay content shall be zero.
      b. Concrete shall conform to all requirements of MCIB and the compressive strength of each mixture shall be as designated therein.

E. Reinforcing Steel: Reinforcing bars shall conform to ASTM C 615, Grade 60. Welded steel wire fabric shall conform to ASTM A 185.

2.2 COMPONENTS

A. Junction Boxes: ASTM C858, precast reinforced concrete.
   1. Base section:
      a. Floor slab; 8 inch thick.
      b. Walls: 6 inch thick.
      c. Base riser section: 6 inch thick.
   2. Riser section: 48 inch diameter unless otherwise indicated on Drawings, with 6 inch thick walls.
   3. Top section: Concentric cone, eccentric cone, or flat slab type, as indicated on Drawings.
      a. Top of cone to match grade rings.
   4. Grade rings: Reinforced concrete rings, 4 to 9 inches thick.
   5. Gasket: ASTM C443, rubber.
   6. Steps: Cast iron steps, case into base, riser and top sections at 16 inch intervals.
   7. Frame and cover: ASTM A48, Class 35B gray iron.
      a. Frame size: 24 inch diameter, by 9 inch riser with 4 inch width flange.
      b. Cover: 26 inch diameter, indented top design, with lettering "STORM SEWER" cast into cover.
   8. Pipe connections: ASTM C923, resilient type.

B. Inlets: ASTM C858, precast reinforced concrete
   1. Base section:
      a. Floor slab: 8 inch thick.
      b. Walls: 6 inch thick.
      c. Base riser section: 6 inch thick.
   2. Riser section: 48 inch diameter unless otherwise indicated on Drawings, with 6 inch thick walls.
   3. Top section: Flat slab type.

a. Opening to match grade rings.
4. Grade rings: Reinforced concrete rings, 4 to 9 inches thick.
5. Gasket: ASTM C443, rubber.
6. Steps: Steel reinforced plastic steps, cast into base, riser and top sections at 16 inch intervals.
7. Pipe connections: ASTM C923, resilient type.

C. Yard Drains:
1. Size: 12 inches by 12 inches unless otherwise indicated on Drawings.
2. Body: ASTM F794, polyvinyl chloride (PVC).
3. Grate: ASTM A48, Class 30B cast iron, hinged type with traffic rating of H-20 approved for use in pedestrian applications.
4. Acceptable manufacturers and product:
a. Nyloplast America, Inc.: Inline Drain.
b. Comparable products of other manufacturers.

2.3 ACCESSORIES

A. Cleanouts: Cast-iron ferrule and countersunk brass cleanout plug, with round cast-iron access frame and heavy-duty, secured, scoriated cast-iron cover.

B. Underground Warning Tape: Polyethylene plastic tape, 6 inches wide by 4 mils thick.
1. Imprint warning tape with “CAUTION – SEWER SERVICE LINE BURIED BELOW” in large black letters.

C. Bedding Materials: As specified under Section 312000.

D. Backfill Materials: As specified under Section 312000.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper and timely completion.
1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Trenching: Comply with requirements of Section 312000.
1. Grade trench bottom to provide smooth, firm, stable, and rock free foundation throughout length of pipe.
2. Remove unstable, soft, and unsuitable material from surface upon which pipe is to lay.
a. Backfill with bedding material.
3. Shape bottom of trench to fit design of pipe.

a. Fill unevenness with tamped bedding material.
b. Dig bell holes at each pipe joint to assure continuous bearing of pipe.

B. Install bedding material at trench bottom in accordance with Section 312000.
1. Install bedding materials in continuous layers not exceeding 6 inches in compacted depth, to total depths indicated on Drawings.
2. Compact bedding materials as specified under Section 312000.

C. Pipe Installation: Comply with pipe manufacturer's instructions.
1. Install pipe beginning at low point of system, true to grades and alignment indicated on Drawings and unbroken continuity of invert.
2. Install concrete pipe in accordance with ACPA Concrete Piping Installation Manual.
3. Install polyethylene corrugated pipe in accordance with ASTM D2321.
a. Install fittings in accordance with manufacturer's instructions.
4. Install PVC pipe in accordance with ASTM D2855 and ASTM F402.
5. Place bell ends or groove ends of piping facing upstream.
6. Install gaskets in accordance with manufacturer's instructions.
7. Install bedding at sides and over top of pipe to minimum compacted thickness of 12 inches for PVC and polyethylene corrugated pipes.
8. Clean interior of piping as Work progresses.
9. Maintain swab or drag line and pull past each joint as it is completed.
10. Install plugs in ends of incomplete piping at end of each day.

D. Install junction boxes complete with accessories indicated on Drawings.
1. Comply with ASTM C891.
2. Form continuous concrete channel and benches between inlets and outlets.
3. Install top of frames and covers flush with adjacent paved surfaces.
a. Install top of frame flush with adjacent landscaped surfaces, unless otherwise indicated on Drawings.

E. Install inlets complete with accessories indicated on Drawings.
1. Comply with ASTM C891.
2. Form continuous concrete channel and benches between inlets and outlets.
3. Install top of frames and covers flush with adjacent paved surfaces.
a. Install top of frame flush with adjacent landscaped surfaces.

F. Install clean-outs and extension from storm drainage pipe to clean-out at grade at locations indicated on Drawings.
1. Set cleanout frame and cover in concrete pad, 18 inches by 18 inches by 12 inches deep except at where location is in concrete paving.
2. Set top of cleanout 1 inch above surrounding earth grade.
3. Set top of cleanout flush with surrounding pavement.

G. Tap Connections:
1. Make connections to existing storm sewer and underground structures to comply with requirements of this Section, as indicated on Drawings.

H. Install underground warning tape continuous buried 6 inches below finish grade, above pipe line.

1. Coordinate with Section 312000.

I. Backfilling: Comply with requirements of Section 312000.

3.3 PROTECTION

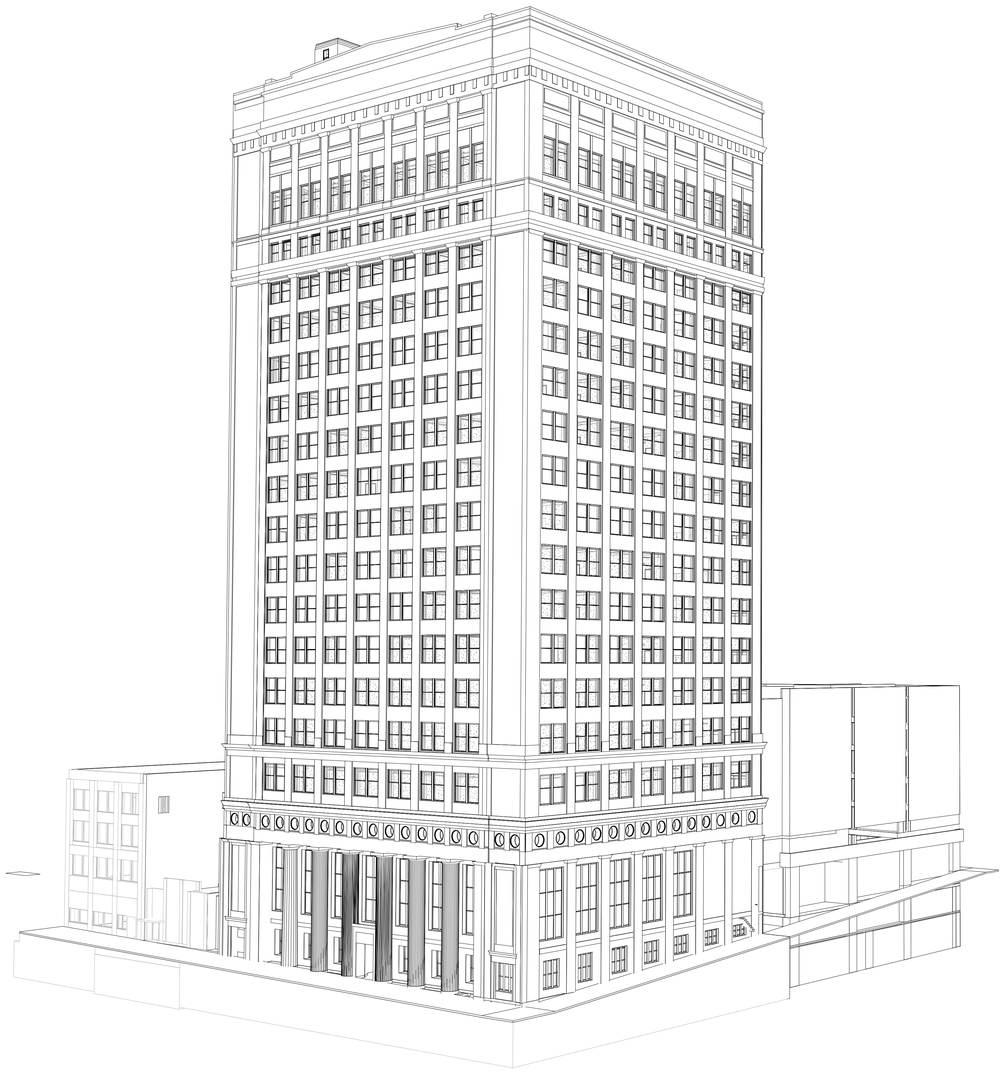
A. Protect installed sewage system from damage of displacement until backfilling operation is complete.

END OF SECTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Phase 1 For Construction Package
September 8, 2020



Delta Quad Holdings, LLC Approval

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ABBREVIATIONS

A/C	-	air conditioning
AFF	-	above finished floor
AHU	-	air handling unit
ALT	-	alternate
AL	-	aluminum
ARCH	-	architect(ural)
BOC	-	bottom of curb
BD	-	board
BLDG	-	building
CHW	-	chilled water
CI	-	cast iron
CIP	-	cast in place
CJ	-	control joint
CL	-	centerline
CLG	-	ceiling
CMU	-	concrete masonry unit
CO	-	clean out
COL	-	column
CONC	-	concrete
CONT	-	continuous
CPT	-	carpet
CT	-	ceramic tile
DBL	-	double
DET	-	detail
DIA	-	diameter
DIM	-	dimension
DIV	-	division
DL	-	dead load
DN	-	down
DS	-	downspout
DWG	-	drawing
E	-	east
EA	-	each
EJ	-	expansion joint
ELEC	-	electric(al)
ELEV	-	elevation, elevator
EPDM	-	ethylene propylene diene monomer
EQ	-	equal
EQUIP	-	equipment
EWC	-	electric water cooler
EXIST	-	existing
EXT	-	exterior
FD	-	floor drain
FE	-	fire extinguisher
FEC	-	fire extinguisher cabinet
FIN	-	finish(ed)
FL	-	floor
FT	-	foot, feet
GA	-	guage
GALV	-	galvanized
GFRC	-	glass fiber reinforced concrete
GFRG	-	glass fiber reinforced gypsum
GL	-	glass
GL BLK	-	glass block
GLZ	-	glazing
GWB	-	gypsum wallboard
GYP	-	gypsum
HB	-	hose bibb
HCM	-	hollow core metal
HCW	-	hollow core wood
HD	-	head
HDW	-	hardware
HGT	-	height
HM	-	hollow metal
HORIZ	-	horizontal
HPL	-	high pressure laminate
HR	-	hour
HVAC	-	heating/ventilation/ air conditioning
ID	-	inside diameter
IN	-	inch
INSUL	-	insulation
INT	-	interior
INV	-	invert
JAN	-	janitor
JST	-	joist
JT	-	joint
KIT	-	kitchen
LAB	-	laboratory
LAM	-	laminate
LAV	-	lavatory
LF	-	lineal foot
LH	-	left hand
LHR	-	left hand reverse
LL	-	live load
LTG	-	lighting
LVR	-	louver
M	-	meter
MACH	-	machine
MAINT	-	maintenance
MAR	-	marble
MAS	-	masonry
MATL	-	material
MAX	-	maximum
MECH	-	mechanical
MEZZ	-	mezzanine
MFR	-	manufacturer
MIN	-	minimum
MISC	-	miscellaneous
MM	-	millimeter
MO	-	masonry opening
MTD	-	mounted
MTL	-	metal
MUL	-	mullion
N	-	north
NIC	-	not in contract
NO	-	number
NOM	-	nominal
NRC	-	noise reduction coefficient
NTS	-	not to scale
OC	-	on center
OD	-	outside diameter
OH	-	overhead door
OHD	-	opposite hand
OPNG	-	opening
OPP	-	opposite
ORD	-	overflow roof drain
P	-	paint
PC	-	precast concrete
PERF	-	perforated
PERP	-	perpendicular
PL	-	plate
PLA	-	plaster
PLWD	-	plywood
PP	-	power pole
PR	-	pair
PRCST	-	precast
PREFAB	-	prefabricated
PSF	-	pounds per square foot
PSI	-	pounds per square inch
PTD	-	painted
QT	-	quarry tile
R	-	riser
RA	-	return air
RAD	-	radius
RB	-	rubber base
RD	-	roof drain
REF	-	refer(ence)
REINF	-	reinforced
REQD	-	required
RES	-	resilient
REV	-	revision
RH	-	right hand
RHR	-	right hand reversed
RM	-	room
RO	-	rough opening
S	-	south
SCHED	-	schedule
SCW	-	solid core wood
SECT	-	section
SF	-	square feet
SHT	-	sheet
SIM	-	similar
SPEC	-	specification(s)
SQ	-	square
SQ FT	-	square feet
SQ IN	-	square inch
SST	-	stainless steel
STD	-	standard
STL	-	steel
STOR	-	storage
STRUCT	-	structural
SUSP	-	suspended
T	-	tread
T&G	-	tongue and groove
TEL	-	telephone
TOC	-	top of curb
TOW	-	top of wall
TYP	-	typical
VB	-	vinyl base
VCT	-	vinyl composition tile
VERT	-	vertical
VWC	-	vinyl wall covering
W	-	west
W/	-	with
W/O	-	without
W/W	-	wall to wall
WC	-	water closet
WD	-	wood
WF	-	wide flange
WGL	-	wire glass
WPT	-	working point
WWF	-	welded wire fabric
YD	-	yard, yard drain

GENERAL PROJECT NOTES

1. DO NOT SCALE DRAWINGS.
2. EACH ITEM REPRESENTED IN THE DRAWING SET OR REFERRED TO IN THE SPECIFICATIONS ARE TO BE PROVIDED BY, COORDINATED BY, AND INSTALLED BY THE CONTRACTOR UNLESS SPECIFICALLY NOTED OTHERWISE.
3. DIMENSIONS ARE TAKEN TO FACE OF METAL STUD, FACE OF CONCRETE, FACE OF MASONRY, FACE OF EXISTING FINISHES, AND COLUMN LINES UNLESS SPECIFICALLY NOTED OTHERWISE. CLEAR (CLR) DIMENSIONS INDICATE FINISH SURFACE TO FINISH SURFACE SPANS BETWEEN WALL OR FROM FINISH SURFACE OF WALL TO LATCH/HINGE OF ADJACENT DOOR OR CENTERLINE OF PLUMBING FIXTURES.
4. LETTER DESIGNATIONS WITHIN A DIMENSION STRING (SUCH AS "A", "B", "C" AND SO ON) INDICATE THAT THE DIMENSION IS TO BE FIELD DETERMINED AND IT IS TO BE EQUAL TO OTHER DIMENSIONS OF THE SAME LETTER THROUGHOUT THAT SPECIFIC DRAWING SHEET, BUT NOT TO THE SAME DESIGNATION ON OTHER DRAWING SHEETS.
5. USE OF "EQUAL" OR "EQ" WITHIN A DIMENSION STRING INDICATES A DIMENSION THAT IS TO BE EQUAL ONLY RELATIVE TO OTHER EQUAL CALLOUTS ON THE SAME DIMENSION STRING IN WHICH IT APPEARS. DIMENSIONS CALLED OUT AS EQUAL ON TWO DIFFERENT DIMENSION STRINGS ARE NOT NECESSARILY EQUAL TO EACH OTHER.
6. ALL DESIGN TEAM DRAWINGS SHALL BE USED TO LOCATE BUILDING ELEMENTS. CONTACT THE ARCHITECT WITH CONFLICTS, DISCREPANCIES, AND OMISSIONS PRIOR TO COMMENCEMENT OF WORK. WRITTEN DOCUMENTATION SHALL BE PROVIDED BY THE CONTRACTOR REGARDING SUCH ITEMS.
7. FLOORS SHALL SLOPE TO FLOOR DRAINS. SLOPES SHALL COMPLY WITH ADA ACCESSIBILITY GUIDELINES.
8. WALL FRAMING, INSULATION, SHEATHING, AND FINISHES SHALL EXTEND FROM THE TOP OF SLAB TIGHT TO THE UNDERSIDE OF THE DECK ABOVE UNLESS NOTED OTHERWISE.
9. REFER TO SPECIFICATIONS FOR EACH ITEM REPRESENTED WITHIN THE DRAWING SET.
10. GENERAL CONTRACTOR SHALL PROVIDE IN-WALL BLOCKING FOR WALL MOUNTED OWNER PROVIDED AND CONTRACTOR PROVIDED ITEMS REPRESENTED WITHIN THE DRAWINGS AND SPECIFICATIONS.
11. CONTRACTOR TO PROVIDE BACKER ROD AND SEALANT, OF A TYPE APPROPRIATE TO EACH CONDITION, BETWEEN MATERIALS BOTH SIMILAR AND DISSIMILAR THROUGHOUT THE INTERIOR AND EXTERIOR OF THE BUILDING. (COLORS TO BE SELECTED BY ARCHITECT)
12. CONTRACTOR SHALL VERIFY THE EXISTING CONDITIONS AND PROMPTLY NOTIFY THE OWNER AND THE ARCHITECT OF ANY CONDITIONS THAT ARE IN CONFLICT WITH THE PROPOSED WORK OR ARE IN VARIANCE WITH THE CONSTRUCTION DOCUMENTS.
13. CONTRACTOR SHALL PROTECT EXISTING MATERIALS, COMPONENTS, AND FEATURES DESIGNATED TO REMAIN, BE SALVAGED, AND/OR REUSED.
14. CONTRACTOR SHALL COORDINATE WITH THE OWNER AND GOVERNING AUTHORITIES TO ESTABLISH CONSTRUCTION TRAFFIC ACCESS TO THE SITE AND DESIGNATED CONSTRUCTION ACCESS THROUGHOUT THE BUILDING.
15. THESE DRAWINGS INDICATE THE GENERAL SCOPE OF THE PROJECT IN TERMS OF ARCHITECTURAL DESIGN CONCEPT, THE DIMENSIONS OF THE BUILDING, AND THE MAJOR ARCHITECTURAL ELEMENTS. AS GRAPHIC DOCUMENTS THE DRAWINGS DO NOT INDICATE OR DESCRIBE THE WORK REQUIRED FOR THE FULL PERFORMANCE AND COMPLETION OF THE CONTRACT DOCUMENTS. ON THE BASIS OF THE GENERAL SCOPE INDICATED OR DESCRIBED THE CONTRACTOR SHALL STUDY THE DRAWINGS AND THEIR GENERAL INFERENCE TO FURNISH THE ITEMS REQUIRED FOR THE PROPER EXECUTION AND COMPLETION OF THE WORK.
16. AT COMPLETION OF THE CONTRACT WALLS, CEILINGS, FLOORS, ETC. ARE TO BE CLEAN OF DEBRIS AND DUST RELATED TO DEMOLITION AND CONSTRUCTION.
17. EACH EXPOSED AND/OR VISIBLE SURFACE OF THE BUILDING IS TO BE FINISHED. UNFINISHED EXPOSED MATERIALS ARE NOT ACCEPTABLE.

FIRE EXTINGUISHERS

1. PROVIDE (1) FIRE EXTINGUISHER WITH SEMI-RECESSED CABINET FOR EVERY 3,000 GROSS SQUARE FEET OF BUILDING AREA (OR FRACTION THEREOF, ROUNDED UP) ON EACH FLOOR LEVEL.
2. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
3. LOCATE FIRE EXTINGUISHERS PER ARCHITECT.

SITE LOCATION PLAN

TOWER GUESTROOM-SHEET INDEX

Sheet Number	Sheet Name	100% Review (08.31.20)	Phase0 1 (09.08.2020)
00 - PROJECT GENERAL			
A0.00	Phase 1 Cover Sheet	X	X
A0.01	Project Data, Code Summary, and Sheet Index	X	X
A0.02	Accessibility Standards	X	X
02 - CIVIL			
C101	SITE DEMOLITION AND EROSION CONTROL PLAN		X
C201	SIDE DIMENSION PLAN		X
C301	SITE GRADING & UTILITY PLAN		X
C500	PUBLIC COVER		X
C501	PUBLIC DEMOLITION PLAN		X
C502	PUBLIC DIMENSION PLAN		X
C503	PUBLIC GRADING DETAILS		X
03 - STRUCTURAL			
S100-T	GENERAL NOTES & TYPICAL DETAILS		X
S300-T	BASEMENT FLOOR FRAMING PLAN		X
S301-T	GROUND FLOOR FRAMING FLOOR		X
S501-T	FRAMING SECTIONS & DETAILS		X
04 - LIFE SAFETY			
LS0.01	LIFE SAFETY CODE ANALYSIS	X	X
LS0.02	LIFE SAFETY CODE ANALYSIS CONTINUED	X	X
LS0.03	LIFE SAFETY CODE ANALYSIS CONTINUED		X
LS1.01-G0	LIFE SAFETY GARAGE BASEMENT PLAN		X
LS1.01-G2	LIFE SAFETY GARAGE DOCK PLAN		X
LS1.01-T0	LIFE SAFETY TOWER BASEMENT PLAN		X
LS1.01-T2B	LIFE SAFETY TOWER 2ND FLOOR PLAN		X
LS1.01-T3B	LIFE SAFETY TOWER 3RD FLOOR PLAN		X
LS1.01-T5	LIFE SAFETY TOWER FIFTH FLOOR PLAN	X	X
LS1.01-T6	LIFE SAFETY TOWER SIXTH FLOOR PLAN	X	X
LS1.01-T7	LIFE SAFETY TOWER SEVENTH FLOOR PLAN	X	X
LS1.01-T8	LIFE SAFETY TOWER EIGHTH FLOOR PLAN	X	X
LS1.01-T9	LIFE SAFETY TOWER NINTH & TENTH FLOOR PLANS	X	X
LS1.01-T11	LIFE SAFETY TOWER 11TH-17TH FLOOR PLANS	X	X
LS1.01-T18	LIFE SAFETY TOWER 18TH & 19TH FLOOR PLANS	X	X
09 - ARCHITECTURAL			
0.00	Guestroom Design Cover Sheet	X	X
A0.10	Wall Types	X	X
A0.20	Guest Room Types	X	X
A1.00-OAB	Overall Plan - Basement	X	X
A1.00-OAG	Overall Plan - Ground Floor	X	X
A1.00-OAM	Overall Plan - Mezzanine	X	X
A1.01-G0	Garage - Floor Plan - Basement	X	X
A1.01-G1	Garage - Floor Plan - 1st	X	X
A1.01-G2	Garage - Floor Plan - Dock	X	X
A1.01-T0	Tower - Floor Plan - Basement	X	X
A1.01-T1	Tower - Floor Plan - 1st	X	X
A1.01-T2	Tower - Floor Plan - Mezzanine	X	X
A1.01-T2B	Tower - Floor Plan - 2nd	X	X
A1.01-T3B	Tower - Floor Plan - 3rd	X	X
A1.01-T5	Tower - Floor Plan - 5th	X	X
A1.01-T6	Tower - Floor Plan - 6th	X	X
A1.01-T7	Tower - Floor Plans - 7th, 10th, 13th, 16th, 19th	X	X
A1.01-T8	Tower - Floor Plans - 8th, 14th, 17th	X	X
A1.01-T9	Tower - Floor Plans - 9th, 12th, 15th	X	X
A1.01-T11	Tower - Floor Plan - 11th	X	X
A1.01-T18	Tower - Floor Plan - 18th	X	X
A1.01-T20	Tower - Floor Plan - 20th	X	X
A1.01-T21	Tower - Floor Plan - 21st	X	X
A1.01-T22A	Tower - Main Roof Plan	X	X
A1.01-T22B	Tower - Lower Roof plan	X	X
A1.20-G0	Garage - RCP - Basement	X	X
A1.20-G1	Garage - RCP - 1st Floor	X	X
A1.20-G2	Garage - RCP - Mezzanine	X	X
A1.20-OAB	Overall RCP - Basement	X	X
A1.20-OAG	Overall RCP - Ground Floor	X	X
A1.20-OAM	Overall RCP - Mezzainine	X	X
A1.20-T0	Tower - RCP - Basement	X	X
A1.20-T1	Tower - RCP - 1st	X	X
A1.20-T2	Tower - RCP - Mezzanine	X	X
A1.20-T4	Tower - RCP - 4th	X	X
A1.20-T5	Tower - RCP - 5th	X	X
A1.20-T6	Tower - RCP - 6th	X	X
A1.20-T11	Tower - RCP - 11th	X	X
A1.20-T20	Tower - RCP - 20th	X	X
A3.01	Plan Details	X	X
A3.02	Plan Details	X	X
A3.03	Enlarged Plan - Restrooms	X	X
A3.04	Enlarged Plan - Elevator Lobby	X	X
A4.02	Stair and Ramp Enlarged Plans and Sections	X	X
A4.03	Stair and Ramp Details		X
A5.01	Unit Plans & Elevations Dbl Queen - 'A'	X	X
A5.02	Unit Plans & Elevations Dbl Queen - 'B'	X	X
A5.02a	Unit Plans & Elevations Dbl Queen - 'B' - ADA	X	X
A5.02b	Unit Plans & Elevations Dbl Queen - 'B' - ADA	X	X
A5.03	Unit Plans & Elevations Dbl Queen - 'C'	X	X
A5.04	Unit Plans & Elevations Dbl Queen - 'D'	X	X
A5.05	Unit Plans & Elevations Dbl Queen - 'E'	X	X
A5.06	Unit Plans & Elevations Dbl Queen - 'F'	X	X
A5.07	Unit Plans & Elevations Sgl King - 'A'	X	X
A5.08	Unit Plans & Elevations Sgl King - 'B'	X	X
A5.09	Unit Plans & Elevations Sgl King - 'C'	X	X
A5.10	Unit Plans & Elevations Sgl King - 'D'	X	X
A5.11	Unit Plans & Elevations Sgl King - 'E'	X	X
A5.11a	Unit Plans & Elevations Sgl King - 'E' ADA	X	X
A5.11b	Unit Plans & Elevations Sgl King - 'E' ADA	X	X
A5.12	Unit Plans & Elevations Sgl King - 'F'	X	X
A5.13	Unit Plans & Elevations Sgl King - 'G'	X	X

TOWER GUESTROOM-SHEET INDEX

Sheet Number	Sheet Name	100% Review (08.31.20)	Phase0 1 (09.08.2020)
A5.14	Unit Plans & Elevations Sgl King - 'H'	X	X
A5.15	Unit Plans & Elevations Sgl King - 'I'	X	X
A5.16	Unit Plans & Elevations Sgl King - 'J'	X	X
A5.17	Unit Plans & Elevations Sgl King - 'K'	X	X
A5.17a	Unit Plans & Elevations Sgl King - 'K' - ADA	X	X
A5.17b	Unit Plans & Elevations Sgl King - 'K' - ADA	X	X
A5.18	Unit Plans & Elevations Sgl King - 'L'	X	X
A5.19	Unit Plans & Elevations Sgl King - 'M'	X	X
A5.20	Unit Plans & Elevations Sgl King - 'M1'	X	X
A6.01	Interior Elevations	X	X
A6.02	Interior Elevations - Restrooms	X	X
A8.02	Guestroom Levels Door Schedule	X	X
A8.03	Phase 1 Door Schedule	X	X
A8.20	Window Elevations	X	X
A8.21	Window Elevations	X	X
A8.22	Window Details	X	X
A8.23	Window Details	X	X
AD1.00-G	Basement Demolition Plan	X	X
AD1.00-T	Basement Demolition Plan	X	X
AD1.01-G	First Floor Demolition Plan	X	X
AD1.01-T	FIrst Floor Demolition Plan	X	X
AD1.02-G	Second Floor Demolition	X	X
AD1.02-T	Second Floor Demolition Plan	X	X
AD1.03A-T	3A DEMOLITION FLOOR PLAN	X	
AD1.04-T	Tower - Fourth Floor Demolition Plan	X	X
10 - FIRE PROTECTION			
FP1.01-G	Garage Basement Floor Fire Protection Plan	X	X
FP1.01-G1	Garage Ground Floor Fire Protection Plan	X	X
FP1.01-G2	Garage Dock Floor Fire Protection Plan	X	X
FP1.01-T	Tower - Basement Floor Fire Protection Plan	X	X
FP1.01-T1	Tower - First Floor Fire Protection Plan	X	X
FP1.01-T2	Tower - Second Floor Fire Protection Plan	X	X
FP1.01-T3	Tower - Third Floor Fire Protection Plan	X	X
FP1.01-T4	Tower - Fourth Floor Fire Protection Plan	X	X
FP1.01-T5	Tower - Fifth Floor Fire Protection Plan	X	X
FP1.01-T20	Tower - Twentieth Floor Fire Protection Plan	X	X
FP1.01-T21	Tower - Twenty-First Floor Fire Protection Plan	X	X
11 - ELECTRICAL			
E1.01-G	Garage Ground Floor Lighting Plan	X	X
E1.01-G1	Garage Basement Floor Lighting Plan	X	X
E1.01-G2	Garage Dock Floor Lighting Plan	X	X
E1.01-T	Tower - Basement Floor Lighting Plan	X	X
E1.01-T1	Tower - First Floor Lighting Plan	X	X
E1.01-T2	Tower - Second Floor Lighting Plan	X	X
E1.01-T3	Tower - Third Floor Lighting Plan	X	X
E1.01-T4	Tower - Fourth Floor Lighting Plan	X	X
E1.01-T5	Tower - Fifth Floor Lighting Plan	X	X
E1.01-T6	Tower - Sixth Floor Lighting Plan	X	X
E1.01-T7	Tower - Seventh Floor Lighting Plan	X	X
E1.01-T8	Tower - Eighth Floor Lighting Plan	X	X
E1.01-T9	Tower - Ninth Floor Lighting Plan	X	X
E1.01-T11	Tower - Eleventh Floor Lighting Plan	X	X
E1.01-T18	Tower - Eighteenth Floor Lighting Plan	X	X
E1.01-T20	Tower - Twentieth Floor Lighting Plan	X	X
E1.01-T21	Tower - Twenty-First Floor Lighting Plan	X	X
E2.01-T	Tower - Basement Floor Power/Special Systems Plan	X	X
E2.01-T1	Tower - First Floor Power/Special Systems Plan	X	X
E2.01-T2	Tower - Second Floor Power/Special Systems Plan	X	X
E2.01-T3	Tower - Third Floor Power/Special Systems Plan	X	X
E2.01-T4	Tower - Fourth Floor Power/Special Systems Plan	X	X
E2.01-T5	Tower - Fifth Floor Power/Special Systems Plan	X	X
E2.01-T6	Tower - Sixth Floor Power/Special Systems Plan	X	X
E2.01-T7	Tower - Seventh Floor Power/Special Systems Plan	X	X
E2.01-T8	Tower - Eighth Floor Power/Special Systems Plan	X	X
E2.01-T9	Tower - Ninth Floor Power/Special Systems Plan	X	X
E2.01-T11	Tower - Eleventh Floor Power/Special Systems Plan	X	X
E2.01-T18	Tower - Eighteenth Floor Power/Special Systems Plan	X	X
E2.01-T20	Tower - Twentieth Floor Power/Special Systems Plan	X	X
E2.01-T21	Tower - Twenty-First Floor Power/Special Systems Plan	X	X
E3.01	Enlarged Unit Plans Electrical	X	X
E3.02	Enlarged Unit Plans Electrical	X	X
E3.03	Enlarged Unit Plans Electrical	X	X
E3.04	Electrical Enlarged Plan	X	X
E3.05	Electrical Enlarged Plan	X	X
E3.06	Electrical Enlarged Plan	X	X
E4.01	Electrical Details	X	X
E4.02	Electrical Details	X	X
E5.01	Electrical Demo Riser Diagram	X	X
E5.02	Electrical New Work Riser Diagram	X	X
E5.03	Electrical Riser Diagram	X	X
E6.01	Electrical Schedules	X	X
E6.02	Electrical Schedules	X	X
E6.03	Electrical Schedules	X	X
E6.04	Electrical Schedules	X	X
E6.05	Electrical Schedules	X	X
E6.06	Electrical Schedules	X	X
12 - MECHANICAL			
M1.01-T1	Tower - First Floor Mechanical Plan	X	X
M1.01-T2	Tower - Second Floor Mechanical Plan	X	X
M1.01-T3	Tower - Third Floor Mechanical Plan	X	X
M1.01-T4	Tower - Fourth Floor Mechanical Plan	X	X
M1.01-T5	Tower - Fifth Floor Plan Mechanical	X	X
M1.01-T6	Tower - Sixth Floor Plan Mechanical	X	X
M1.01-T7	Tower - Seventh Floor Plan Mechanical	X	X
M1.01-T8	Eighth Floor Plan Mechanical	X	X
M1.01-T9	Ninth Floor Plan Mechanical	X	X
M1.01-T11	Eleventh Floor Plan Mechanical	X	X
M1.01-T18	Eighteenth Floor Plan Mechanical	X	X
M2.01-G	Garage Basement Floor Mechanical Piping Plan	X	X
M2.01-G1	Tower - Garage Ground Floor Mechanical Piping Plan	X	X
M2.01-G2	Tower - Garage Dock Floor Mechanical Piping Plan	X	X

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Sheet Number	Sheet Name	100% Review (08.31.20)	Phase0 1 (09.08.2020)
M2.01-T1	Tower - First Floor Mechanical Piping Plan	X	X
M2.01-T2	Tower - Second Floor Mechanical Piping Plan	X	X
M2.01-T3	Tower - Third Floor Mechanical Piping Plan	X	X
M2.01-T4	Tower - Fourth Floor Mechanical Piping Plan	X	X
M2.01-T5	Tower - Fifth Floor Plan Mechanical Piping	X	X
M2.01-T6	Tower - Sixth Floor Plan Mechanical Piping	X	X
M2.01-T7	Tower - Seventh Floor Plan Mechanical Piping	X	X
M2.01-T8	Tower - Eighth Floor Plan Mechanical Piping	X	X
M2.01-T9	Tower - Ninth Floor Plan Mechanical Piping	X	X
M2.01-T11	Tower - Eleventh Floor Plan Mechanical Piping	X	X
M2.01-T18	Tower - Eighteenth Floor Plan Mechanical Piping	X	X
M2.01-T19	Tower - Nineteenth Floor Plan Mechanical Piping	X	X
M2.01-T20	Tower - Twentieth Floor Mechanical Piping Plan	X	X
M2.01-T21	Tower - Twenty-First Floor Mechanical Piping Plan	X	X
M3.01	Enlarged Unit Plans Mechanical	X	X
M3.02	Enlarged Unit Plans Mechanical	X	X
M3.03	Enlarged Unit Plans Mechanical	X	X
M3.04	Enlarged Plans Mechanical Closets	X	X
M3.05	Mechanical Enlarged Plan	X	X
M3.06	Mechanical Enlarged Plan	X	X
M3.07	Mechanical Enlarged Plan	X	X
M4.01	Mechanical Details	X	X
M4.02	Mechanical Details	X	X
M4.03	Mechanical Details	X	X
M5.01	Mechanical Piping Diagrams	X	X
M5.02	Mechanical Risers and Diagrams	X	X
M5.03	Mechanical Risers and Diagrams	X	X
M6.01	Mechanical Schedules	X	X
M6.02	Mechanical Schedules	X	X
M6.03	Mechanical Schedules	X	X
M6.04	Mechanical Schedules	X	X
M6.05	Mechanical Schedules	X	X
M6.06	Mechanical Schedules	X	X
MPE1.01	Symbols Legend	X	X
MPE1.02	MEP Roof Plan	X	X
13 - PLUMBING			
P1.00-G	Garage Basement Floor Below Grade Plumbing Plan	X	X
P1.00-T	Tower - Basement Floor Below Grade Plumbing Plan	X	X
P1.01-G	Garage Basement Floor Above Grade Plumbing Plan	X	X
P1.01-G1	Garage Ground Floor Plumbing Plan	X	X
P1.01-G2	Garage Dock Floor Plumbing Plan	X	X
P1.01-T	Tower - Basement Floor Above Grade Plumbing Plan	X	X
P1.01-T1	Tower - First Floor Plumbing Plan	X	X
P1.01-T2	Tower - Second Floor Plumbing Plan	X	X
P1.01-T3	Tower - Third Floor Plumbing Plan	X	X
P1.01-T4	Tower - Fourth Floor Plumbing Plan	X	X
P1.01-T5	Tower - Fifth Floor Plan Plumbing	X	X
P1.01-T6	Tower - Sixth Floor Plan Plumbing	X	X
P1.01-T7	Tower - Seventh Floor Plumbing Plan	X	X
P1.01-T8	Tower - Eighth Floor Plan Plumbing	X	X
P1.01-T9	Tower - Ninth Floor Plan Plumbing	X	X
P1.01-T11	Tower - Eleventh Floor Plan Plumbing	X	X
P1.01-T18	Tower - Eighteenth Floor Plan Plumbing	X	X
P1.01-T19	Tower - Ninteenth Floor Plan Plumbing	X	X
P1.01-T20	Tower - Twentieth Floor Plumbing Plan	X	X
P1.01-T21	Tower - Twenty-First Floor Plumbing Plan	X	X
P3.01	Enlarged Unit Plans Plumbing	X	X
P3.02	Enlarged Unit Plans Plumbing	X	X
P3.03	Enlarged Unit Plans Plumbing	X	X
P3.04	Enlarged Unit Plans Plumbing	X	X
P3.05	Enlarged Unit Plans Plumbing	X	X
P3.06	Enlarged Unit Plans Plumbing	X	X
P3.07	Enlarged Unit Plans Plumbing	X	X
P3.08	Plumbing Enlarged Plan	X	X
P3.09	Plumbing Enlarged Plan	X	X
P3.10	Plumbing Enlarged Plan	X	X
P4.01	Plumbing Details	X	X
P4.02	Plumbing Details	X	X
P5.01	Domestic Water Riser Diagram	X	X
P5.02	Domestic Water Riser Diagram	X	X
P5.03	Plumbing Risers	X	X
P5.04	Plumbing Risers	X	X
P5.05	Plumbing Risers	X	X
P6.01	Plumbing Schedules	X	X
P6.02	Plumbing Schedules	X	X
P6.03	Plumbing Schedules	X	X
14 - DATA/VOICE			
DV0.00	PROJECT REQUIREMENTS NOTES & SPECS.	X	
DV0.01	SYMBOLS AND LEGEND/SCHEDULES	X	
DV1.01-T5	TOWER - FIFTH FLOOR PLAN	X	
DV1.01-T6	TOWER - SIXTH FLOOR PLAN	X	
DV1.01-T7	TOWER - SEVENTH FLOOR PLAN	X	
DV1.01-T8	TOWER - EIGHTH FLOOR PLAN	X	
DV1.01-T9	TOWER - NINTH FLOOR PLAN	X	
DV1.01-T10	TOWER - TENTH FLOOR PLAN	X	
DV1.01-T11	TOWER - ELEVENTH FLOOR PLAN	X	
DV1.01-T12	TOWER - TWELFTH FLOOR PLAN	X	
DV1.01-T13	TOWER - THIRTEENTH FLOOR PLAN	X	
DV1.01-T14	TOWER - FOURTEENTH FLOOR PLAN	X	
DV1.01-T15	TOWER - FIFTEENTH FLOOR PLAN	X	
DV1.01-T16	TOWER - SIXTEENTH FLOOR PLAN	X	
DV1.01-T17	TOWER - SEVENTEENTH FLOOR PLAN	X	
DV1.01-T18	TOWER - EIGHTEENTH FLOOR PLAN	X	
DV1.01-T19	TOWER - NINETEENTH FLOOR PLAN	X	
DV7.00	ENLARGED GUESTROOM PLANS	X	
DV7.01	ENLARGED GUESTROOM LAYOUTS	X	
DV9.00	ENLARGED EQUIPMENT ROOM LAYOUTS	X	
DV9.01	DATA/VOICE/MATV CONDUIT RISER DIAGRAM	X	
DV9.02	DATA/VOICE CABLING RISER DIAGRAM	X	
DV9.03	MATV CABLING RISER DIAGRAM	X	
DV9.04	EQUIPMENT RACK DETAILS	X	
DV9.05	INSTALLATION DETAILS	X	
DV9.06	SECURITY INSTALLATION DETAILS	X	
DV9.07	ADDITIONAL REQUIREMENTS FOR HSIA CABLING	X	
DV9.08	TYPICAL COMPONENT ELEVATIONS	X	

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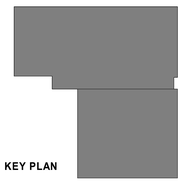

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Project Data, Code Summary, and Sheet Index

A0.01

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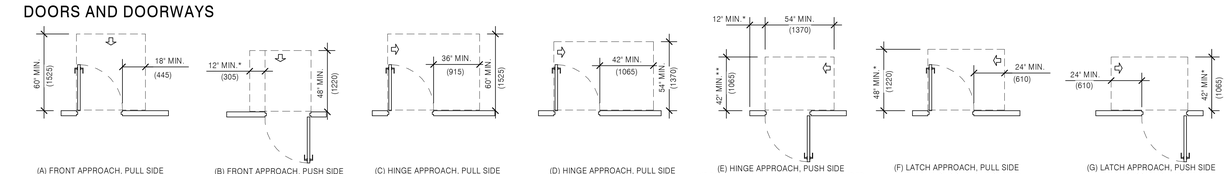
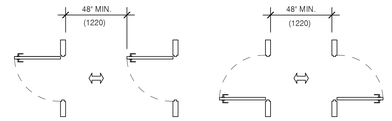
9/10/2020 5:16:13 PM

DOORS AND DOORWAYS



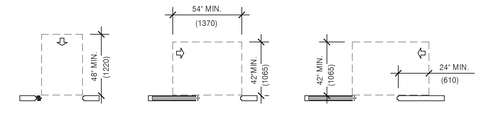
(A) FRONT APPROACH, PULL SIDE
(B) FRONT APPROACH, PUSH SIDE
*IF BOTH CLOSER AND LATCH ARE PROVIDED
(C) HINGE APPROACH, PULL SIDE
(D) HINGE APPROACH, PULL SIDE
(E) HINGE APPROACH, PUSH SIDE
*IF BOTH CLOSER AND LATCH ARE PROVIDED
** 48 MIN. IF BOTH CLOSER AND LATCH PROVIDED
(F) LATCH APPROACH, PULL SIDE
* 54" MIN. IF CLOSER IS PROVIDED
(G) LATCH APPROACH, PUSH SIDE
* 48" IF CLOSER IS PROVIDED

FIG. 404.2.4.1
MANEUVERING CLEARANCE AT SWINGING DOORS



(A)
(B)

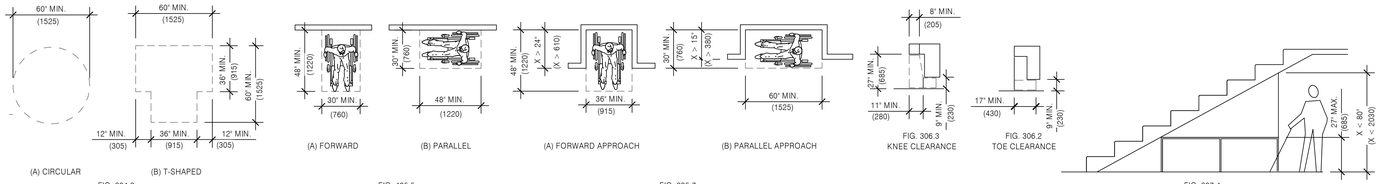
FIG. 404.2.6
TWO DOORS IN A SERIES



(A) FRONT APPROACH
(B) POCKET OR HINGE APPROACH
(C) STOP OR LATCH APPROACH

FIG. 404.2.4.2
MANEUVERING CLEARANCE AT SLIDING AND FOLDING DOORS

CLEAR FLOOR SPACE



(A) CIRCULAR
(B) T-SHAPED

FIG. 304.3
SIZE OF WHEELCHAIR TURNING SPACE

(A) FORWARD
(B) PARALLEL

FIG. 405.5
POSITION OF CLEAR FLOOR OR GROUND SPACE

(A) FORWARD APPROACH
(B) PARALLEL APPROACH

FIG. 305.7
MANEUVERING CLEARANCE IN AN ALCOVE

FIG. 306.3
KNEE CLEARANCE

FIG. 306.2
TOE CLEARANCE

FIG. 307.4
REDUCED VERTICAL CLEARANCE

REACH RANGES

NOTE: THESE APPLY TO LOCATIONS OF SWITCHES, CONTROLS, ETC.

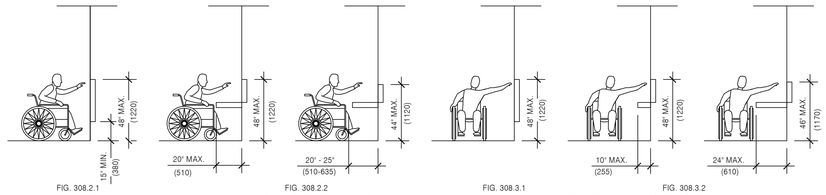


FIG. 308.2.1
UNOBSTRUCTED FORWARD REACH

FIG. 308.2.2
OBSTRUCTED HIGH FORWARD REACH

FIG. 308.3.1

FIG. 308.3.2
UNOBSTRUCTED SIDEOBSTRUCTED HIGH SIDE REACH

GENERAL SITE AND BUILDING ELEMENTS

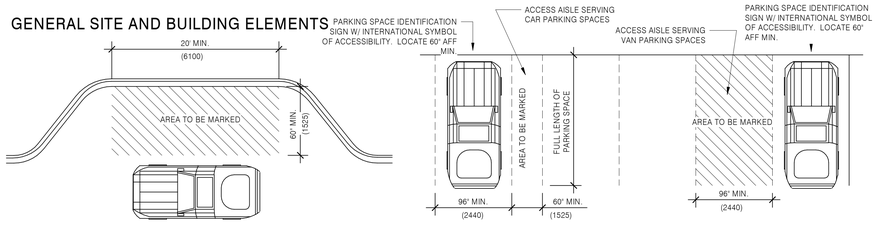
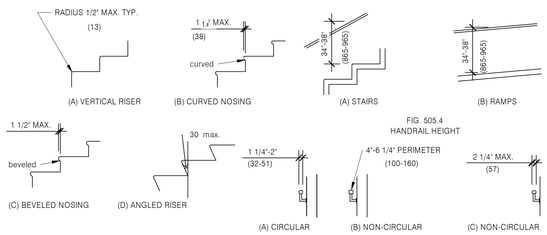


FIG. 503.3
PASSENGER LOADING ZONE ACCESS AISLE

FIG. 502.2/502.3
VEHICLE PARKING SPACE/
PARKING SPACE ACCESS AISLE



(A) VERTICAL RISER
(B) CURVED NOSING
(A) STAIRS
(B) RAMPS

FIG. 505.4
HANDRAIL HEIGHT

FIG. 505.5
HANDRAIL CLEARANCE

(C) BEVELED NOSING
(D) ANGLED RISER

FIG. 504.5
STAIR NOSINGS

(A) CIRCULAR
(B) NON-CIRCULAR
(C) NON-CIRCULAR

FIG. 505.7
HANDRAIL CROSS SECTION

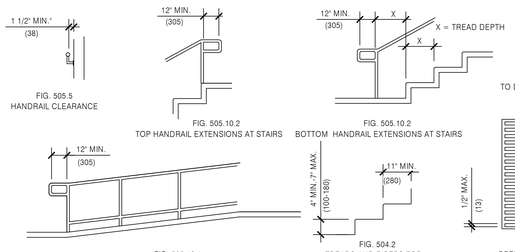


FIG. 505.10.2
TOP HANDRAIL EXTENSIONS AT STAIRS

FIG. 505.10.2
BOTTOM HANDRAIL EXTENSIONS AT STAIRS

FIG. 505.10.1
TOP AND BOTTOM HANDRAIL EXTENSIONS AT RAMPS

FIG. 504.2
TREADS AND RISERS FOR
ACCESSIBLE STAIRWAYS

BUILDING BLOCKS

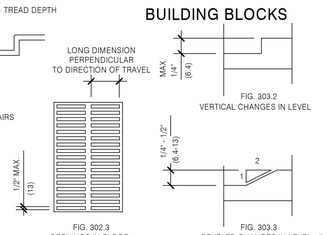


FIG. 303.2
VERTICAL CHANGES IN LEVEL

FIG. 302.3
OPENINGS IN FLOOR
OR GROUND SURFACES

FIG. 303.3
BEVELED CHANGES IN LEVEL

COMMUNICATION ELEMENTS AND FEATURES

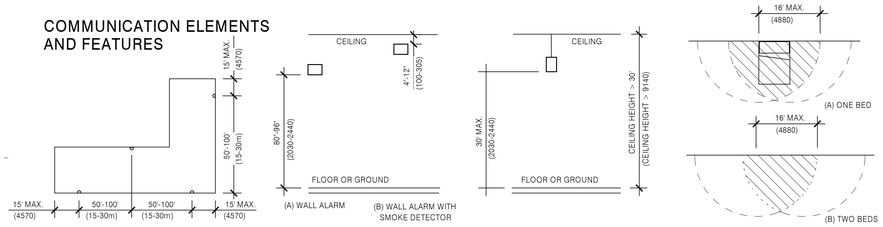


FIG. 702.3.5.1
APPLIANCE SPACING IN CORRIDORS

(A) WALL ALARM
(B) WALL ALARM WITH SMOKE DETECTOR

FIG. 702.3.3.1
LOCATION OF WALL-MOUNTED APPLIANCES

FIG. 702.3.3.2
LOCATION OF CEILING-MOUNTED APPLIANCES

(A) ONE BED
(B) TWO BEDS

FIG. 702.3.6.2
APPLIANCE LOCATION IN SLEEPING ROOMS

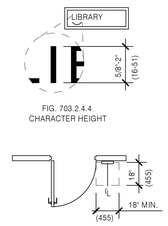
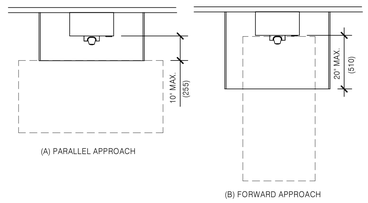


FIG. 703.2.4.4
CHARACTER HEIGHT

FIG. 703.2.8
MOUNTING LOCATION AT DOORS



(A) PARALLEL APPROACH
(B) FORWARD APPROACH

FIG. 704.2.1
CLEAR FLOOR OR GROUND
SPACE FOR TELEPHONES

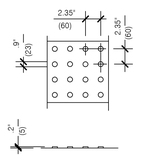


FIG. 705.3.1.1
TRUNCATED DOME SIZE

PROTRUDING OBJECTS

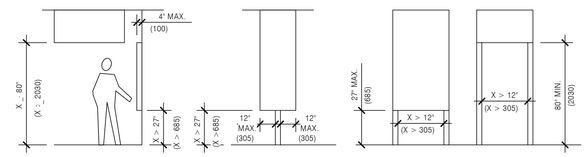
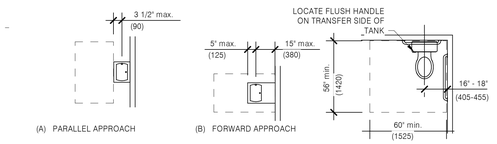


FIG. 307.2
LIMITS OF PROTRUDING OBJECTS

FIG. 307.3
POST-MOUNTED PROTRUDING OBJECTS

PLUMBING ELEMENTS AND FACILITIES



(A) PARALLEL APPROACH
(B) FORWARD APPROACH

FIG. 602.5
DRINKING FOUNTAIN SPOUT LOCATION

FIG. 604.2/604.3.1
WATER CLOSET LOCATION/
SIZE CLEARANCE

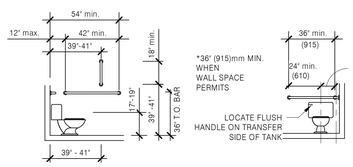


FIG. 604.4/604.5.1
HEIGHT OF WATER CLOSET/
SIDE WALL GRAB BAR FOR WATER CLOSET

FIG. 604.5.2
REAR WALL GRAB BAR FOR WATER CLOSET

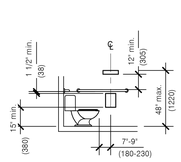
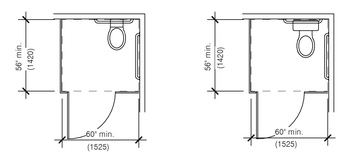


FIG. 604.7
DISPENSER LOCATION



(A) WALL-HUNG WATER CLOSET
(B) FLOOR-MOUNTED WATER CLOSET

FIG. 604.8.1.1
WHEELCHAIR ACCESSIBLE TOILET COMPARTMENTS

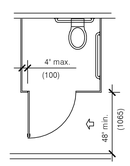


FIG. 604.8.3
TOILET COMPARTMENT DOORS

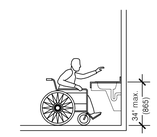


FIG. 606.3
HEIGHT OF LAVATORIES AND SINKS

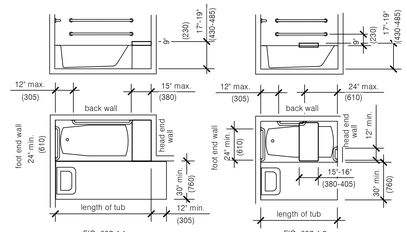


FIG. 607.4.1
GRAB BARS FOR BATHTUBS
WITH PERMANENT SEATS
(WITH FIG. 607.2 CLEARANCES)

FIG. 607.4.2
GRAB BARS FOR BATHTUBS
WITHOUT PERMANENT SEATS
(WITH FIG. 607.2 CLEARANCES)

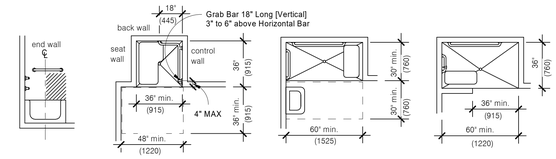


FIG. 607.5
LOCATION OF
BATHTUB CONTROLS

FIG. 608.2.1/608.3.1
TRANSFER-TYPE SHOWER
COMPARTMENT WITH GRAB
BARS

FIG. 608.2.2
STANDARD ROLL-IN-TYPE
SHOWER COMPARTMENT

FIG. 608.2.2
STANDARD ROLL-IN-TYPE
SHOWER COMPARTMENT

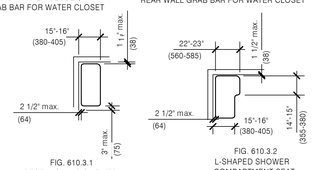
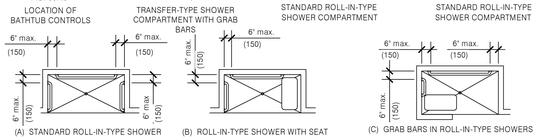


FIG. 610.3.1
RECTANGULAR SHOWER
COMPARTMENT SEAT

FIG. 610.3.2
L-SHAPED SHOWER
COMPARTMENT SEAT

FIG. 609.3
SPACING OF GRAB BARS



(A) STANDARD ROLL-IN-TYPE SHOWER
(B) ROLL-IN-TYPE SHOWER WITH SEAT
(C) GRAB BARS IN ROLL-IN-TYPE SHOWERS

FIG. 608.3.2
GRAB BARS IN ROLL-IN-TYPE SHOWERS

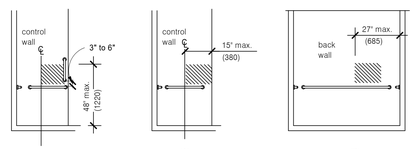
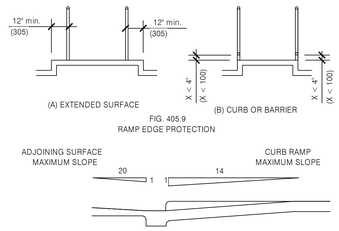


FIG. 608.5
CONTROLS IN TRANSFER-TYPE
SHOWERS

(A)
(B)

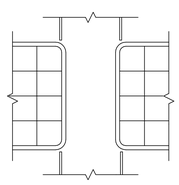
FIG. 608.6
LOCATION OF SHOWER SPRAY UNIT



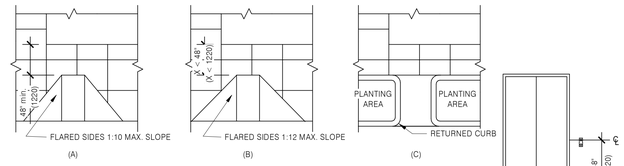
(A) EXTENDED SURFACE
(B) CURB OR BARRIER

FIG. 405.9
RAMP EDGE PROTECTION

FIG. 406.3
COUNTER SLOPE OF SURFACES ADJACENT TO CURB RAMPS



(A) CUT THROUGH AT ISLAND



(A)
(B)
(C)

FIG. 406.4
SIDES OF CURB RAMPS

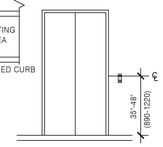


FIG. 407.2.2
ELEVATOR CALL BUTTONS

ACCESSIBLE ROUTES

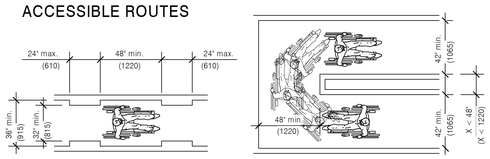
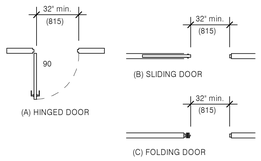


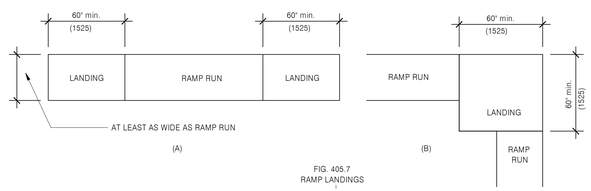
FIG. 403.5
CLEAR WIDTH OF AN ACCESSIBLE ROUTE

FIG. 403.5.1
CLEAR WIDTH AT TURN



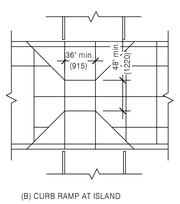
(A) HINGED DOOR
(B) SLIDING DOOR
(C) FOLDING DOOR

FIG. 404.2.3
CLEAR WIDTH OF DOORWAYS



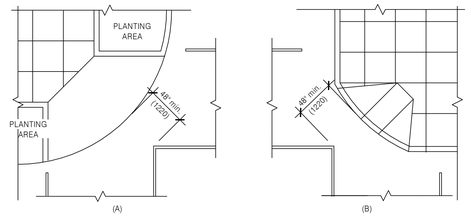
(A)
(B)

FIG. 405.7
RAMP LANDINGS



(B) CURB RAMP AT ISLAND

FIG. 406.12
ISLANDS



(A)
(B)

FIG. 406.11
DIAGONAL CURB RAMPS

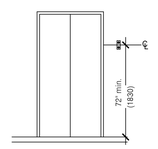


FIG. 407.2.3.2.1
HEIGHT OF ELEVATOR VISIBLE SIGNALS

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626 North Illinois Street
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Phone: (317) 635-5030
Website: www.bdmd.com
MO Certificate of Authority: W00923182

Delta Quad Holdings, LLC
Owner

Rau Construction Co.
Construction Manager

9101 West 110th Street, Suite 150
Overland Park, Kansas 66210
Phone: (913) 642-6000
Website: www.website.com

Lawson Elser, Inc.
Structural Engineer

650 East Carmel Drive, Suite 150
Carmel, Indiana 46032
Phone: (317) 574-5409
Website: www.lawsonelser.com

Hoss & Brown Engineers, Inc.
MEP Engineer

11205 West 79th Street, Suite 102
Lenexa, Kansas 66214
Phone: (913) 362-9090
Website: www.h-be.com

SK Design Group, Inc.
Civil Engineer

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Overland Park, KS 66211
Phone: (913) 451-1818
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Matchline Design Group, LLC
Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
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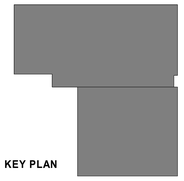


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
REGISTERED ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Accessibility Standards

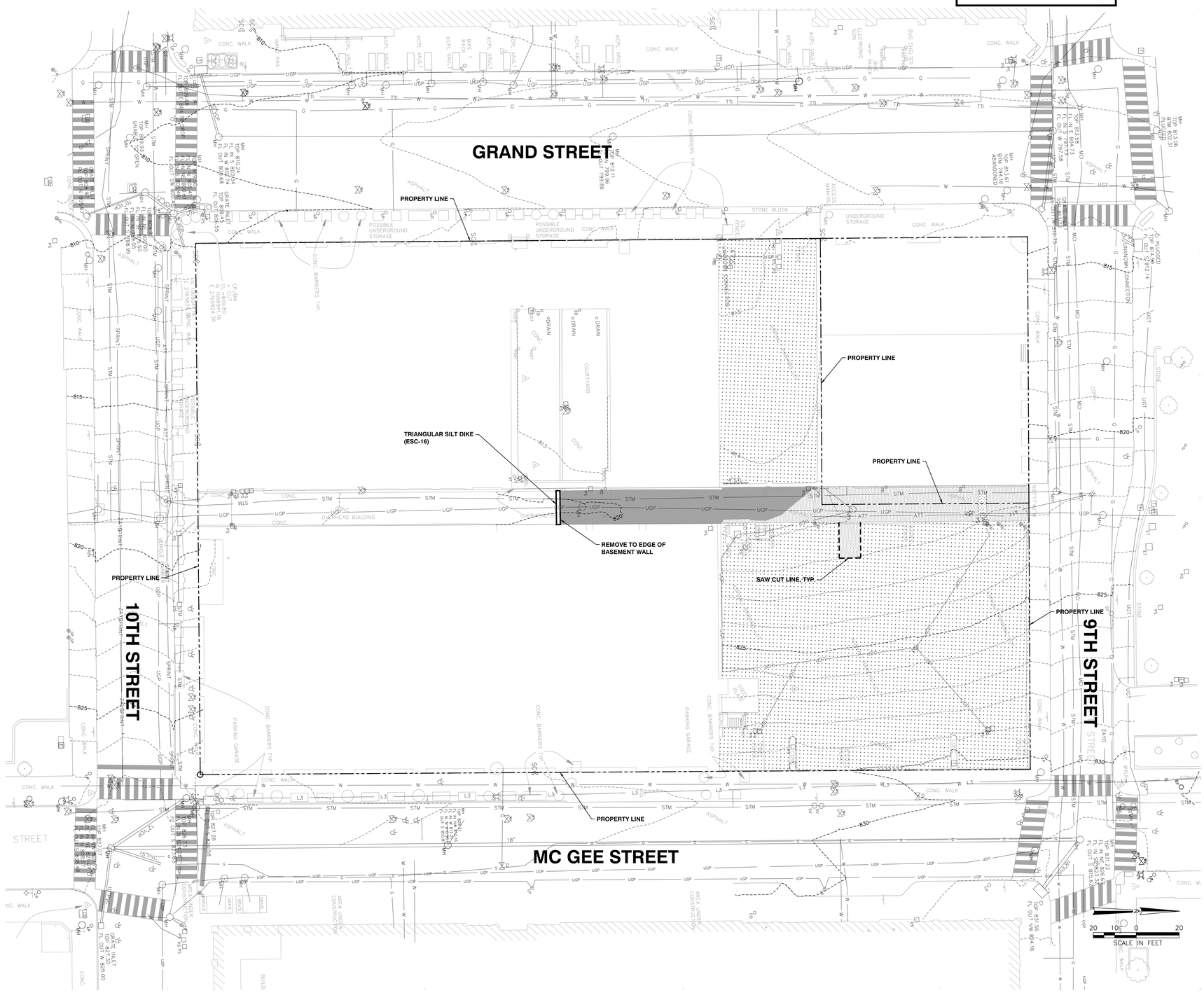
A0.02

\\bdmd.local\LIEM\UserShare\cmendoza\Documents\18A023 KCES R20_cmendoza.rvt
9/10/2020 5:16:23 PM

LEGEND

- EXISTING ASPHALT PAVEMENT TO BE REMOVED
- EXISTING CONCRETE PAVEMENT TO BE REMOVED
- 2" MILL
- EXISTING VEHICLE BARRIER TO BE REMOVED
- SAW CUT
- TRIANGULAR SILT DIKE RE: APWA DETAIL (ESC-16)

DISTURBED AREA = 0.08 ACRES



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Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com

STATE OF MISSOURI
GARY M. URKEVICH
NUMBER E-20381
REGISTERED PROFESSIONAL ENGINEER
9-8-2020

CERTIFICATION

FOR CONSTRUCTION

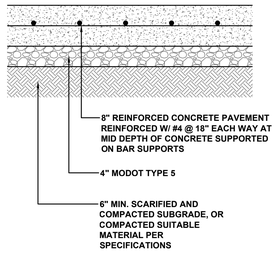
The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: SN
Checked By: GU
Scale: See Drawing
Issue Date: September 8, 2020

SITE DEMOLITION AND EROSION CONTROL PLAN

C101



NOTE:
ALL CONCRETE SHALL BE KCMMB MIX

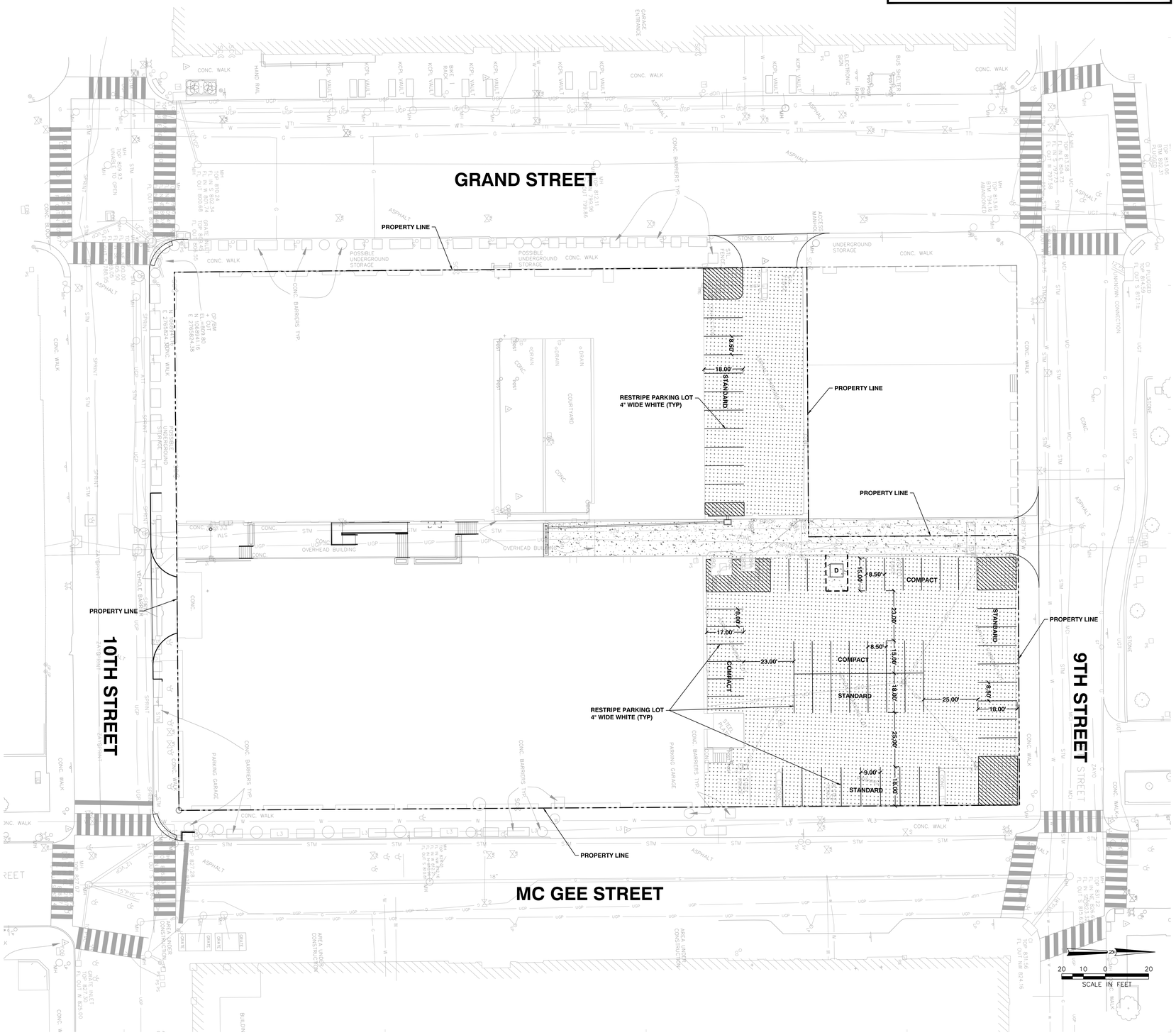
1 8" FULL DEPTH PORTLAND CEMENT CONCRETE PAVEMENT

Not to Scale

LEGEND:

NEW PORTLAND CEMENT CONCRETE PAVEMENT RE: 1/C201

2" MILL & OVERLAY



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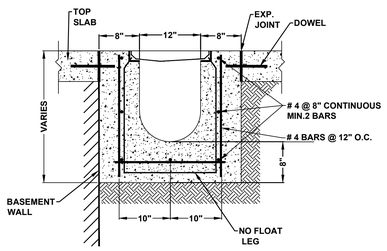
SITE DIMENSION PLAN

C201

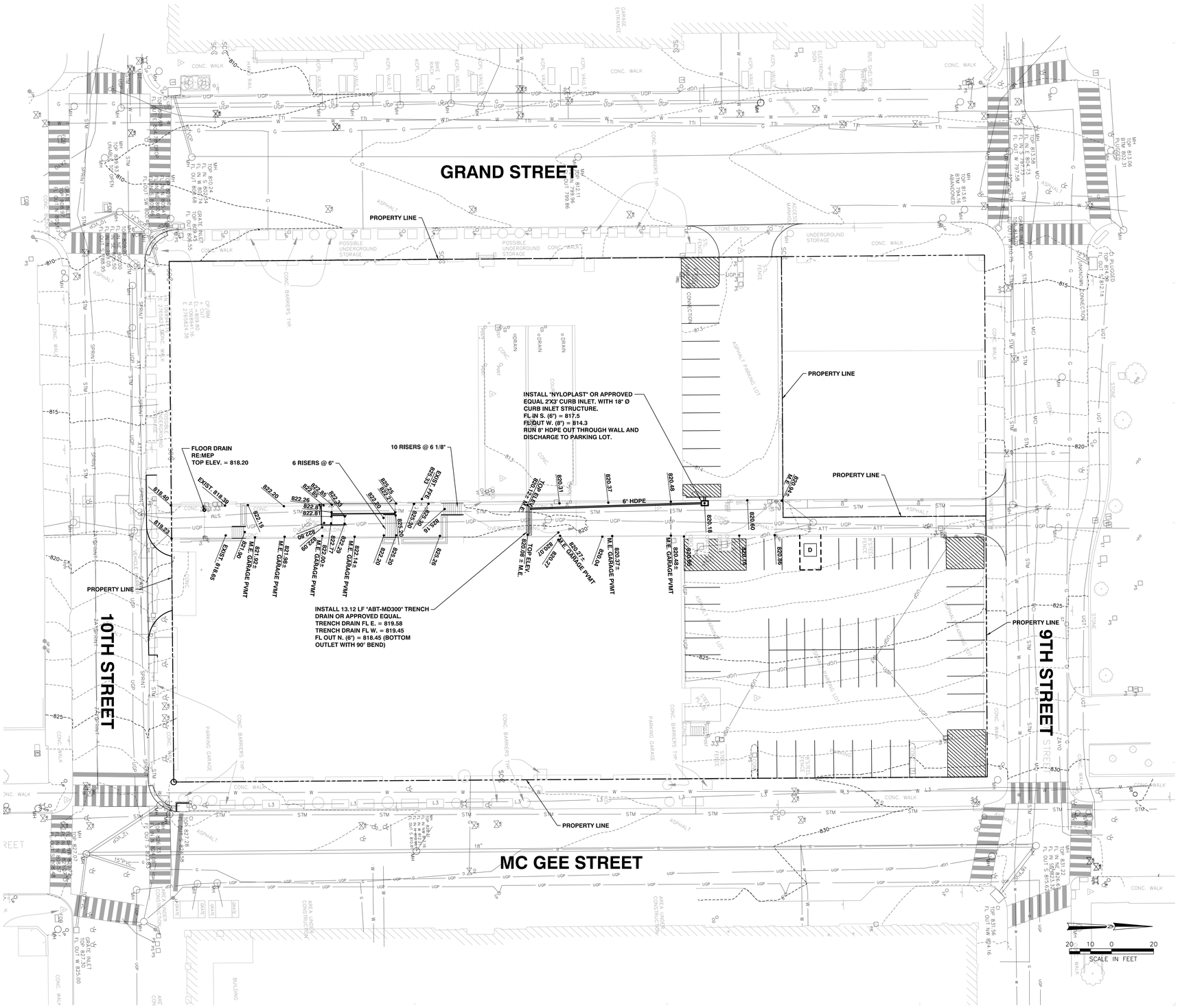


1 MD 300 TYPICAL TRENCH DRAIN SECTION

(PROVIDE REMOVABLE GRATE OPTION)

Not to Scale

NOTE: ALL EXISTING FIRE LINES, DOMESTIC WATER SERVICES AND SANITARY SERVICE LINES ARE PROPOSED TO BE REUSED. NO NEW CONNECTIONS ARE PROPOSED.



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SITE GRADING & UTILITY PLAN

C301

PUBLIC STREETSCAPE PLANS FOR THE GRAND RESERVE

PROPERTY ADDRESS: 925 GRAND STREET
JACKSON COUNTY, KANSAS CITY, MISSOURI
PLAT NAME: SWOPE'S ADDITION

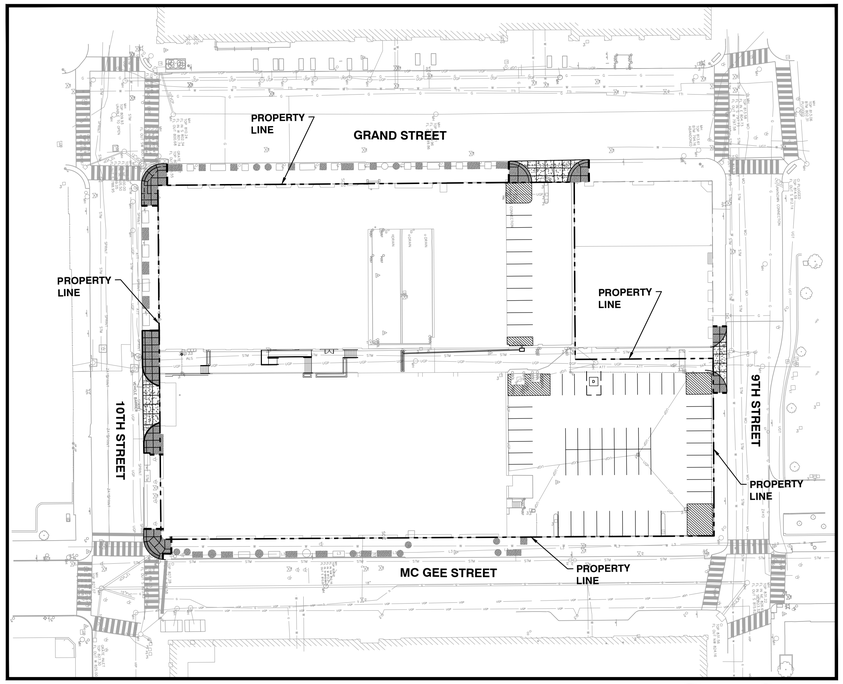
SECTION 5, TOWNSHIP 49 N, RANGE 33 W
PROJECT NO. ???
FILE NO. ???

GENERAL NOTES

1. THE CONSTRUCTION COVERED BY THESE PLANS SHALL CONFORM TO THE CURRENT "CITY STANDARDS" AND SPECIFICATIONS KANSAS CITY, MISSOURI, EXCEPT AS NOTED.
2. OWNER/DEVELOPER IS RESPONSIBLE FOR ALL PERMITS BONDS AND INSURANCE REQUIRED BY THE CITY.
3. THE CONTRACTOR SHALL BE RESPONSIBLE TO LOCATE AND PROTECT ALL EXISTING UTILITIES TO REMAIN. ANY UTILITIES DAMAGED AS A RESULT OF SITE CONSTRUCTION SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
4. THE CONTRACTOR SHALL ADHERE THE PROVISIONS OF THE SENATE BILL NUMBER 583, 78TH GENERAL ASSEMBLY OF THE STATE OF MISSOURI. THE BILL REQUIRES THAT ANY PERSON OR FIRM DOING EXCAVATION ON PUBLIC RIGHT-OF-WAY DO SO ONLY AFTER GIVING NOTICE TO, AND OBTAINING INFORMATION FROM, UTILITY COMPANIES. STATE LAW REQUIRES 48 HOURS ADVANCE NOTICE. PRIOR TO COMMENCEMENT OF WORK, THE CONTRACTOR SHALL NOTIFY ALL THOSE COMPANIES WHICH HAVE FACILITIES IN THE NEAR VICINITY OF THE CONSTRUCTION TO BE PERFORMED.
5. THE CONTRACTOR SHALL CONTROL THE EROSION AND SILTATION DURING ALL PHASES OF CONSTRUCTION, AND SHALL KEEP THE STREETS CLEAN OF MUD AND DEBRIS.
6. ALL MANHOLES, CATCH BASINS, UTILITY VALVES AND METER PITS TO BE ADJUSTED OR REBUILT TO GRADE AS REQUIRED.
7. ALL EXCESS MATERIAL SHALL BE REMOVED FROM SITE AND LEGALLY DISPOSED OF.
8. STREET SURFACES SHALL BE OF VIRGIN MATERIAL.
9. ALL STREET SURFACES REMOVED BY THIS CONSTRUCTION SHALL BE REPLACED IN ACCORDANCE WITH THE CURRENT "STREET CUT RESTORATION" REQUIREMENTS OF KANSAS CITY, MISSOURI.
10. TRAFFIC CONTROL AND MAINTENANCE OF TRAFFIC DURING CONSTRUCTION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE PERFORMED PER REQUIREMENTS OF PUBLIC WORKS DEPARTMENTS. THE CONTRACTOR IS TO SUBMIT A TRAFFIC CONTROL APPLICATION COMPLETE WITH A TRAFFIC CONTROL PLAN FOR MAINTAINING VEHICULAR AND PEDESTRIAN TRAFFIC. THIS PERMIT TO BE SUBMITTED 14 DAYS PRIOR TO ANY WALK OR STREET CLOSURES TO ALLOW FOR ADEQUATE REVIEW TIME.
11. EROSION CONTROL SHALL BE IN ACCORDANCE WITH KCMO ORDINANCE NO. 981135.
12. DAMAGE TO ADJACENT WORK / PROPERTY SHALL BE REPAIRED BY CONTRACTOR AT NO COST TO CITY OR OWNER.
13. CONTRACTOR SHALL REMOVE EXISTING GUTTER OR CURB AND GUTTER AND SIDEWALK WHERE INDICATED.
14. ALL CONCRETE SIDEWALKS SHALL BE CONSTRUCTED PER CITY AND SW-ADA STANDARDS AND SPECIFICATIONS AND SHALL MEET THE REQUIREMENTS OF SW-305 AND SW-NOTES SIDEWALK DETAILS.
15. PRIOR TO CONSTRUCTION, COORDINATE ANY STREET LIGHTING CONFLICTS WITH THE PUBLIC WORKS
    STREET LIGHTING MAINTENANCE SUPERVISOR, CAROLYN ATKINS AT 816-513-9506.
16. EROSION CONTROL, TRAFFIC CONTROL AND STREET REPAIR ARE INCIDENTAL TO OTHER WORK ITEMS LISTED IN THE SUMMARY OF QUANTITIES TABLE.

LEGEND

	DECIDUOUS TREE	WV	WATER VALVE
	CONIFEROUS TREE		FIRE HYDRANT
	BUSH	GV	GAS VALVE
	SHRUB	℄	CENTERLINE
BOL	BOLLARD	PL	PROPERTY LINE
GI	GRATE INLET ROUND		SECTION LINE
GI	GRATE INLET SQUARE		BENCH MARK
ET	ELECTRICAL TRANSFORMER BOX		FOUND MONUMENT AS NOTED
GM	GAS METER		SET 1/2" BAR & CAP
LP	LIGHT POLE		CHISELED "+"
MH	MANHOLE		YARD LIGHT
TP	TELEPHONE POLE		SINGLE POST SIGN
WM	WATER METER		DOUBLE POST SIGN
PP	POWER POLE	D	DEED
	GUY WIRE	M	MEASURED
TS	TELEPHONE SPLICE BOX	RM	RADIALLY MEASURED
CI	CURB INLET	C	CALCULATED
RR	RAILROAD	P	POWER/PLAT
x	FENCE	FND	FOUND
	CONTINUING LINE	R/W	RIGHT-OF-WAY
SP	TRAFFIC SIGNAL POLE	G	GAS
TV	TV SPLICE BOX	S	SANITARY SEWER
		ST	STORM SEWER
E	ELECTRIC METER	W	WATER
PS	POWER SPLICE BOX	T	TELEPHONE
		UG	UNDERGROUND
POST	POST	OH	OVERHEAD
MB	MAIL BOX	CIP	CAST IRON PIPE
	STUMP	CMP	CORRUGATED METAL PIPE
	MATCH POINT	RCP	REINFORCED CONCRETE PIPE
	CP (CONTROL POINT)	VCP	VITRIFIED CLAY PIPE
		PCP	PLASTIC CORRUGATED PIPE
GT	GAS TEST	TV	CABLE TELEVISION
GR	GAS REGULATOR	E	ELECTRIC
SC	SIAMESE CONNECTOR	ED	EAVES DRAIN
		RD	ROOF DRAIN
SV	STEAM VALVE	PL	PLASTIC
WF	WATER FAUCET		MARSH AREA
DR	DRAIN	PIV	POST INDICATOR VALVE
FP	FLAG POLE	PM	PARKING METER
TH	TEST HOLE	STM	STEAM
FOM	FIBER OPTIC TELEPHONE MARKER	AI	AREA INLET
AC	AIR CONDITIONER	GI	GRATE INLET
CO	CLEAN OUT	CMAP	CORRUGATED METAL ARCH PIPE
		FO	FIBER OPTIC
			PARKING METER
	UTILITY POLE		

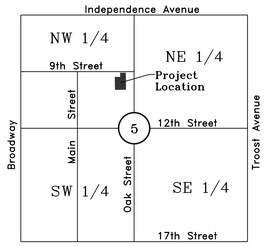


GENERAL LAYOUT

50 25 0 50
SCALE IN FEET

INDEX OF SHEETS

SHEET NO.	SHEET TITLE
C500	COVER SHEET
C501	PUBLIC DEMOLITION PLAN
C502	PUBLIC DIMENSION PLAN
C503	PUBLIC GRADING DETAILS



Vicinity Map
Scale 1" = 2000'

SUMMARY OF QUANTITIES
(OBTAIN PERMIT FROM LDD FOR THE QUANTITIES IN THE PUBLIC R/W)

ITEM NO.	ITEM DESCRIPTION	QUANTITY	UNITS	AS-BUILT	CONTRACT NO.
1	REMOVE CURB	140	LF		1
2	REMOVE SIDEWALK	1238	SF		1
3	REMOVE CONCRETE DRIVE PAVEMENT	1228	SF		1
4	REMOVE VEHICLE BARRIERS	44	EA		1
5	TYPE CS CURB	170	LF		1
6	SIDEWALK	2545	SF		1
7	CONCRETE DRIVE PAVEMENT	1111	SF		1

DEVELOPER: DELTA QUAD HOLDINGS LLC.

Name: DAVID L. ROOS

Address: 70932 CAMBRIDGE CT
NILES, MI 49120

Phone: 269-262-4565

Email: DROOS@ROOSENTERPRISES.COM

I have reviewed these plans and understand what is proposed. The work will be accomplished in 1 contract.
Any incidental work not specifically permitted (i.e. final cleanup) will be performed by permit holder.

DELTA QUAD HOLDINGS LLC

By:_____ (Owner's Representative)
Date:_____

CALL BEFORE YOU DIG 1-800-DIG-RITE
EMERGENCY PHONE NUMBERS

Aquila, Inc.	800-303-0357
AT&T	800-252-1133
KCMO -Traffic Signals	816-513-9314
KCMO -Street &Traffic Division	816-513-9300
KCMO -Water Service Department	816-513-0209
KCP&L	816-471-KCPL
MCI/Western Union	800-MCI-WORK
Missouri Gas Energy	800-582-0000
SBC	800-870-8390
Sprint	800-880-2822
Time Warner, Inc.	816-358-8833

MISSOURI ONE CALL SYSTEM, INC.
1-800-344-7483
STOP-CALL BEFORE YOU DIG!

UTILITY NOTE:

"THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS, THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA. EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. THIS SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES."

LEGAL DESCRIPTION

ALL OF LOTS 103,104,105,106,107,108,111,112,113,114,115,116,117 AND 118, SWOPE'S ADDITION TO THE CITY OF KANSAS, NOW KANSAS CITY, A SUBDIVISION IN KANSAS CITY, JACKSON COUNTY, MISSOURI; TOGETHER WITH THAT PART OF THE VACATED NORTH-SOUTH ALLEY LYING EAST AND ADJACENT TO LOTS 103 THROUGH 108, INCLUSIVE, AND WEST AND ADJACENT TO LOTS 113 THROUGH 118, INCLUSIVE, AND THE EAST ½ OF THE VACATED ALLEY WEST AND ADJACENT TO LOTS 111 AND 112.

BENCHMARK:

NOTES
HORIZONTAL AND VERTICAL IS A LOCAL SYSTEM
BM
'+' CUT NORTHEAST CORNER OF 10TH AND GRAND
ELEV. 809.80

☐ **FOR CONSTRUCTION**
☐ **REVIEWED FOR CONSTRUCTION**

FILE NUMBER:

"FOR CONSTRUCTION STREET IMPROVEMENT PLANS"

BY:_____
REVIEW ENGINEER

_____
DEPARTMENT OF CITY PLANNING AND DEVELOPMENT
KANSAS CITY, MISSOURI
CONSTRUCTION PERMIT MUST BE SECURED WITHIN ONE YEAR OF REVIEW

"I hereby certify that this project has been designed, and these plans prepared, to meet or exceed the design criteria of Kansas City, Missouri, in current usage except as indicated below".

Exceptions:

1. None.

(Name)
GARY M. URKEVICH, P.E.
09/09/2020 (Date)

Design Professional: SK Design Group, Inc.
Contact Name: Gary M. Urkevich, P.E.
Address: 4600 College Boulevard, Suite 100
Overland Park, Kansas 66211
Phone: (913) 451-1818
Fax: (913) 451-7599
Email: gurkevich@skdg.com

PREPARED BY :
SK DESIGN GROUP, INC.
4600 College Boulevard, Suite 100
Overland Park, Ks. 66211
913-451-1818
Fax 913-451-7599

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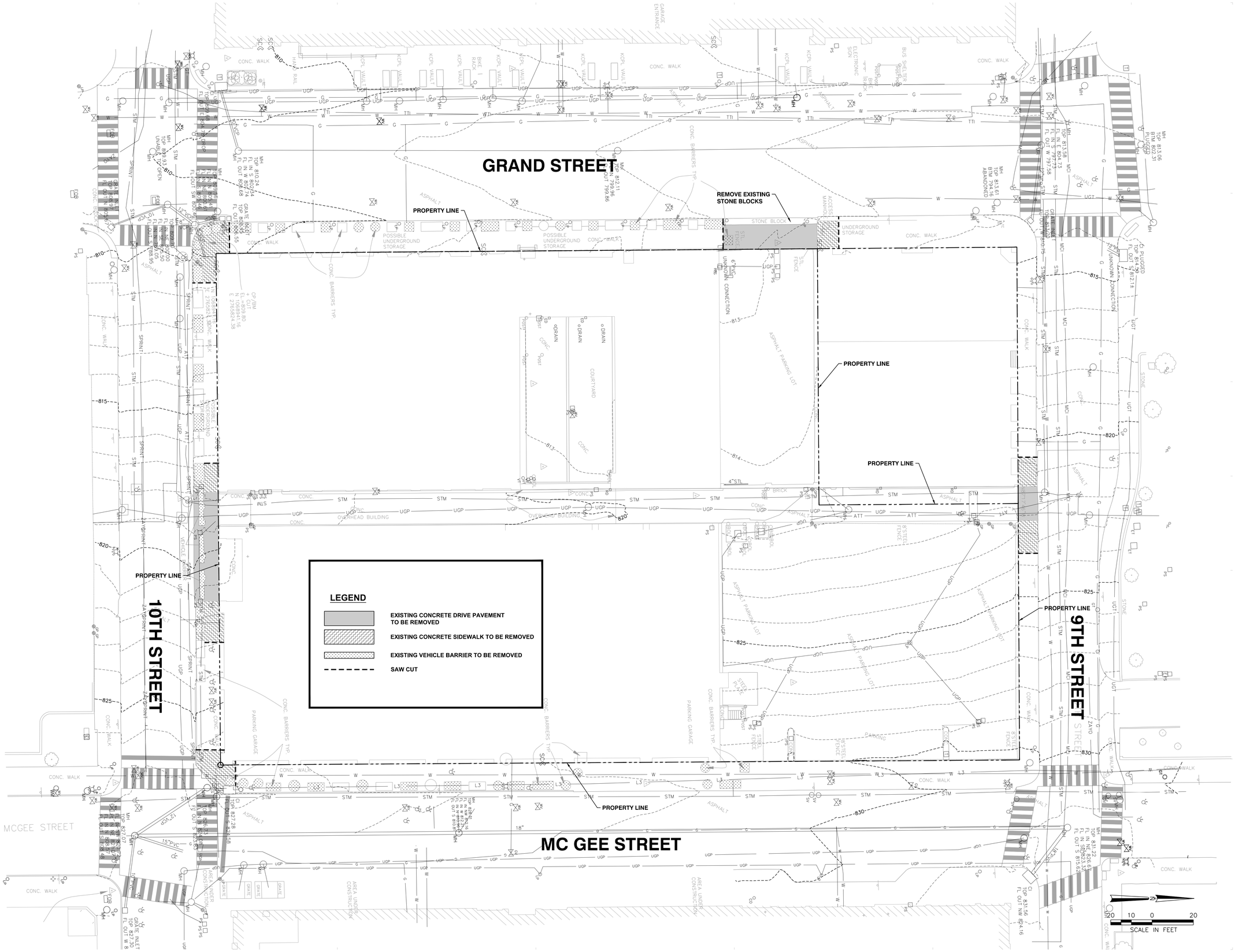
PUBLIC COVER

C500



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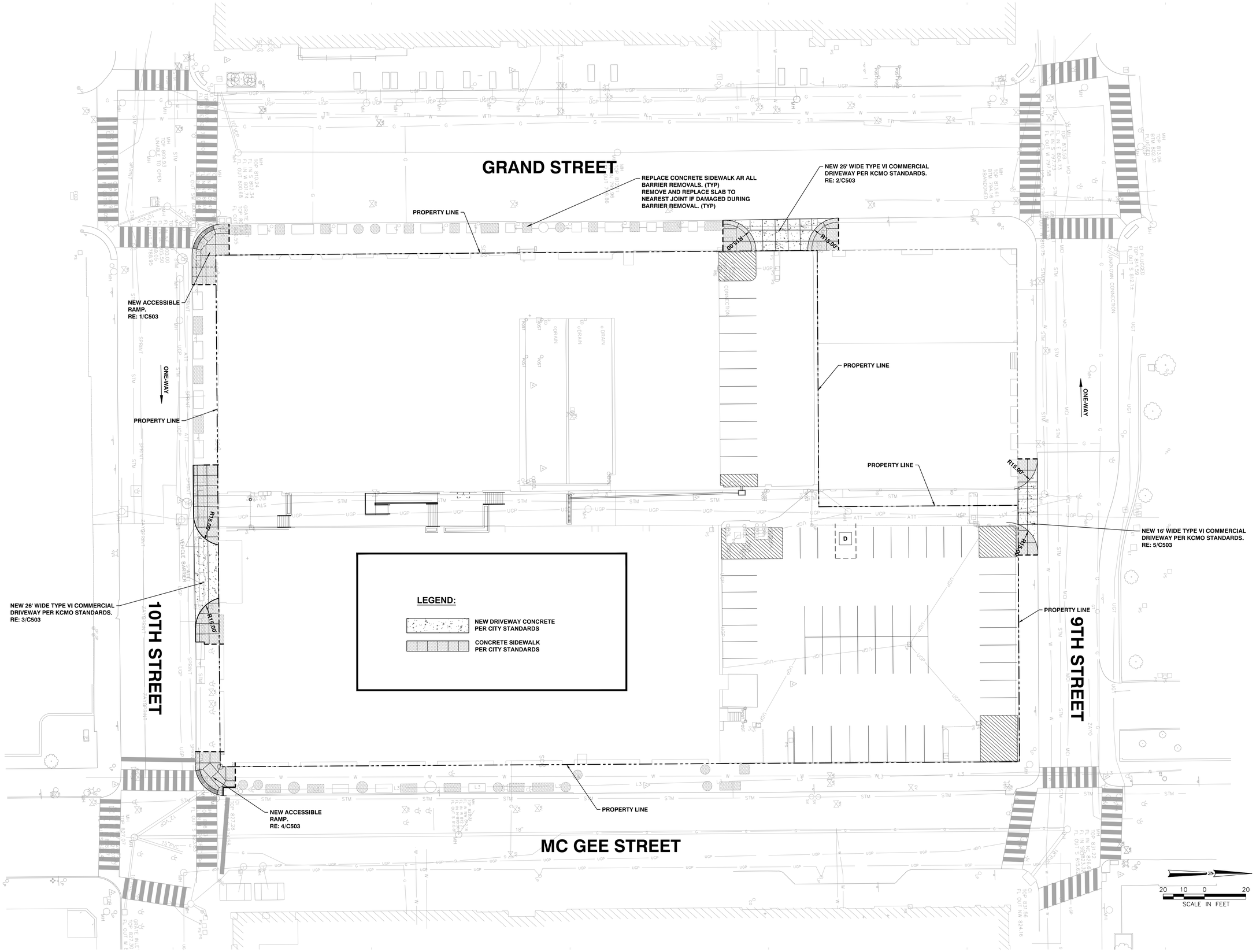
PUBLIC DEMOLITION PLAN

C501



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Website: www.bdmd.com

Delta Quad Holdings, LLC
Owner

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Construction Manager

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STATE OF MISSOURI
GARY M. URKEVICH
NUMBER E-20381
REGISTERED PROFESSIONAL ENGINEER
9-8-2020

CERTIFICATION

FOR CONSTRUCTION

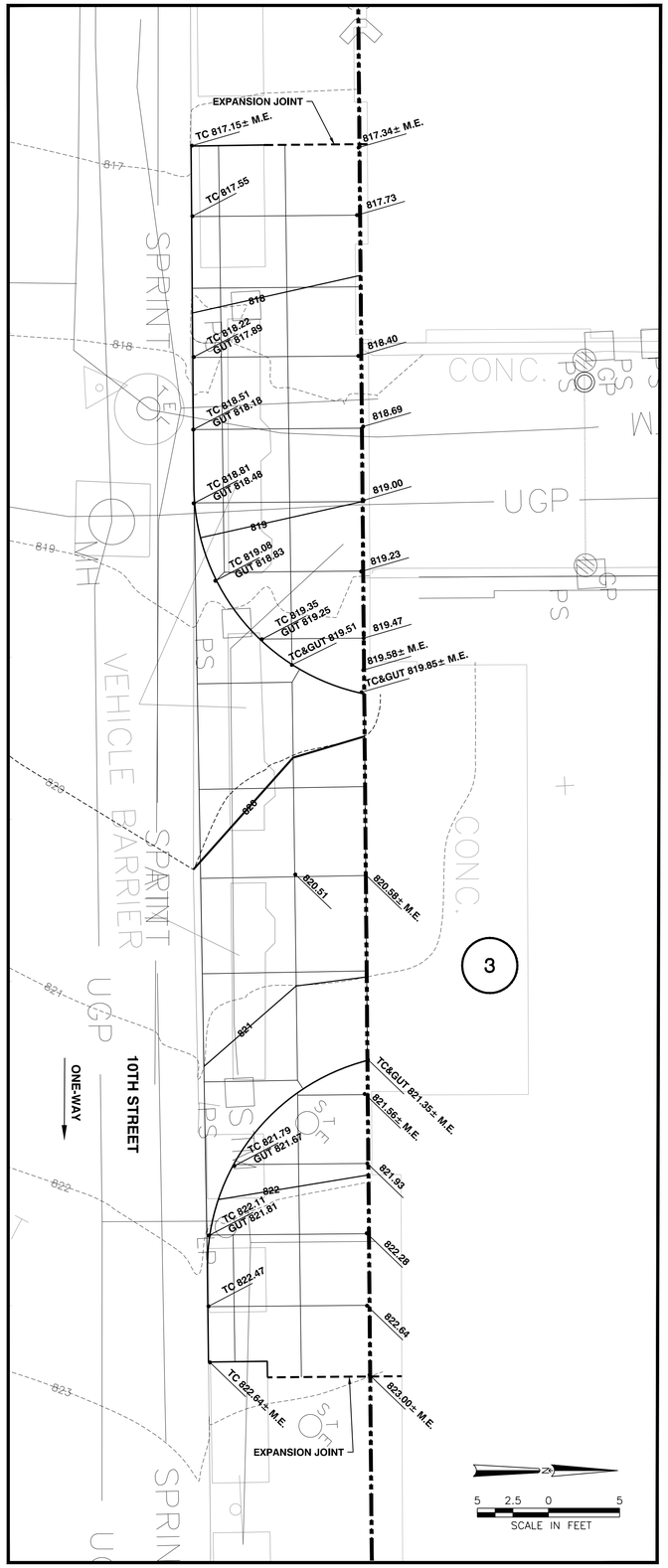
The Grand Reserve

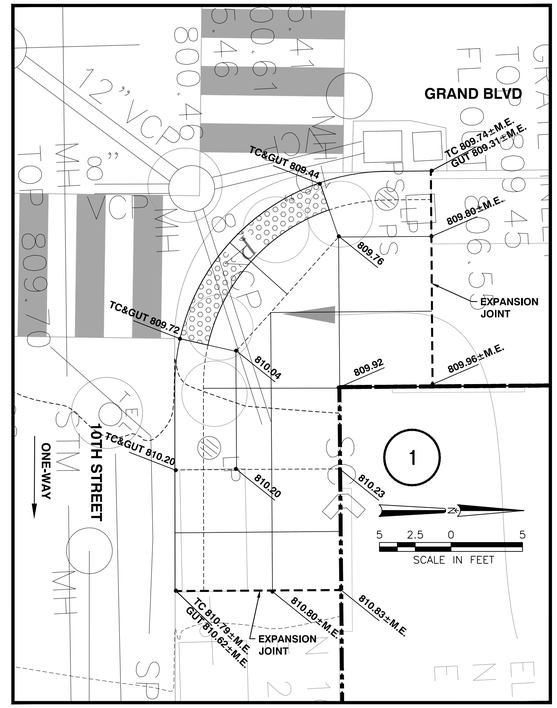
925 Grand Boulevard
Kansas City, MO 64198

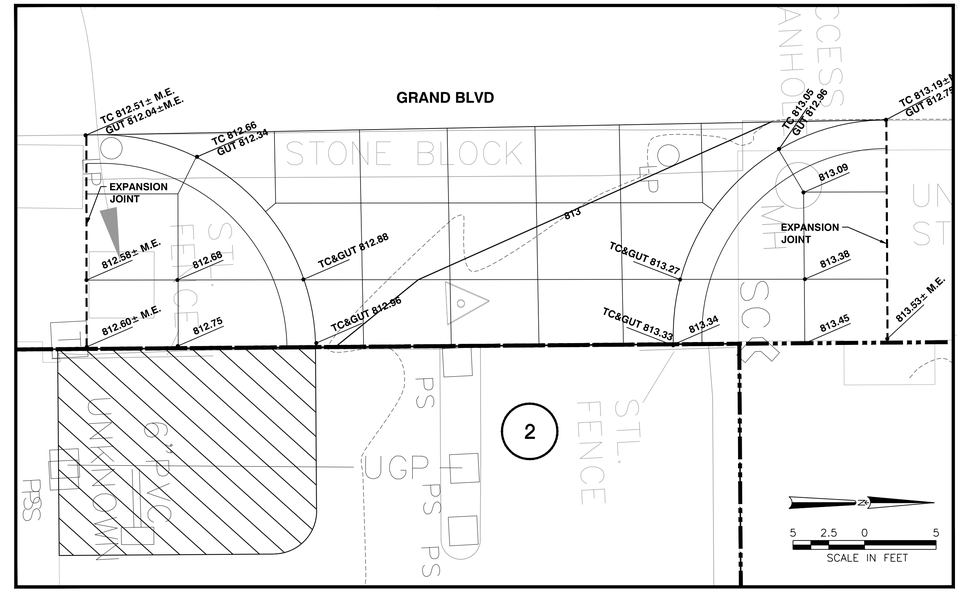
Project No.: 18A023
Drawn By: SN
Checked By: GU
Scale: See Drawing
Issue Date: September 8, 2020

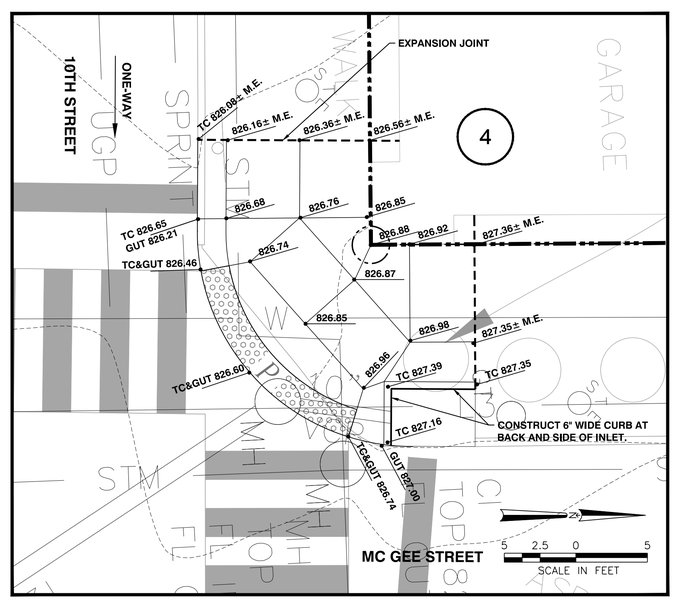
PUBLIC DIMENSION PLAN

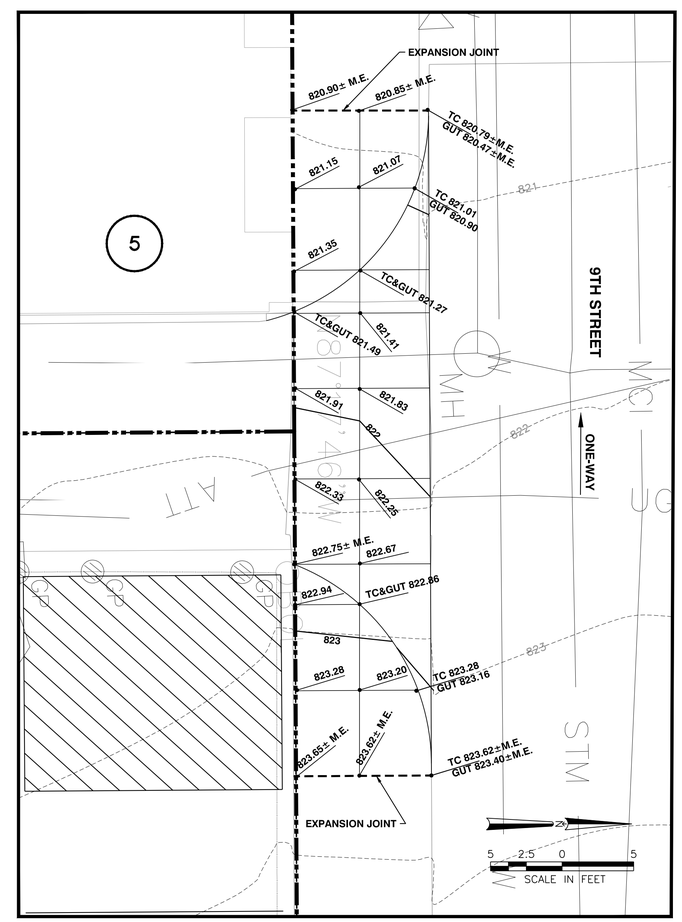
C502











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PUBLIC GRADING DETAILS

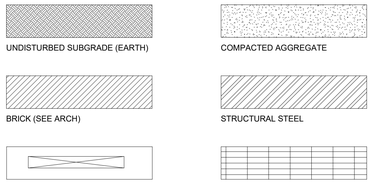
C503

ABBREVIATIONS

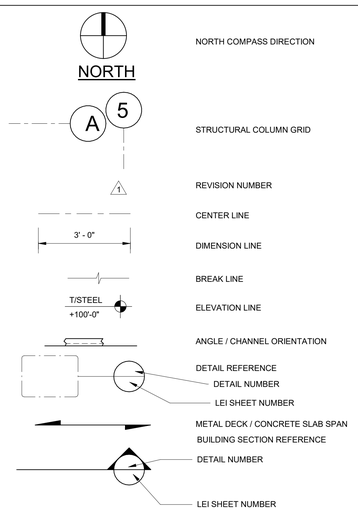
ADMIN	ADMINISTRATION	JST	JOIST
AFF	ABOVE FINIISHED FLOOR	JNT	JOINT
ARCH	ARCHITECT OR ARCHITECTURAL	MATL	MATERIAL
BLDG	BUILDING	MAX	MAXIMUM
BO'TT	BOTTOM	MFGR	MANUFACTURER
BTM	BOTTOM	MTL	METAL
BRG	BEARING	MIN	MINIMUM
CJ	CONTROL JOINT	MSRY	MASONRY
℄	CENTERLINE	MECH	MECHANICAL
CLG	CEILING	NA	NOT APPLICABLE
CLR	CLEAR	NTS	NOT TO SCALE
CONC	CONCRETE	OC	ON CENTER
CONST	CONSTRUCTION	OD	OUTSIDE DIAMETER
CONT	CONTINUOUS	OPNG	OPENING
CMU	CONCRETE MASONRY UNIT	OSB	ORIENTED STRAND BOARD
COL	COLUMN	PL	PLATE
DIA	DIAMETER	PLBG	PLUMBING
DN	DOWN	PLYWD	PLYWOOD
DTL	DETAIL	RAD	RADIUS
DWG	DRAWING	REINF	REINFORCE/REINFORCING
EA	EACH	REBAR	REINFORCING BAR
EJ	EXPANSION JOINT	REF	REFERENCE
EL	ELEVATION	REV	REVISION
ELEV	ELEVATION	REQ'D	REQUIRED
EQ	EQUAL	RM	ROOM
EQUIP	EQUIPMENT	RTU	ROOF TOP UNIT
EW	EACH WAY	SCHED	SCHEDULE
EXIST	EXISTING	SECT	SECTION
EXP	EXPANSION	SEE ARCH	REF ARCHITECTURAL DWGS
EXT	EXTERIOR	SF	SQUARE FEET
FD	FLOOR DRAIN	SHT	SHEET
FF	FINISHED FLOOR	SIM	SIMILAR
FIN FLR	FINISHED FLOOR	SPECS	SPECIFICATIONS
FLR	FLOOR	STIFF	STIFFNER
FT	FOOT	STL	STEEL
FTG	FOOTING	SYS	SYSTEM
FV	FIELD VERIFY	SQ	SQUARE
GA	GAUGE	T&G	TONGUE AND GROOVE
GALV	GALVANIZED	TEMP	TEMPORARY
GYP	GYPSUM	T/	TOP OF
HORIZ	HORIZONTAL	TYP	TYPICAL
HT	HEIGHT	VB	VAPOR BARRIER
ID	INSIDE DIAMETER	VERT	VERTICAL
INSUL	INSULATION	W/	WITH
INT	INTERIOR	WWF	WELDED WIRE FABRIC

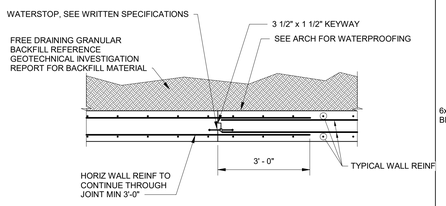
MATERIAL LEGEND

WALL SECTION HATCH PATTERNS



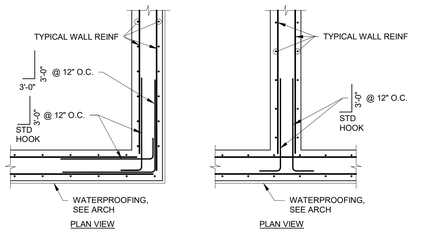
GRAPHIC SYMBOLS





6 BELOW GRADE WALL CONSTRUCTION JOINT

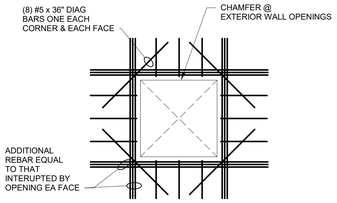
N.T.S.



NOTE: CORNER BAR SIZES TO MATCH HORIZONTAL WALL REINFORCING

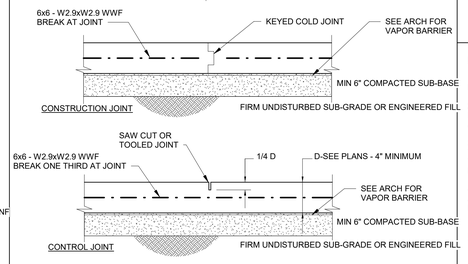
7 TYPICAL WALL CORNER DETAILS

N.T.S.



8 TYPICAL WALL OPENING

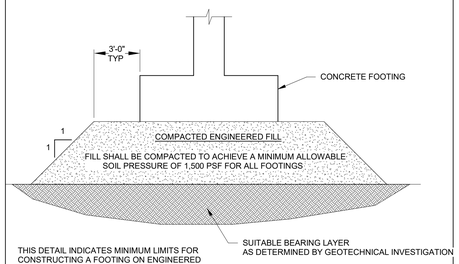
N.T.S.



IF CONTROL JOINTS ARE SAWED, THE SAWING OPERATION SHALL BEGIN AS SOON AS THE SURFACE IS FIRM ENOUGH TO SUPPORT EQUIPMENT AND THE BLADE WILL NOT TEAR OR DAMAGE THE CUT LINE. MAKE CUTS PRIOR TO THE DEVELOPMENT OF STRESSES THAT WOULD CAUSE CRACKS DUE TO SHRINKAGE.

1 SLAB ON GRADE JOINT DETAILS

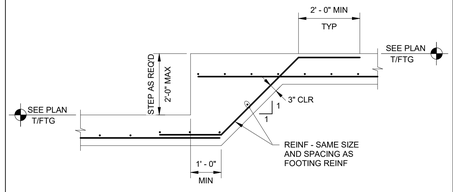
N.T.S.



THIS DETAIL INDICATES MINIMUM LIMITS FOR CONSTRUCTING A FOOTING ON ENGINEERED FILL. THE CONTRACTOR SHALL RETAIN THE SERVICES OF AN ENGINEER LICENSED IN THE STATE OF INDIANA TO ENSURE THAT THE ALLOWABLE SOIL BEARING PRESSURE IS ACHIEVED.

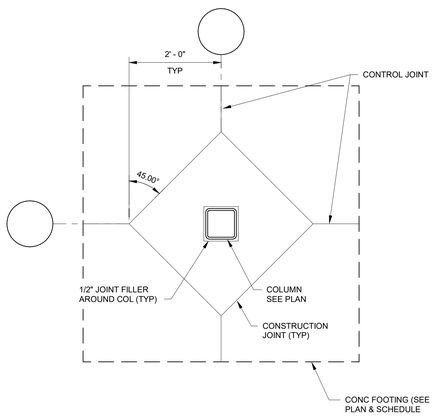
2 LIMITS OF ENGINEERED FILL

N.T.S.



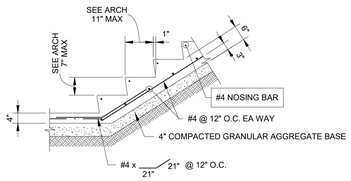
3 TYPICAL STEPPED FOOTING

N.T.S.



4 TYPICAL COLUMN BLOCK OUT

N.T.S.



5 TYPICAL CONCRETE STAIR

N.T.S.

GENERAL NOTES

EXISTING CONDITIONS

1. REPORT TO THE ARCHITECT/ENGINEER ANY EXISTING CONDITIONS WHICH PREVENT THE WORK FROM BEING PERFORMED IN ACCORDANCE WITH THE PLANS BEFORE PROCEEDING WITH THE WORK.

2. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS LOCATING EXISTING CONSTRUCTION BEFORE FABRICATION OF NEW CONSTRUCTION BEGINS. IMMEDIATELY REPORT ANY DISCREPANCIES TO THE ARCHITECT/ENGINEER.

3. SIZES AND DIMENSIONS INDICATED ON THE DRAWINGS RELATED TO EXISTING CONSTRUCTION WERE TAKEN FROM EXISTING DOCUMENTS WHERE AVAILABLE AND WERE NOT FIELD VERIFIED. CONTRACTOR TO FIELD VERIFY ALL SUCH INFORMATION BEFORE CONSTRUCION BEGINS. IMMEDIATELY REPORT ANY DISCREPANCIES TO THE ARCHITECT/ENGINEER.

4. WHERE DRAWINGS WERE UNAVAILABLE, FRAMING SIZES, DIRECTIONS, AND DETAILS WERE APPROXIMATED. CONTRACTOR TO FIELD VERIFY EXISTING FRAMING & CONDITIONS AND REPORT ANY DISCREPANCIES PRIOR TO BEGINNING CONSTRUCTION.

FOUNDATIONS

1. REFERENCE THE LISTED GEOTECHNICAL INVESTIGATION REPORT FOR SUBSURFACE REQUIREMENTS AND SOIL PROPERTIES INCLUDING THE NEED FOR SUBSURFACE DEWATERING SYSTEMS AND PLACEMENT OF ENGINEERED FILL.

2. PLACE FOOTINGS ON FIRM UNDISTURBED SUBGRADE, IF PROOFROLLING INDICATE AREAS OF SOFT OR UNSUITABLE SOILS, REMOVE THE UNSUITABLE MATERIAL AND REPLACE WITH COMPACTED ENGINEERED FILL REFERENCE THE GEOTECHNICAL INVESTIGATION REPORT FOR MATERIAL AND COMPACTION REQUIREMENTS.

3. DO NOT LEAVE FOOTING EXCAVATIONS OPEN FOR MORE THAN ONE DAY. PROTECT EXCAVATION AGAINST RUNOFF, RAINWATER AND FREEZING PRIOR TO PLACING CONCRETE FOOTINGS.

4. FOOTINGS SHALL BE FORMED ON THE VERTICAL SIDES UNLESS ADJACENT SOIL CONDITIONS WARRANT BANK FORMING. DO NOT BANK FORM WITHOUT NOTIFYING THE ARCHITECT OR ENGINEER. WHEN BANK FORMING, ALLOW 3 INCHES ADDITIONAL CONCRETE ON ALL SIDES

5. PROTECT FOOTINGS AFTER PLACEMENT AGAINST EXPOSURE TO EXCESSIVE RUNOFF, RAINWATER AND FREEZING.

MASONRY

1. CONCRETE MASONRY UNITS: HOLLOW LOAD BEARING UNITS, ASTM C90, GRADE N-1 NOMINAL DIMENSIONS ARE 16" LONG x 8" HIGH x THICKNESS AS INDICATED ON THE DRAWINGS.

2. MORTAR: ASTM C270 TYPE N.; GROUT ASTM C476. DO NOT USE MORTAR TO GROUT CORES.

3. ANCHOR BOLTS: STEEL BOLTS WITH HEX NUTS AND WASHERS, ASTM A307, GRADE A, HOT-DIPPED GALVANIZED IN SIZE AS INDICATED ON THE DRAWINGS.

4. MASONRY HORIZONTAL JOINT WALL REINFORCING (HJR) SHALL BE ZINC-COATED TRUSS TYPE AS MANUFACTURED BY DUR-O-WALL INC. OR APPROVED EQUAL. WIDTH TO BE APPROXIMATELY 2" LESS THAN THE NOMINAL WIDTH OF THE WALL. SIDE ROD AND CROSS ROD DIAMETER TO BE 0.1875 INCH.

5. LAY MASONRY UNITS WITH CORE CELLS VERTICALLY ALIGNED. REINFORCE MASONRY UNIT CORES WITH REINFORCEMENT BARS AND GROUT SOLID AROUND BARS AS INDICATED ON THE DRAWINGS.

6. USE LOW LIFT GROUTING TECHNIQUES FOR ALL GROUTING AS FOLLOWS:

A. PROVIDE MINIMUM OF 2" CLEAR DIMENSION AND 8 SQ. IN. CLEAR AREA IN VERTICAL CORES TO BE GROUTED.
B. PLACE REINFORCING PRIOR TO LAYING MASONRY UNITS AND EXTEND ABOVE MAXIMUM POUR HEIGHT AS REQUIRED FOR SPLICING.
C. LAY MASONRY UNITS TO MAXIMUM POUR HEIGHT. DO NOT EXCEED 5'-0", EXCEPT POUR HEIGHT SHALL STOP AT COURSE BELOW BOND BEAM.
D. POUR GROUT USING CHUTE OR CONTAINER WITH SPOUT. ROD OR VIBRATE GROUT DURING PLACEMENT. PLACE GROUT CONTINUOUSLY AND DO NOT INTERRUPT POURING FOR MORE THAN 20 MINUTES. TERMINATE POUR 1 1/2" BELOW TOP COURSE OF POUR.

7. VERTICAL REINFORCING SHALL PASS THROUGH BOND BEAMS WITHOUT LAPS OR INTERUPTION.

8. GROUT BOND BEAMS SOLID WITH MIN 2# 4 BARS CONT.

STRUCTURAL STEEL

1. STRUCTURAL STEEL SHALL CONFORM TO THE LATEST ISSUE OF "SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS - ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN" AS ADOPTED BY THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION.

2. SUBMIT COMPLETE SHOP DRAWINGS AND ERECTION PLANS TO THE ENGINEER FOR REVIEW BEFORE ANY FABRICATION IS BEGUN. REVIEW WILL COVER SIZE AND ARRANGEMENT OF PRINCIPLE AND AUXILIARY MEMBERS, AND STRENGTH OF CONNECTIONS.

3. STRUCTURAL STEEL BEAMS:
ASTM A992 GRADE 50, Fy = 50,000 psi
MISC. ANGLES, PLATES: ASTM A36, Fy = 36,000 psi
STRUCTURAL TUBING: ASTM A500, GRADE B, Fy = 46,000 psi

4. USE ONLY 3/4" DIAMETER ASTM A325 H.S. BOLTS UNLESS NOTED OTHERWISE.

5. WELDING SHALL BE DONE IN ACCORDANCE WITH THE AWS CODE, LATEST EDITION, USE E70XX ELECTRODES.

6. FIELD WELDING SHALL BE DONE BY A CERTIFIED WELDING OPERATOR. WELDS ARE SUBJECT TO REVIEW BY THE ARCHITECT OR ENGINEER.

7. PROVIDE ADEQUATE TEMPORARY BRACING OF THE STRUCTURE. FIT, PLUMB, LEVEL AND ALIGN STRUCTURAL STEEL BEFORE MAKING PERMANENT FIELD CONNECTIONS.

8. STRUCTURAL STEEL SHALL RECEIVE SUPPLIER'S STANDARD SHOP PAINT UNLESS INDICATED OTHERWISE. DO NOT PRIME OR PAINT STEEL THAT IS TO RECEIVE FIREPROOFING.

9. PROVIDE 1/4" CAP PLATE ON ENDS OF ALL TUBES UNO.

STRUCTURAL FOAM

1. STRUCTURAL FOAM: WHERE STRUCTURAL FOAM IS INDICATED FOR INFILL OF THE EXISTING MECHANICAL EQUIP ROOM, PROVIDE "EPS22-GEOFOAM" AS MANUFACTURED BY "INSULFOAM, INC."

2. LAY IN THE FOAM BLOCKS IN LAYERS AS RECOMMEDED BY THE MANUFACTURER'S WRITTEN INSTRUCTIONS. CUT THE FOAM BLOCKS WITH A HOT-WIRE TOOLING CUTTER AS PROVIDED BY INSULFOAM, INC.

3. POUR A NEW SLAB OVER THE STRUCTURAL FOAM INFILL AS INDICATED ON THE DRAWINGS. SEAL JOINTS BETWEEN THE FINISH LAYERS OF STRUCTURAL FOAM SUCH THAT CONCRETE DOES NOT SEEP DOWN INTO THE LOWER FOAM LAYERS.

METAL DECK

1. ALL METAL DECK SHALL CONFORM TO THE REQUIREMENTS OF THE STEEL DECK INSTITUTE.

2. ALL METAL DECK ACCESSORIES INCLUDING EDGE FORMS, COLUMN CLOSURES, FILLERS, POUR STOPS, EDGE SUPPORTS AND WELDING WASHERS FOR A COMPLETE INSTALLATION WHETHER OR NOT SUCH ITEMS ARE SHOWN ON THE PLANS.

3. REFER TO THE FRAMING DETAILS FOR THE DECK FASTENING REQUIREMENTS.

4. ALL METAL DECK SHALL BE CONTINUOUS OVER A MINIMUM OF THREE SPANS.

CONCRETE

1. CONCRETE WORK SHALL CONFORM TO THE LATEST ISSUE OF "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE", ACI 318 AND "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS, ACI 301, UNLESS NOTED OTHERWISE ON THE PLANS.

2. WEATHER EXPOSED CONCRETE SHALL BE AIR-ENTRAINED. AIR CONTENT SHALL BE 5% TO 7% BY VOLUME.

3. MINIMUM 28 DAY CONCRETE COMPRESSIVE STRENGTH:
FOOTING - f'c = 3000 psi
SLABS AND ALL OTHER - f'c = 4000 psi

4. CONTRACTOR SHALL SUBMIT A COMPLETE CONCRETE MIX DESIGN FOR BOTH REGULAR WEIGHT, NON-AIR ENTRAINED AND REGULAR WEIGHT, AIR ENTRAINED CONCRETE MIXES. MIXDESIGN SHALL CONFORM TO THE REQUIREMENTS OF ACI 301, LATEST ISSUE. MAXIMUM SLUMP FOR ALL CLASSES SHALL BE 4 INCHES.

5. DURING THE PROGRESS OF THE CONCRETE WORK, STANDARD TEST CYLINDERS SHALL BE MADE AND CURED IN ACCORDANCE WITH ASTM C-31.

6. CONCRETE FINISHING:
INTERIOR SLABS - HARD TROWEL
EXTERIOR SLABS - BRUSH OR BROOM FINISH

7. HOT WEATHER CONCRETING SHALL CONFORM TO ACI 305.

8. CONCRETE SHALL BE CURED USING AN APPROVED MEMBRANE CURING COMPOUND. EXPOSED INTERIOR SLABS SHALL BE SEALED WITH SEALING COMPOUND. DO NOT PLACE ANY SLAB ON UNCOMPACTED FILL.

9. LOCATIONS OF CONSTRUCTION JOINTS OTHER THAN THOSE INDICATED ON THE PLANS SHALL BE SUBMITTED FOR REVIEW PRIOR TO THE START OF WORK.

FORMWORK

1. FORMWORK SHALL BE DESIGNED, ERECTED, MAINTAINED AND REMOVED ACCORDING TO THE PROVISIONS OF "RECOMMENDED PRACTICE FOR CONCRETE FORMWORK" ACI 347, LATEST ISSUE.

2. COMPLETED WORK SHALL NOT VARY FROM THE PLUMB, LEVEL, INDICATED GRADE OR POSITION SHOWN ON THE PLANS BY MORE THAN 1/4 INCH IN TEN FEET. REFER ALSO TO ACI 301, LATEST ISSUE, FOR ADDITIONAL FORMWORK TOLERANCES.

REINFORCING STEEL

1. DETAILING, FABRICATION, PLACING, AND SUPPORT OF REINFORCING STEEL SHALL FOLLOW THE CURRENT ISSUE OF THE "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES", ACI 315, UNLESS NOTED OTHERWISE.

2. REINFORCING BARS SHALL HAVE DEFORMED SURFACES CONFORMING TO ASTM A615.

3. WELDED WIRE FABRIC (WWF) SHALL BE LAPPED 1-1/2 MESH AND WWF SHALL BE WIRED TOGETHER WHERE REQUIRED. WWF SHALL CONFORM TO ASTM A185. PROVIDE WWF IN SHEETS ONLY. PLACE WWF AT THE MID-DEPTH OF THE SLAB AND SUPPORT AT INTERVALS SUFFICIENT TO ADEQUATELY HOLD AND RESTRAIN THE ENTIRE SHEET AT THE MID-DEPTH DURING CONCRETE PLACEMENT.

4. REINFORCING STEEL IN FOOTINGS WITH LONGITUDINAL AND TRANSVERSE STEEL SHALL BE ASSEMBLED INTO EQUALLY SPACED MAT GRILLS AND WIRED TOGETHER AT ALTERNATE INTERSECTIONS BEFORE CONCRETE IS PLACED.

5. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS CLEARLY INDICATING SIZE, QUANTITY, LOCATIONS AND DETAILS OF ALL REINFORCING STEEL FOR REVIEW BEFORE THE START OF WORK.

6. HOOKS, BENDS AND LAP SPLICES AND CLEAR COVER SHALL COMPLY WITH ACI 318, LATEST EDITION, UNLESS NOTED OTHERWISE.

7. DESIGN STRESSES FOR THE VARIOUS REINFORCING ARE AS FOLLOWS:
WELDED WIRE FABRIC - Fy = 60,000 psi
ALL OTHER REINFORCING - GRADE 60 - Fy = 60,000 psi

DESIGN DATA

CODE: 2012 INTERNATIONAL BUILDING CODE

FLOOR LIVE LOAD

ASSEMBLY AREAS & CORRIDORS:	100 PSF
HOTEL ROOMS:	40 PSF
ROOF LIVE LOAD	20 PSF
ALLOWABLE NET SOIL BEARING PRESSURE: (BEARING PRESSURE ASSUMED, TO BE VERIFIED BY A LICENSED GEOTECHNICAL ENGINEER)	1,500 PSF*

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Civil Engineer's Name
Civil Engineer
Street Number and Name
City, State and Zip
Phone: (012) 345-6789
Website: www.website.com

STATE OF MISSOURI
MICHAEL J. LAWSON
NUMBER PE-2002016439
09-08-20
PROFESSIONAL ENGINEER

CERTIFICATION Michael J Lawson - Engineer PE-2002016439

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: LEI #1851
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

GENERAL NOTES & TYPICAL DETAILS

S100-T

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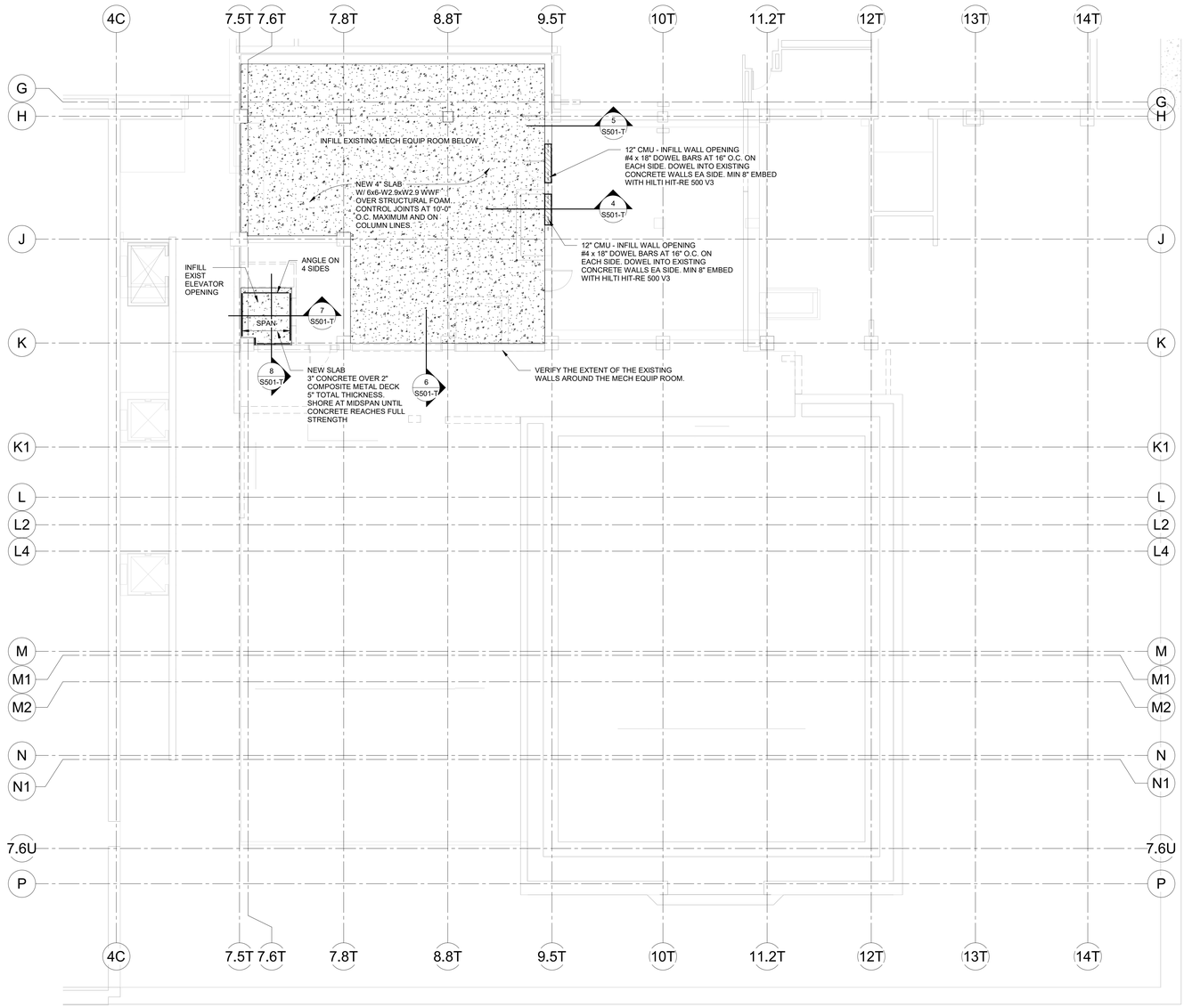

TOWER-BASEMENT FLOOR FRAMING

1/8" = 1'-0"

NORTH

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Civil Engineer's Name
Civil Engineer

Street Number and Name
City, State and Zip
Phone: (012) 345-6789
Website: www.website.com

STATE OF MISSOURI
MICHAEL J. LAWSON
NUMBER
PE-2002016439
09-08-20
PROFESSIONAL ENGINEER

CERTIFICATION Michael J Lawson - Engineer
PE-2002016439

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: LEI #1851
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

BASEMENT FLOOR FRAMING PLAN

S300-T

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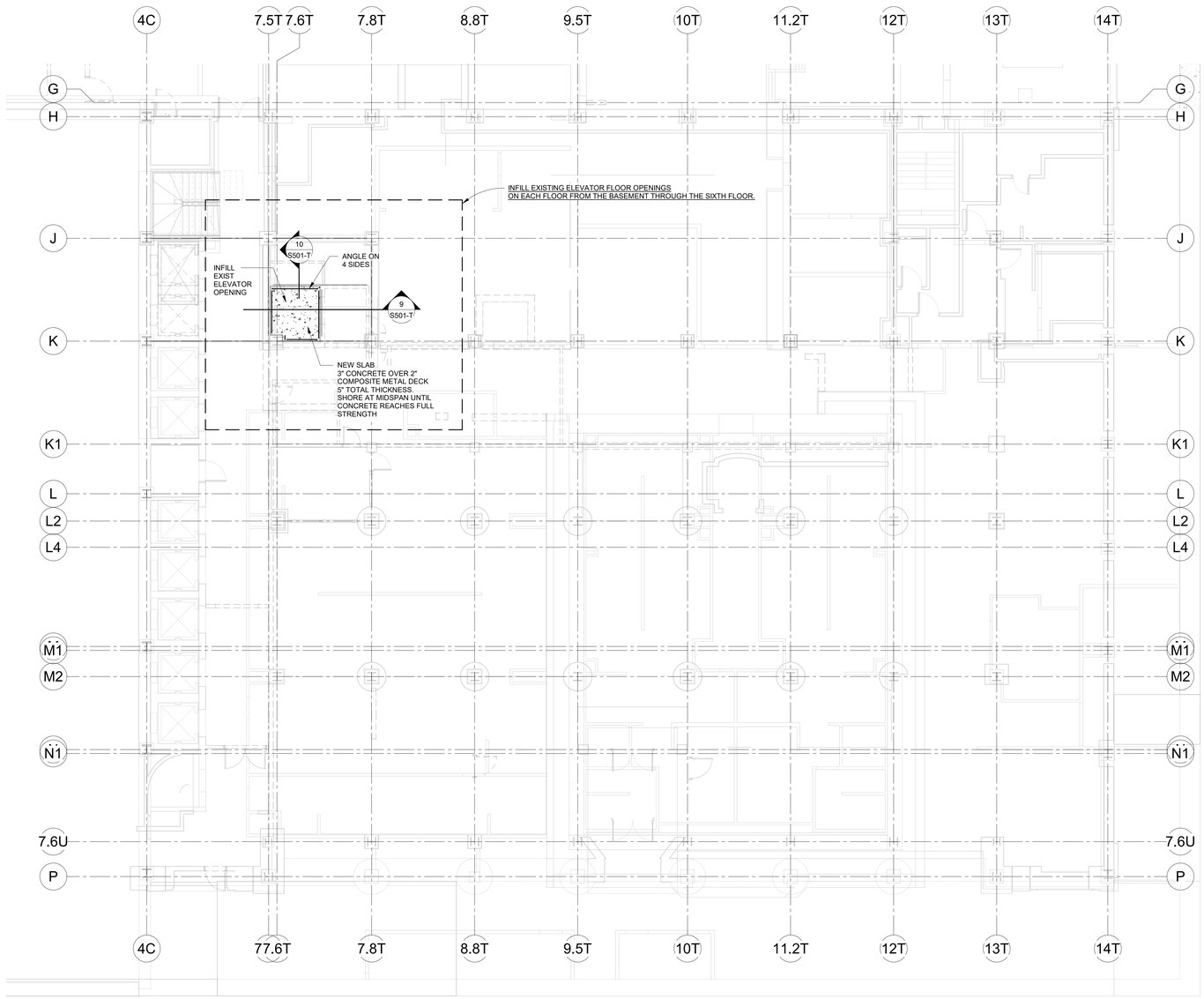

TOWER-GROUND FLOOR FRAMING

1/8" = 1'-0"

NORTH

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GROUND FLOOR
FRAMING FLOOR

S301-T

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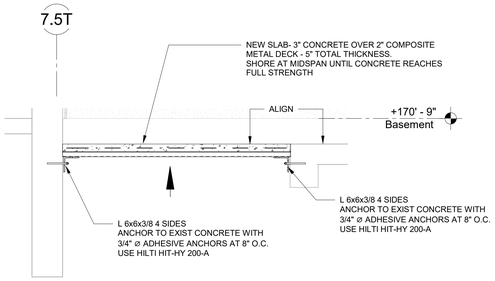

7 SECTION
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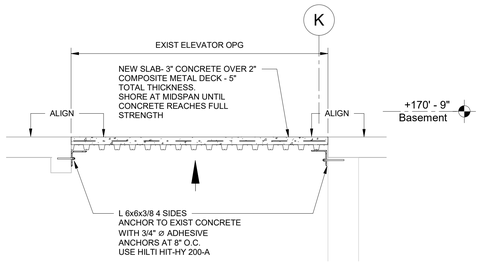

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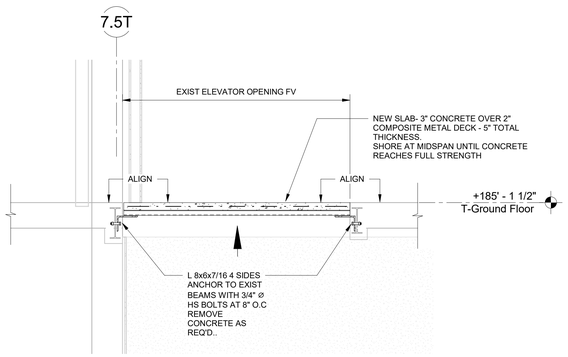

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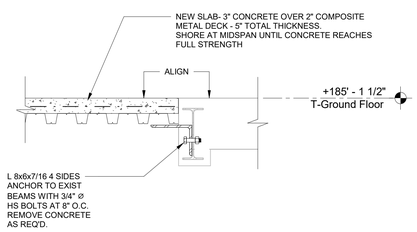

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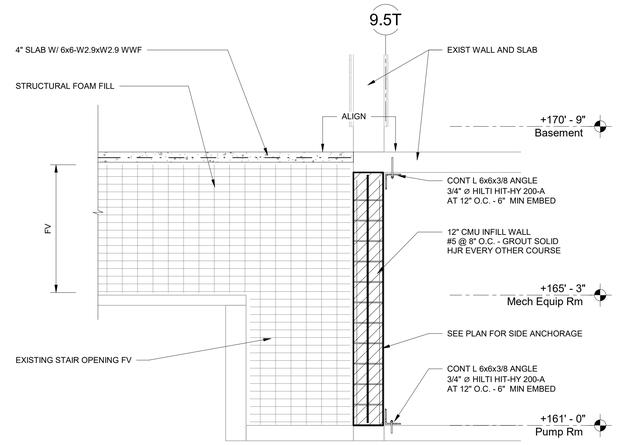

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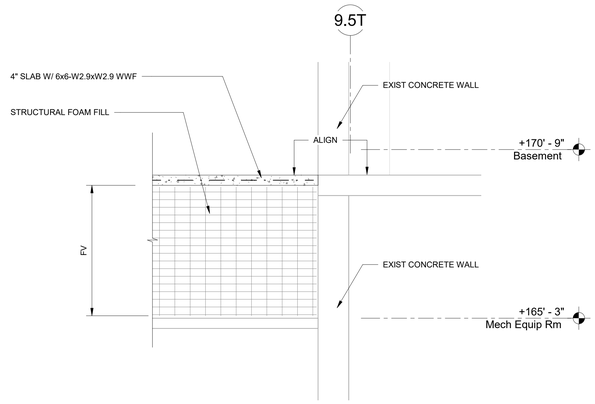

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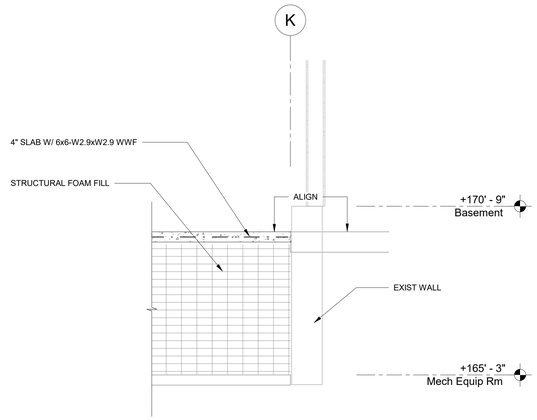

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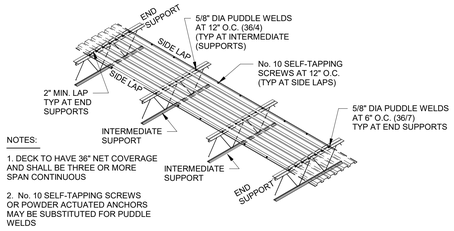
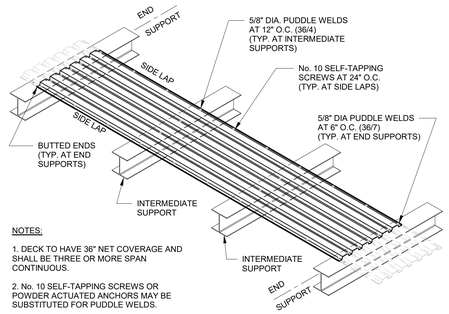


NOTES:

1. DECK TO HAVE 36" NET COVERAGE AND SHALL BE THREE OR MORE SPAN CONTINUOUS

2. No. 10 SELF-TAPPING SCREWS OR POWDER ACTUATED ANCHORS MAY BE SUBSTITUTED FOR PUDDLE WELDS

1 TYPICAL ROOF DECK ATTACHMENT
N.T.S.



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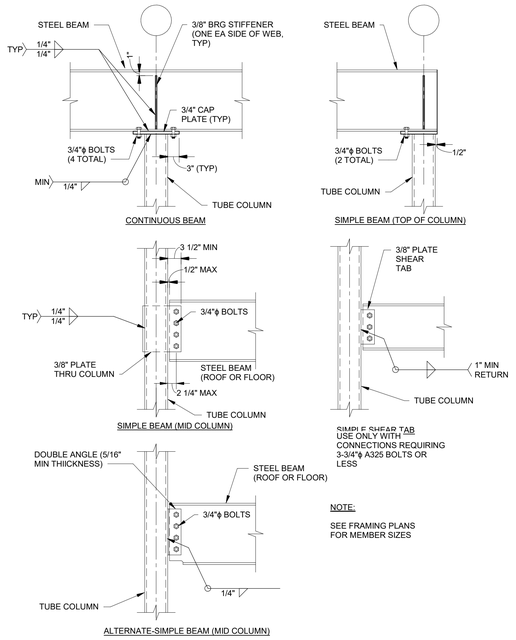
2 TYPICAL FLOOR DECK ATTACHMENT
N.T.S.



NOTE:

SEE FRAMING PLANS FOR MEMBER SIZES

3 TYPICAL TUBE COLUMN CONNECTION DETAILS
N.T.S.

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FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
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REVISION SCHEDULE		
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FRAMING SECTIONS & DETAILS

S501-T

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FSC, Inc.

Authorities Having Jurisdiction: City of Kansas City, Missouri and The Embassy Suites

Applicable Codes:
- 2012 International Building Code (ICC)
- 2012 International Fuel Gas Code (ICC)
- 2012 International Mechanical Code (ICC)
- 2011 National Electrical Code (NFPA)
- 2012 Uniform Plumbing Code (UPC)
- 2012 International Fire Code (ICC)
- 2009 CABO/ANSI A117.1
- Hilton Design Guidelines (Embassy Suites)

Project Description:

The scope of work is to renovate portions of the historic Federal Reserve Complex in Kansas City, Missouri. Portions of the complex will undergo a change of occupancy. The project will include the garage, tower building, and basement levels – the annex is not part of this project.

Code Approach:

The Complex

1. The existing complex consists of three main buildings:

   - Tower – The tower was constructed in 1921. It is 21 stories, with office and assembly use and is not currently protected with sprinklers. The tower is an existing high-rise building constructed of non-combustible materials. The tower will be converted into a hotel – Group R-1.
   - Garage – The garage was added in 1967. The garage is enclosed and protected with sprinklers. There are 6.5 levels over three bank/security levels. The garage building is a concrete structure. The garage has no change of occupancy.
   - Annex – The annex building was constructed in 1905 and is 4 stories. The annex building is a concrete structure and is not currently protected with sprinklers. A small security building is located between the tower and the annex. The annex and security building will not be part of the project.

2. The tower and garage buildings will be protected by an automatic sprinkler system in accordance with the requirements of Section 903.2.1.3 and NFPA 13, with the exception of tall ceiling in the historic grand lobby. A CMR has been submitted.

3. The portion of the complex being renovated will be subdivided into three buildings - separated by fire walls and horizontal building separations (using existing exterior masonry walls and existing horizontal assemblies). The horizontal separation will occur at Level 3 – above the grand lobby.

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Building 1 – The Tower
- Per Section 508, the tower building will be treated as mixed use, nonseparated for uses A-2, A-3, B, M, R-1, S-1.
- The tower building is an existing high-rise building. High-rise features are described in Section 3 of this report.
- High-rise requirements will be provided for the existing high-rise with the change of occupancy, to the extent that is technically feasible.

Building 2 – The Building Below Podium
- The grand lobby is historic and the design team wishes to leave it unchanged with the renovation. Certain features, such as the guardrail and handrail at the stairs must remain for the historic value. There are several unenclosed floor openings: two stairs that are open to the ground floor, and the large lobby which is a tall two-story volume. The open stairs will be separated by fire-resistance-rated construction.
- The grand two-story lobby will remain as a two-story volume and will be separated from connections to other floors with fire resistance rated construction.
- The storage space under the lobby stair should be separated by 1-hour construction.

Building 3 – The Garage
The garage will only undergo minimal work to accommodate back-of-house spaces for the hotel operation.

Section 1 - Basic Building Information - All Buildings

	Building 1 - Tower Building 2 - Below Podium	Building 3 - Garage
Type of Construction	Type I-A	Type I-A
Allowable Number of Stories	UL	UL
Actual Number of Stories	21	6
Allowable Area Per Story	Unlimited	Unlimited
Actual Area (Largest Story)	44,437 ft²	
Allowable Building Area	Unlimited	Unlimited
Actual Building Area	456,350 ft²	
Separated/Nonseparated	Non-separated	
Occupancy Classifications	R-1 (hotel) A-2 (banquet halls, bar, lounges) A-3 (large conference rooms) B (hotel support office, meeting rooms less than 750 ft², small food establishments) S-1 (miscellaneous storage)	A-3 – swimming pool S-2 parking garage
Change of Occupancy	Yes	Yes – for the small portion that will be converted to a pool
High-Rise	Yes (Tower portion)	No

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Section 2 - Scope of Work and Change of Occupancy

The tower was originally Business (most floors) and Assembly (top floor court room and gymnasium). The tower will be converted to hotel and associated amenities. The former assembly spaces will be repurposed to new assembly uses - the courtroom (which became the gymnasium) will become the ballroom.

The basement will serve as mechanical, storage, and hotel support spaces.

The garage will have minimal work and has a small portion that will have a change of occupancy.

The design team will comply with change of occupancy as described below and high-rise requirements in the high-rise building to the extent technically feasible as described in Section 3 of this report.

NOTE:
R-1 unit separation walls will comply with 2012 IBC requirements for fire partitions.
R-1 corridor walls will comply with 2012 IBC requirements for fire partitions.
Floor level exit signs will be provided throughout the R-1 occupancy.

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Section 3 - High-Rise Provisions

2012 IBC High-rise Requirements	Existing Building	This Project
Automatic Sprinkler System (S. 403.3 and 903)	A small portion of the complex is protected with sprinklers.	All portions of the building will be protected with sprinklers with exception of the tall ceiling volume in the Grand Lobby; which will be provided with beam detection.
Second connection to a city main	Not provided	*Request single connection be permitted to remain if capable of supporting the sprinkler system.*
Secondary on-site water supply for the sprinkler system (S. 903.3.5.2)	Not required	Not required, IBC Section 903.3.5.2, Exception
Fire pump circuit feeder wiring protection	Not provided	Per NEC Article 700.10, wiring is to be encased in concrete or in spaces protected with sprinklers.
Smoke detection (S. 403.4.1 and 907.2.13.1)	Not provided	Required and will be provided
Fire alarm (Sections 403.4.2 and 907.2.13)	Provided	Required and will be provided
Emergency voice alarm/communication system (S. 403.4.4 and 907.5.2.2)	Not provided	Required and will be provided
Emergency responder radio coverage (IFC Section 510)	Not provided	Required and will be provided
Fire command center (S. 403.4.6 and 911)	Not provided	Required and will be provided
Smoke removal for post-fire salvage (S. 403.4.7)	Not provided	*Requesting ACH method be provided for the corridor only*
Standby power (Section 403.4.8.3)	Uncertain	*Request to connect to the downtown loop; the capacity of the existing generator is being evaluated*
Emergency power (Section 403.4.8.4)	Uncertain	Exit signs and exit lighting are required to be provided with on site power. Floor level exit signs are required in R-1 spaces.
Elevator hoistway protection (Section 3006)	See section 5 for elevator provisions	See section 8 for elevator door protection
Fire Service Access Elevator	Not provided	Phase 1 recall only will be provided. One *elevator to accommodate a stretcher will be provided*
Pressurized stair enclosures (S. 403.5.4)	See detailed section on stair provisions	Required and will be provided
Luminous egress path markings	Not provided	Required for R-1, *requesting omission where existing handrails will remain.*

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Section 4 - Active Fire Protection

Currently, the tower building is only partially protected with sprinklers. Standpipes are provided in both stair enclosures that serve the building. It is assumed the building has a single connection to a single city main. The current psi at the upper most standpipe is 65 psi which would have been required at the time of installation. With the system replacement, the pressure will be increased to 100 psi at the uppermost standpipe.

The Garage is protected with existing sprinklers and existing standpipes.

Section 5 - Elevators

The original tower building had nine elevators. Elevator 6 has already been converted to a mechanical shaft. Currently, the hoistways are not pressurized and it will not be added with this renovation. The hoistways will be provided with lobbies on all floors – except the ground floor as permitted and the upper level of the grand lobby because it is the same atmospheric environment as the ground floor.

Section 6 - Egress Stairs

Existing Stair Conditions

IEBC section 407.3 permits allows stairways to remain and states they are not required to comply with IBC Section 1009 where the existing space and construction does not allow a reduction in pitch or slope.

- The existing handrails and guardrails will remain in the Garage and Tower.
- The rise and run of the stairs are not required to comply with 2012 IBC.

Stair Discharge

Building 1 – The Tower
The tower floors 1-4 are served by three stair enclosures - two of which discharge to the exterior. One of the pressurized stairs slops one level above the ground floor as it transitions to a historic grand stair.
The tower floors 5-21 are served by two stair enclosures - both of which discharge to the exterior.

Building 2 – Below the Podium
The basement has access to several stair enclosures - four discharge to the exterior.

Building 3 – Garage
The garage levels are served by three stair enclosures; all three discharge to the exterior.

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Section 7 - Nonconforming Conditions

The design team has made every effort to comply with change of occupancy and high-rise requirements. Chapter 4, which details the Prescriptive Compliance Method, states the following for historic buildings.

> **[B] 801.1 Historic buildings.** The provisions of this code relating to the construction, repair, alteration, addition, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings where such buildings are judged by the building official to not constitute a distinct life safety hazard.

This building is on the national register of historic places. As such, certain conditions are difficult to address and ***we have submitted a CMR to allow these conditions to remain***

- The Northwest stair transitions from a typical cadence to winders between the second and first floor. Previously, this transition discharged to the main level and was unenclosed. A new enclosure is being created to isolate the stair discharge.
- The grand lobby be permitted to remain without sprinklers if provided with smoke detectors in locations that will not detract from the historic ceilings.
- Although we are requesting the historic ceilings in the Grand Lobby not be protected with sprinklers, we are requesting the discharge through the level of exit discharge be permitted and the omission of elevator lobbies at the two-story Grand Lobby.
- Omission of luminous egress markings on existing handrails where the application of luminous markings would be difficult and all components of the historic winder stair near the primary entry.
- Existing garage ventilation system remain - as there is no change of occupancy in the garage.
- Existing garage fire alarm system remain as there is no change of occupancy in the garage portion.
- The garage has no sand/oil interceptor. As the garage is existing to remain, we request the existing condition be permitted to remain.
- A single connection to a single city main - if adequate pressure can be supplied to the new sprinkler system.

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Section 8 - Code Requirements for the Tower

Passive Fire Resistance

Identification of fire rated walls with signs or stenciling	Section 703.7 requires fire rated walls to be identified
Occupancy separations	Not required. Nonseparated approach is utilized (Section 508.3)
Sleeping unit separation	1-hour fire partition (Sections 420.5) required to be continuous to the slab above – may not terminate at a rated floor ceiling assembly (Brand Standard & NFPA 101)
Corridor	1/2-hour fire partition (Section 708.3, Exception 1) required to be continuous to the slab above – may not terminate at a rated floor ceiling assembly (Brand Standard & NFPA 101) A corridor smoke damper is required per IBC 717.5.4.1
Horizontal exits	2-hour walls with 2-hour supporting construction (90-minute doors) and fire/smoke dampers (Section 1022)
Stair enclosures	2-hour (90-minute doors) with 2-hour supporting construction (Section 1009.3.1.2). No HVAC duct penetrations are permitted. (Section 1022.5)
Vertical HVAC shafts	2-hour shaft with 2-hour supporting construction and fire/smoke dampers. (Section 713.3-713.4)
Elevator hoistways	2-hour with 2-hour supporting construction (Section 713.4)
Elevator lobbies	Required – a CMR has been submitted to request omission at upper level of the two-story Grand lobby
Elevator machine rooms	2-hour (90-minute doors) with fire dampers (Section 3006.4)
Permanent partitions	0-hour (Table 601)
Control area	2-hour pool chemical room (if provided) (Section 414.2)
Laundry rooms > 100 ft²	1-hour (45-minute doors) with fire dampers (Table 509)
Storage rooms > 100 ft²	0-hour (nonseparated use)
Space under stairs	1-hour for enclosed spaces under unenclosed stairs
Electrical room	0-hour (assume no transformers) 1-hour for dry type transformer >112.5kVA (NEC Article 450.21)

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Sprinkler pump room	2-hour (90-minute doors) with fire dampers (Section 913.2.1)
Wall penetrations	F rating = rating of wall penetrated (Section 714.3.1.2)
Floor penetrations	F rating = rating of floor penetrated (Section 714.4.1.1.2) T rating = rating of floor penetrated. Note: T rating = 0 if pipe is in wall cavity (Section 714.4.1.1.2 Exception 1)

Interior Finish

Wall and ceiling finish (Section 801 and 803): smoke-developed of 450 of less, and,
Inside exit stair enclosures and exit passageways – Class B
Inside corridors – Class B for Assembly occupancies
Inside corridors – Class C for Business, Mercantile and R-1 occupancies
Inside rooms – Class C

Floor finish	DOC FF-1 "pill test" (Section 804.4.1, exception) See also 804.4
Plenums	Class A and smoke-developed of 50 of less (IMC Section 602)

Active Fire Protection

Automatic sprinkler system	Required (Section 903.2.8) NFPA 13
Standpipes	Required and provided in stairs (Section 905.3.1)
Fire extinguishers	Required (Section 906)
Manual fire alarm system	Required. Pull stations may be omitted (Section 907.2.8.1, Exception 2) alarm must activate by sprinkler water flow, and one fire alarm box must be provided (Section 907.2)
Voice evacuation	Required in the high-rise (Section 907.2.13)
Smoke detection	Required (Section 907.2.8.2 and 907.2.13.1)
Smoke alarms	Required (Section 907.2.11.1)
Carbon monoxide (CO) alarms	.... (Section 908.7)

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No. 18A023
Drawn By FSC
Checked By JJK
Scale See Drawing
Issue Date September 8, 2020

REVISION SCHEDULE

Rev. #	Revision Description	Issue Date

LIFE SAFETY CODE ANALYSIS

LS0.01

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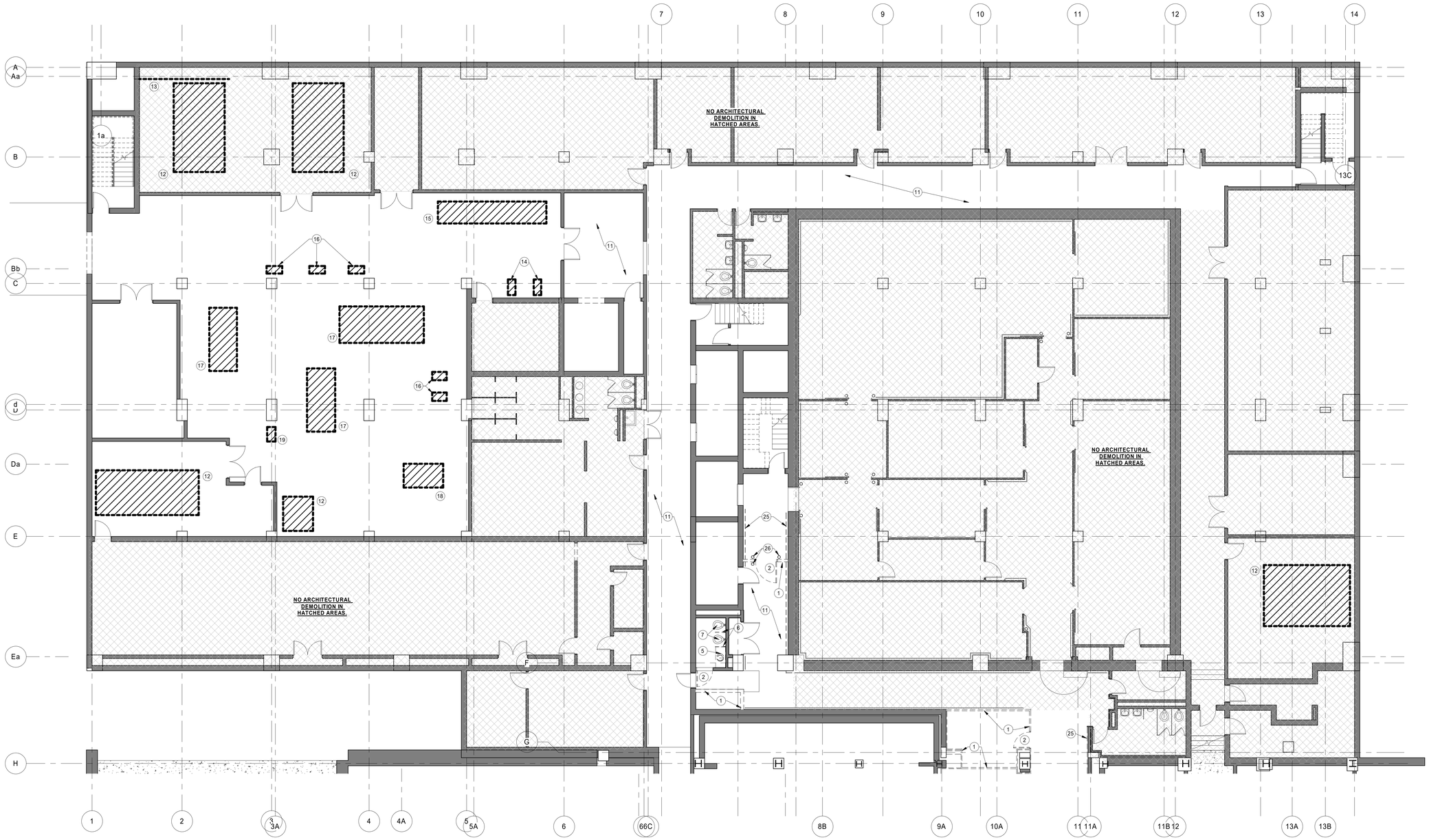

1 PHASE 1 DEMOLITION
BASEMENT FLOOR PLAN - GARAGE
AD1.00-G 1/8" = 1'-0"

SEE SHEET AD1.00-T FOR GENERAL DEMOLITION NOTES.

- DEMOLITION PLAN NOTES - BASEMENT

1. DASHED LINES INDICATE EXISTING WALLS, COLUMN CONSTRUCTION (STUDS, GYPSUM, PLASTER, CMU, CONCRETE, WIRE, GLAZING) AND ASSOCIATED ITEMS TO BE REMOVED IN THEIR ENTIRETY.
2. DASHED LINES INDICATE EXISTING DOORS, FRAMES, AND HARDWARE AND ASSOCIATED ITEMS TO BE REMOVED
3. EXISTING MATERIAL LIFT AND ALL ASSOCIATED EQUIPMENT TO BE REMOVED IN ITS ENTIRETY.
4. REMOVE EXISTING RAISED FLOOR SYSTEM IN ITS ENTIRETY.
5. REMOVE COUNTERS, SINKS, ASSOCIATED PLUMBING COMPLETELY
6. REMOVE ALL TOILET ROOM PARTITIONS AND ACCESSORIES COMPLETELY.
7. REMOVE EXISTING TOILETS, URINALS, AND ASSOCIATE PLUMBING COMPLETELY.
8. EXISTING STAIR, SUPPORT, RAILINGS, ETC. TO BE REMOVED IN ITS ENTIRETY..
9. ELEVATOR TO BE REMOVED IN ITS ENTIERTY INCLUDING ASSOCIATED ANCHORAGE AND MEP ITEMS.
10. EXISTING VAULT WALLS AND DOOR TO REMAIN..
11. REMOVE EXISTING CEILINGS TO DECK ABOVE.
12. AIR HANDLING UNIT - EXISTING AIR HANDLING UNIT TO BE DEMOLISHED. DEMOLISH ALL EXISTING PIPING AND DUCTWORK CONNECTIONS SERVING AHU. DEMOLISH ELECTRICAL BACK TO ASSOCIATED PANEL. REFER TO NEW WORK PLANS FOR ANY DUCTWORK THAT MAY BE RE-USED
13. OUTSIDE AIR SHAFT - EXISTING OUTSIDE AIR SHAFT/PLENUM TO REMAIN FOR USE IN NEW WORK.
14. HEATING HOT WATER PUMPS – DEMOLISH HOT WATER PUMPS AND ASSOCIATED PIPING. DEMOLISH EXISTING HOUSEKEEPING PADS. DEMOLISH ALL CONTROLS ASSOCIATED WITH UNIT. DEMOLISH ELECTRICAL BACK TO ASSOCIATED PANEL.
15. STEAM PIPING – DEMOLISH ALL STEAM & STEAM CONDENSATE PIPING IN CENTRAL PLANT. DEMOLISH ALL ASSOCIATED HEAT EXCHANGERS, CONDENSATE TRAPS AND PUMPS. DEMOLISH ALL ASSOCIATED CONTROLS.
16. CHILLED WATER PUMPS – DEMOLISH CHILLED WATER PUMPS AND ASSOCIATED PIPING. DEMOLISH EXISTING HOUSEKEEPING PADS. DEMOLISH ALL CONTROLS ASSOCIATED WITH UNIT. DEMOLISH ELECTRICAL BACK TO ASSOCIATED PANEL.
17. LIQUID COOLED CHILLER – DEMOLISH EXISTING CHILLER AND ASSOCIATED CHILLED WATER AND CONDENSER WATER PIPING CENTRAL PLANT ROOM. DEMOLISH ALL CONTROLS ASSOCIATED WITH UNIT. DEMOLISH ELECTRICAL BACK TO ASSOCIATED PANEL.
18. HEAT EXCHANGER – DEMOLISH EXISTING PLATE AND FRAME HEAT EXCHANGER AND ASSOCIATED PIPING WITHIN CENTRAL PLANT ROOM.
19. CONDENSER WATER PUMPS – DEMOLISH CONDENSER WATER PUMPS AND ASSOCIATED PIPING IN CENTRAL PLANT ROOM. DEMOLISH ALL CONTROLS ASSOCIATED WITH UNIT. DEMOLISH ELECTRICAL BACK TO ASSOCIATED PANEL.
20. DEMOLISH ALL PIPING SERVING EQUIPMENT IN CENTRAL PLANT.
21. FIRE PUMP – DEMOLISH EXISTING FIRE PUMPS AND ASSOCIATED PIPING BACK TO SERVICE ENTRANCE.
22. WATER SERVICE ENTRANCE – DEMOLISH EXISTING DOMESTIC WATER PIPING BACK TO SERVICE ENTRANCE. DEMOLISH BOOSTER PUMP AND ASSOCIATED CONTROLS. DEMOLISH ELECTICAL BACK TO ASSOCIATED PANEL
23. MECHANICAL & PLUMBING PIPING – DEMOLISH ALL MECHANICAL EQUIPMENT IN THIS AREA. DEMOLISH ALL PIPING TO MAKE ROOM FOR HEADROOM AFTER ROOM IS INFILLED
24. NEW OPENING IN EXISTING WALL. COORDINATE LOATION AND SIZE WITH DRAWINGS FOR NEW WORK.
25. EXISTING FLOOR MOUNTED CART 'BUMPERS' TP BE REMOVED IN THEIR ENTIRETY.
26. EXISTING PIPE BOLLARDS TO BE REMOVED IN THEIR ENTIERTY.
27. REMOVE SLAB AS NEEDED FOR NEW ELEVATOR PIT. REFERENCE STRUCTURAL DRAWINGS.
28. DEMOLISH ALL PIPING AND MECHANICAL EQUIPMENT IN STAIRWELL.
29. DEMOLISH ALL ELECTRICAL CONDUITS AND CONDUCTORS IN STAIRWELL.
30. ELEVATOR CABS TO BE DEMOLISHED. COORDINATE SCOPE WITH ELEVATOR SPECIFICATIONS.
31. REMOVE EXISTING 'STEP' IN SLAB ELEVATION.

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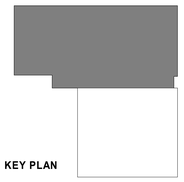

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
REGISTERED ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
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Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Basement Demolition Plan

AD1.00-G

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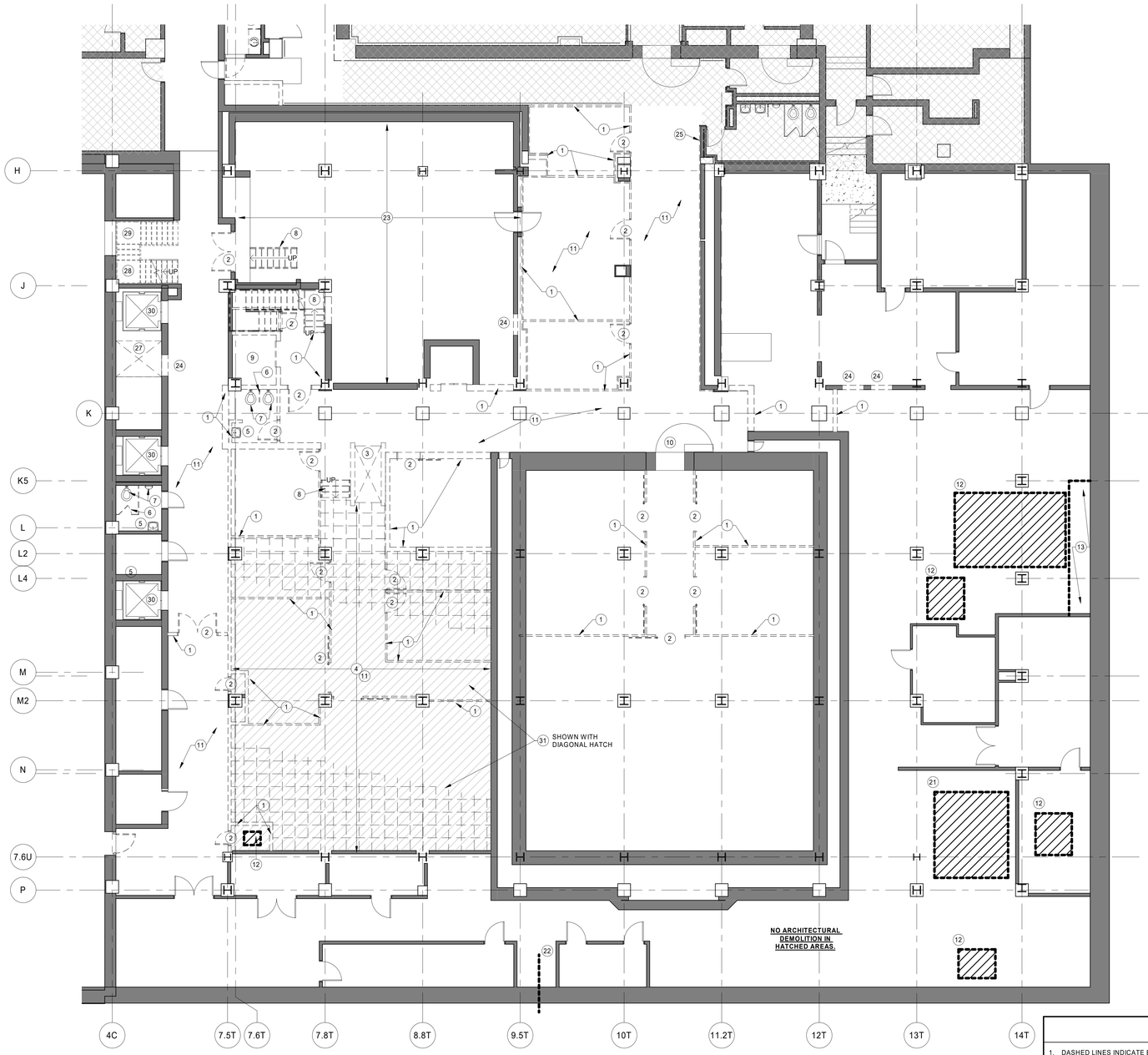

1 PHASE 1 DEMOLITION
BASEMENT FLOOR PLAN - TOWER
AD1.00-T 1/8" = 1'-0"

GENERAL DEMOLITION NOTES - MEP

1. WHERE MECHANICAL, ELECTRICAL OR PLUMBING SYSTEMS LOCATED ON THE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.INSTALL APPROPRIATE COVERPLATES AS REQUIRED.
2. OPENINGS IN THE EXISTING BUILDING WHICH REMAIN AFTER PIPING, DUCTWORK, AND OTHER PENETRATIONS HAVE BEEN REMOVED AND WHICH ARE NOT BEING REUSED AS A PART OF THE BUILDING RENOVATION ARE TO BE INFILLED FLUSH WITH THE SAME MATERIAL AS ADJACENT.
3. EQUIPMENT TO BE REMOVED INCLUDES ALL FLOOR ATTACHMENTS. GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING FINISH FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL WITH EXSITING FINISH FLOOR.
4. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION.
5. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION OR MADE SUITABLE FOR FINAL CONSTRUCTION AS PART OF THIS CONTRACT.
6. ALL EXTERIOR WALL PENETRATIONS MADE BY PIPE CONDUIT OR OTHERWISE SHALL BE REMOVED. THE EXTERIOR WALL PENETRATION SHALL BE REPAIRED TO MATCH THE EXISTING CONSTRUCTION.
7. EXTERIOR HOSE BIBS SHALL REMAIN IN PLACE.
8. EXTERIOR FIRE DEPARTMENT CONNECTIONS SHALL BE REMOVED COMPLETE.
9. THE CONTRACTOR SHALL VERIFY THAT THERE IS NO ACTIVE NATURAL GAS MAINS OR THAT PIPES MAY HAVE NOT BEEN PURGED PROPERLY. ALL NATURAL GAS PIPE SYSTEM REMOVAL SHALL BE MADE IN A SAFE MANNER TO ENSURE THE SAFTEY OF ALL WORKERS AND GENERAL PUBLIC AND TO THE SAFTEY OF THE BUILDING.
10. ALL MECHANICAL, ELECTRICAL AND PLUMBING FLOOR PENETRATIONS SHALL BE FILLED IN COMPLETE.
11. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY LIGHTING AND POWER IN ORDER TO CREATE A SAFE WORK PLACE. INSTALLATION OF TEMPROARY SERVICES SHALL BE COORDINATED WITH THE LOCAL UTILITY. PROVIDE METERING, PANELBOARDS, SERVICE AS PER UTILITY DIRECTION.
12. THE BUILDING SHALL BE LEFT AT THE END OF THE DEMOLITION PHASE WITH NO FIRE PROTECTION OR LIFE SAFTEY SYSTEMS. THE DURATION OF THIS CONDITION IS UNKNOWN.
13. THE CONTRACTORS SHALL FIELD VERIFY ALL LEVELS AND ALL AREA PRIOR TO BID AND DEMOLITION. ANY AREA NOT INDICATED ON THE PLANS SHALL HAVE ALL SYSTEMS AND EQUIPMENT REMOVED COMPLETE SAME AS OTHER AREAS.
14. ALL MECHANICAL AND PLUMBING ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS CONTROLS, ETC. CAP ALL OPEN-ENDED PIPES AND DUCTWORK.
15. ANY INTERRUPTION OF EXISTING ELECTRICAL SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE PRESSENT BUILDING OPERATION.
16. ALL BRANCH DUCTWORK AND HVAC PIPING ON TOWER FLOORS SHALL BE REMOVED COMPLETE.
17. ALL ELECTRICAL ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, CONDUIT, WIRE, ETC. UNLESS NOTED OTHERWISE ON PLANS. DEMOLISH BRANCH CIRCUITS AND FEEDERS BACK TO THEIR ASSOCIATED CIRCUIT BREAKERS UNLESS NOTED OTHERWISE. TURN OFF AND LABEL CIRCUIT BREAKERS AS SPARES FOR NEW WORK.
18. EXTEND CONDUIT AND WIRES AS REQUIRED IN AREAS THAT ELECTRICAL DEMOLITION AFFECTS ELECTRICAL SERVICE TO DEVICES DOWNSTREAM THAT ARE TO REMAIN.

GENERAL DEMOLITION NOTES

1. THE CONTRACTOR IS TO FOLLOW AND OBEY ALL FEDERAL, STATE, AND LOCAL CODES, LAWS, SAFETY REGULATIONS, AND HAZARDOUS WASTE LAWS, ETC. WITH NO EXCEPTIONS.
2. CONTRACTOR TO OBTAIN ALL NECESSARY PERMITS, RELEASES, AND AUTHORIZATIONS BEFORE PERFORMING DEMOLITION WORK.
3. THOROUGHLY REVIEW THE CONSTRUCTION DOCUMENT SET FOR ADDITIONAL DEMOLITION COORDINATION. FIELD VERIFY CONFLICTING ITEMS WITH THE ARCHITECT PRIOR TO COMMENCEMENT OF ANY DEMOLITION WORK.
4. ALL CONTRACTORS ARE TO CONDUCT NON-STRUCTURAL EXPLORATORY DEMOLITION TO DETERMINE STRUCTURAL EFFECT ON ALL PLANNED DEMOLITION AND CONFIRM WITH THE STRUCTURAL ENGINEER BEFORE ANY DEMOLITION OCCURS.
5. DEMOLITION IS TO BE CLEAN, COMPLETE, AND IN A MANNER SUITABLE TO ACCEPT NEW FINISHES AND SURFACES. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR DESCRIPTION OF NEW MATERIALS.
6. WHERE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.
7. IF ANY MATERIAL IS ENCOUNTERED THAT IS SUSPECTED TO CONTAIN ASBESTOS, DO NOT DISTURB AND IMMEDIATELY CONTAACT THE OWNER FOR REMEDIATION.
8. THESE DRAWINGS WERE DEVELOPED FROM A VISUAL SURVEY OF THE EXISTING CONDITIONS. THE AVAILABLE ORIGINAL ARCHITECTURAL AND STRUCTURAL DRAWINGS HAVE BEEN USED FOR LOCATION OF STRUCTURAL SUPPORTS. THE INFORMATION REFLECTED IN THOSE DRAWINGS DOES NOT GUARANTEE THAT ALL THE AS-BUILT CONDITIONS HAVE BEEN REPRESENTED. ALL EXISTING CONDITIONS WITHIN THE CONTRACT DOCUMENTS, ELEVATIONS, AND DIMENSIONS ARE TO BE VERIFIED IN FIELD BY THE CONTRACTOR OR SUBCONTRACTORS PRIOR TO CONSTRUCTION OR FABRICATION. NOTIFY THE ARCHITECT OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK.
9. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION AND CONSTRUCTION PROCESS INCLUDING BUT NOT LIMITED TO ALL WALLS (STRUCTURAL AND PARTITION), CEILINGS, FLOORS, DOORS, FINISHES, ETC.
10. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION OR MADE SUITABLE FOR FINAL CONSTRUCTION AS PART OF THIS CONTRACT.
11. WALLS TO BE REMOVED SHALL BE REMOVED IN FULL, UNLESS NOTED OTHERWISE. REMOVE TO SUBFLOOR MATERIAL, ALL FLOOR ATTACHMENTS, AND GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING SUB-FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL FLUSH WITH SUBFLOOR.
12. FOR DOORS TO BE REMOVED THE CONTRACTOR SHALL REMOVE DOOR, DOOR FRAME, DOOR HARDWARE, ASSOCIATED ANCHORING, AND ALL ASSOCIATED TRANSOMS AND/OR SIDELITES AND GLAZING COMPLETE UNLESS NOTED OTHERWISE.
13. FLOOR MATERIALS TO BE REMOVED TO SOUND SUB-BASE MATERIAL (MUD SLAB AND SLEEPERS) AND ARE TO BE FREE OF GLUES, FASTENERS AND FILLERS.
14. CAP ABANDONED CONDUITS AT POINT OF TERMINATION AND MAINTAIN ANY REQUIRED FIRE SEPARATION.
15. IN AREAS TO REMAIN, EXISTING LOOSE AND OR FLAKING PAINT THAT IS NOT ENCAPSULATED IN A NEW FINISH IS TO BE SCRAPED, ABRADED AND PREPARED FLAT & SMOOTH TO RECEIVE NEW FINISH.
16. ALL LOOSE AND CRUMBLING PLASTER TO BE REMOVED TO SOLID, UNDAMAGED MATERIAL OR SUBSTRATE
17. **ALL ITEMS HANGING FROM EXISTING STRUCTURE ARE TO BE CAREFULLY CUT DOWN TO PREVENT ANY DAMAGE TO STRUCTURE ABOVE. PULLING ITEMS FROM CEILING IS NOT PERMITTED.**
18. FOLLOW THE GUIDELINES OF THE NATIONAL PARK SERVICE (NPS), PART 2 - DESCRIPTIOON OF REHABILITATION FOR THE CARE OF ALL HISTORICAL MATERIALS.
19. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK

- DEMOLITION PLAN NOTES - BASEMENT

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20. DEMOLISH ALL PIPING SERVING EQUIPMENT IN CENTRAL PLANT.
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27. REMOVE SLAB AS NEEDED FOR NEW ELEVATOR PIT. REFERENCE STRUCTURAL DRAWINGS.
28. DEMOLISH ALL PIPING AND MECHANICAL EQUIPMENT IN STAIRWELL.
29. DEMOLISH ALL ELECTRICAL CONDUITS AND CONDUCTORS IN STAIRWELL.
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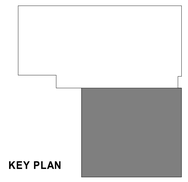

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
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1 PHASE 1 DEMOLITION
FIRST FLOOR PLAN - GARAGE
AD1.01-G 1/8" = 1'-0"

SEE SHEET AD1.01-T FOR GENERAL DEMOLITION NOTES.

- DEMOLITION PLAN NOTES - FIRST FLOOR

1. DASHED LINES INDICATE EXISTING WALLS, COLUMN CONSTRUCTION (STUDS, GYPSUM, PLASTER, CMU, CONCRETE, WIRE, GLAZING) AND ASSOCIATED ITEMS TO BE REMOVED IN THEIR ENTIRETY.
2. DASHED LINES INDICATE EXISTING DOORS, FRAMES, AND HARDWARE AND ASSOCIATED ITEMS TO BE REMOVED
3. EXISTING ROTATING ENTRY DOOR SYSTEM TO BE REMOVED IN ITS ENTIRETY.
4. EXISTING MARBLE WALL AND SUPPORT CONSTRUCTION FROM PILASTER TO PILASTER AND FROM FLOOR TO MEZZANINE WALL/TRIM ABOVE TO BE REMOVED IN ITS ENTIRETY. **MARBLE PANELS TO BE SALVAGED FOR RE-USE**.
5. REMOVE COUNTERS, SINKS, ASSOCIATED PLUMBING COMPLETELY
6. REMOVE ALL TOILET ROOM PARTITIONS AND ACCESSORIES COMPLETELY.
7. REMOVE EXISTING TOILETS, URINALS, AND ASSOCIATE PLUMBING COMPLETELY.
8. EXISTING STAIR, SUPPORT, RAILINGS, ETC. TO BE REMOVED IN ITS ENTIRETY..
9. ELEVATOR TO BE REMOVED IN ITS ENTIERTY INCLUDING ASSOCIATED ANCHORAGE AND MEP ITEMS.
10. ELEVATOR CABS TO BE DEMOLISHED. COORDINATE SCOPE WITH ELEVATOR SPECIFICATIONS.
11. REMOVE EXISTING CEILINGS TO DECK ABOVE.
12. REMOVE ANY EXISTING FLOORING DOWN TO HARD SURFACE (MARBLE, TERAZZO, CONCRETE) BELOW.
13. EXISTING MARBLE FLOORING TO BE PROTECTED DURING DEMOLITION TO PREVENT DAMAGE.
14. EXISTING RADIATOR ENCLOSURES TO REMAIN AND BE PROTECTED.
15. DEMOLISH ALL PIPING AND MECHANICAL EQUIPMENT IN STAIRWELL.
16. DEMOLISH ALL ELECTRICAL CONDUITS AND CONDUCTORS IN STAIRWELL.

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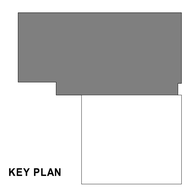

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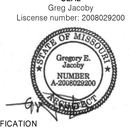

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First Floor Demolition Plan

AD1.01-G

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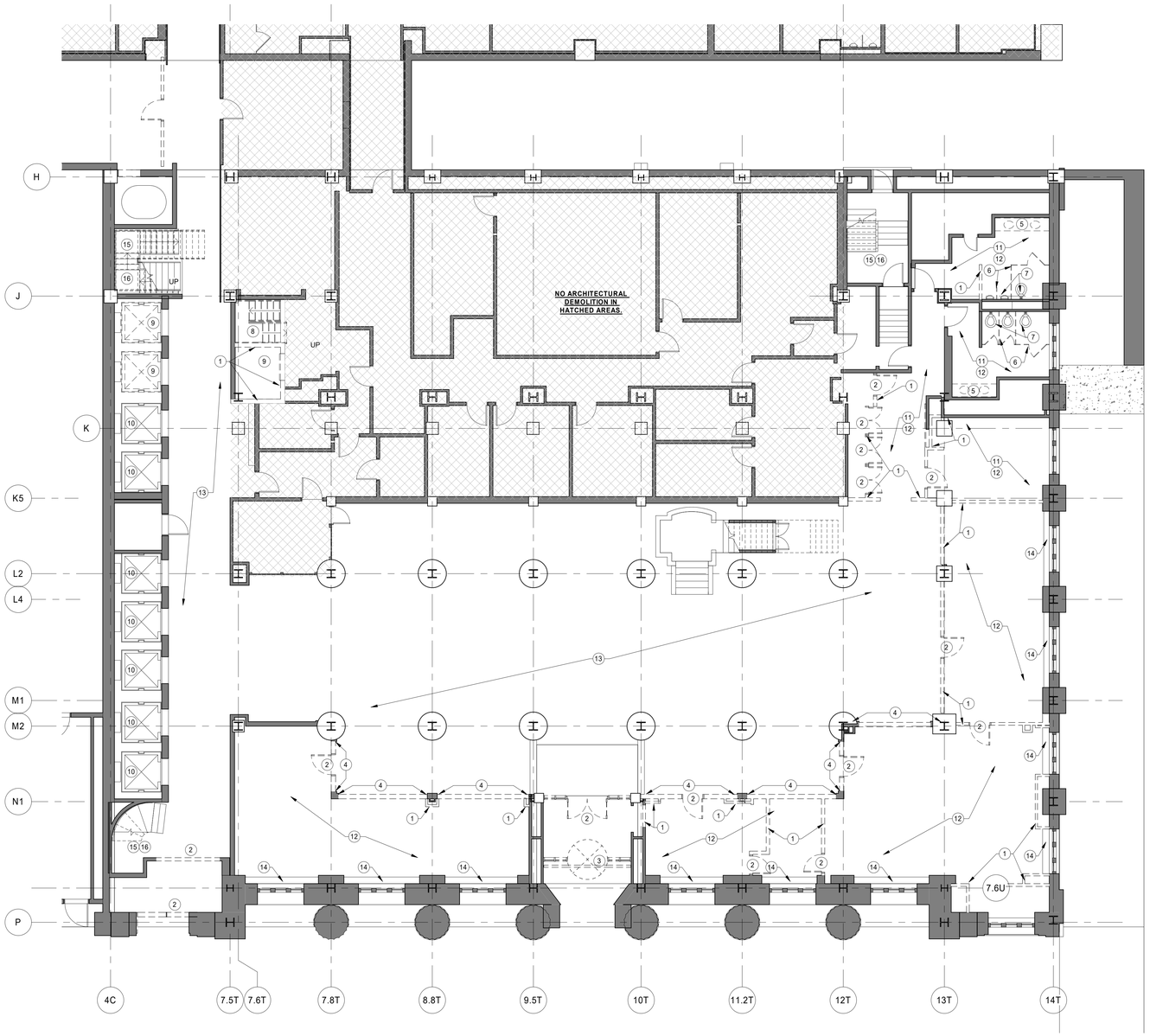

1 **PHASE 1 DEMOLITION**
FIRST FLOOR PLAN - TOWER
AD1.01-T 1/8" = 1'-0"

GENERAL DEMOLITION NOTES - MEP

1. WHERE MECHANICAL, ELECTRICAL OR PLUMBING SYSTEMS LOCATED ON THE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.INSTALL APPROPRIATE COVERPLATES AS REQUIRED.
2. OPENINGS IN THE EXISTING BUILDING WHICH REMAIN AFTER PIPING, DUCTWORK, AND OTHER PENETRATIONS HAVE BEEN REMOVED AND WHICH ARE NOT BEING REUSED AS A PART OF THE BUILDING RENOVATION ARE TO BE INFILLED FLUSH WITH THE SAME MATERIAL AS ADJACENT.
3. EQUIPMENT TO BE REMOVED INCLUDES ALL FLOOR ATTACHMENTS. GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING FINISH FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL WITH EXSITING FINISH FLOOR.
4. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION.
5. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION OR MADE SUITABLE FOR FINAL CONSTRUCTION AS PART OF THIS CONTRACT.
6. ALL EXTERIOR WALL PENETRATIONS MADE BY PIPE CONDUIT OR OTHERWISE SHALL BE REMOVED. THE EXTERIOR WALL PENETRATION SHALL BE REPAIRED TO MATCH THE EXISTING CONSTRUCTION.
7. EXTERIOR HOSE BIBS SHALL REMAIN IN PLACE.
8. EXTERIOR FIRE DEPARTMENT CONNECTIONS SHALL BE REMOVED COMPLETE.
9. THE CONTRACTOR SHALL VERIFY THAT THERE IS NO ACTIVE NATURAL GAS MAINS OR THAT PIPES MAY HAVE NOT BEEN PURGED PROPERLY. ALL NATURAL GAS PIPE SYSTEM REMOVAL SHALL BE MADE IN A SAFE MANNER TO ENSURE THE SAFTEY OF ALL WORKERS AND GENERAL PUBLIC AND TO THE SAFTEY OF THE BUILDING.
10. ALL MECHANICAL, ELECTRICAL AND PLUMBING FLOOR PENETRATIONS SHALL BE FILLED IN COMPLETE.
11. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY LIGHTING AND POWER IN ORDER TO CREATE A SAFE WORK PLACE. INSTALLATION OF TEMPROARY SERVICES SHALL BE COORDINATED WITH THE LOCAL UTILITY. PROVIDE METERING, PANELBOARDS, SERVICE AS PER UTILITY DIRECTION.
12. THE BUILDING SHALL BE LEFT AT THE END OF THE DEMOLITION PHASE WITH NO FIRE PROTECTION OR LIFE SAFTEY SYSTEMS. THE DURATION OF THIS CONDITION IS UNKNOWN.
13. THE CONTRACTORS SHALL FIELD VERIFY ALL LEVELS AND ALL AREA PRIOR TO BID AND DEMOLITION. ANY AREA NOT INDICATED ON THE PLANS SHALL HAVE ALL SYSTEMS AND EQUIPMENT REMOVED COMPLETE SAME AS OTHER AREAS.
14. ALL MECHANICAL AND PLUMBING ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS CONTROLS, ETC. CAP ALL OPEN-ENDED PIPES AND DUCTWORK.
15. ANY INTERRUPTION OF EXISTING ELECTRICAL SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE PRESSENT BUILDING OPERATION.
16. ALL BRANCH DUCTWORK AND HVAC PIPING ON TOWER FLOORS SHALL BE REMOVED COMPLETE.
17. ALL ELECTRICAL ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, CONDUIT, WIRE, ETC. UNLESS NOTED OTHERWISE ON PLANS. DEMOLISH BRANCH CIRCUITS AND FEEDERS BACK TO THEIR ASSOCIATED CIRCUIT BREAKERS UNLESS NOTED OTHERWISE. TURN OFF AND LABEL CIRCUIT BREAKERS AS SPARES FOR NEW WORK.
18. EXTEND CONDUIT AND WIRES AS REQUIRED IN AREAS THAT ELECTRICAL DEMOLITION AFFECTS ELECTRICAL SERVICE TO DEVICES DOWNSTREAM THAT ARE TO REMAIN.

GENERAL DEMOLITION NOTES

1. THE CONTRACTOR IS TO FOLLOW AND OBEY ALL FEDERAL, STATE, AND LOCAL CODES, LAWS, SAFETY REGULATIONS, AND HAZARDOUS WASTE LAWS, ETC. WITH NO EXCEPTIONS.
2. CONTRACTOR TO OBTAIN ALL NECESSARY PERMITS, RELEASES, AND AUTHORIZATIONS BEFORE PERFORMING DEMOLITION WORK.
3. THOROUGHLY REVIEW THE CONSTRUCTION DOCUMENT SET FOR ADDITIONAL DEMOLITION COORDINATION. FIELD VERIFY CONFLICTING ITEMS WITH THE ARCHITECT PRIOR TO COMMENCEMENT OF ANY DEMOLITION WORK.
4. ALL CONTRACTORS ARE TO CONDUCT NON-STRUCTURAL EXPLORATORY DEMOLITION TO DETERMINE STRUCTURAL EFFECT ON ALL PLANNED DEMOLITION AND CONFIRM WITH THE STRUCTURAL ENGINEER BEFORE ANY DEMOLITION OCCURS.
5. DEMOLITION IS TO BE CLEAN, COMPLETE, AND IN A MANNER SUITABLE TO ACCEPT NEW FINISHES AND SURFACES. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR DESCRIPTION OF NEW MATERIALS.
6. WHERE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.
7. IF ANY MATERIAL IS ENCOUNTERED THAT IS SUSPECTED TO CONTAIN ASBESTOS, DO NOT DISTURB AND IMMEDIATELY CONTAACT THE OWNER FOR REMEDIATION.
8. THESE DRAWINGS WERE DEVELOPED FROM A VISUAL SURVEY OF THE EXISTING CONDITIONS. THE AVAILABLE ORIGINAL ARCHITECTURAL AND STRUCTURAL DRAWINGS HAVE BEEN USED FOR LOCATION OF STRUCTURAL SUPPORTS. THE INFORMATION REFLECTED IN THOSE DRAWINGS DOES NOT GUARANTEE THAT ALL THE AS-BUILT CONDITIONS HAVE BEEN REPRESENTED. ALL EXISTING CONDITIONS WITHIN THE CONTRACT DOCUMENTS, ELEVATIONS, AND DIMENSIONS ARE TO BE VERIFIED IN FIELD BY THE CONTRACTOR OR SUBCONTRACTORS PRIOR TO CONSTRUCTION OR FABRICATION. NOTIFY THE ARCHITECT OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK.
9. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION AND CONSTRUCTION PROCESS INCLUDING BUT NOT LIMITED TO ALL WALLS (STRUCTURAL AND PARTITION), CEILINGS, FLOORS, DOORS, FINISHES, ETC.
10. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION OR MADE SUITABLE FOR FINAL CONSTRUCTION AS PART OF THIS CONTRACT.
11. WALLS TO BE REMOVED SHALL BE REMOVED IN FULL, UNLESS NOTED OTHERWISE. REMOVE TO SUBFLOOR MATERIAL. ALL FLOOR ATTACHMENTS, AND GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING SUB-FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL FLUSH WITH SUBFLOOR.
12. FOR DOORS TO BE REMOVED THE CONTRACTOR SHALL REMOVE DOOR, DOOR FRAME, DOOR HARDWARE, ASSOCIATED ANCHORING, AND ALL ASSOCIATED TRANSOMS AND/OR SIDELITES AND GLAZING COMPLETE UNLESS NOTED OTHERWISE.
13. FLOOR MATERIALS TO BE REMOVED TO SOUND SUB-BASE MATERIAL (MUD SLAB AND SLEEPERS) AND ARE TO BE FREE OF GLUES, FASTENERS AND FILLERS.
14. CAP ABANDONED CONDUITS AT POINT OF TERMINATION AND MAINTAIN ANY REQUIRED FIRE SEPARATION.
15. IN AREAS TO REMAIN, EXISTING LOOSE AND OR FLAKING PAINT THAT IS NOT ENCAPSULATED IN A NEW FINISH IS TO BE SCRAPED, ABRADED AND PREPARED FLAT & SMOOTH TO RECEIVE NEW FINISH.
16. ALL LOOSE AND CRUMBLING PLASTER TO BE REMOVED TO SOLID, UNDAMAGED MATERIAL OR SUBSTRATE
17. **ALL ITEMS HANGING FROM EXISTING STRUCTURE ARE TO BE CAREFULLY CUT DOWN TO PREVENT ANY DAMAGE TO STRUCTURE ABOVE. PULLING ITEMS FROM CEILING IS NOT PERMITTED.**
18. FOLLOW THE GUIDELINES OF THE NATIONAL PARK SERVICE (NPS), PART 2 - DESCRIPTIO0N OF REHABILITATION FOR THE CARE OF ALL HISTORICAL MATERIALS.
19. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK

- DEMOLITION PLAN NOTES - FIRST FLOOR

1. DASHED LINES INDICATE EXISTING WALLS, COLUMN CONSTRUCTION (STUDS, GYPSUM, PLASTER, CMU, CONCRETE, WIRE, GLAZING) AND ASSOCIATED ITEMS TO BE REMOVED IN THEIR ENTIRETY.
2. DASHED LINES INDICATE EXISTING DOORS, FRAMES, AND HARDWARE AND ASSOCIATED ITEMS TO BE REMOVED
3. EXISTING ROTATING ENTRY DOOR SYSTEM TO BE REMOVED IN ITS ENTIRETY.
4. EXISTING MARBLE WALL AND SUPPORT CONSTRUCTION FROM PILASTER TO PILASTER AND FROM FLOOR TO MEZZANINE WALL/TRIM ABOVE TO BE REMOVED IN ITS ENTIRETY. **MARBLE PANELS TO BE SALVAGED FOR RE-USE**.
5. REMOVE COUNTERS, SINKS, ASSOCIATED PLUMBING COMPLETELY
6. REMOVE ALL TOILET ROOM PARTITIONS AND ACCESSORIES COMPLETELY.
7. REMOVE EXISTING TOILETS, URINALS, AND ASSOCIATE PLUMBING COMPLETELY.
8. EXISTING STAIR, SUPPORT, RAILINGS, ETC. TO BE REMOVED IN ITS ENTIRETY..
9. ELEVATOR TO BE REMOVED IN ITS ENTIERTY INCLUDING ASSOCIATED ANCHORAGE AND MEP ITEMS.
10. ELEVATOR CABS TO BE DEMOLISHED. COORDINATE SCOPE WITH ELEVATOR SPECIFICATIONS.
11. REMOVE EXISTING CEILINGS TO DECK ABOVE.
12. REMOVE ANY EXISTING FLOORING DOWN TO HARD SURFACE (MARBLE, TERAZZO, CONCRETE) BELOW.
13. EXISTING MARBLE FLOORING TO BE PROTECTED DURING DEMOLITION TO PREVENT DAMAGE.
14. EXISTING RADIATOR ENCLOSURES TO REMAIN AND BE PROTECTED.
15. DEMOLISH ALL PIPING AND MECHANICAL EQUIPMENT IN STAIRWELL.
16. DEMOLISH ALL ELECTRICAL CONDUITS AND CONDUCTORS IN STAIRWELL.

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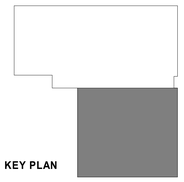

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

FIrst Floor Demolition Plan

AD1.01-T

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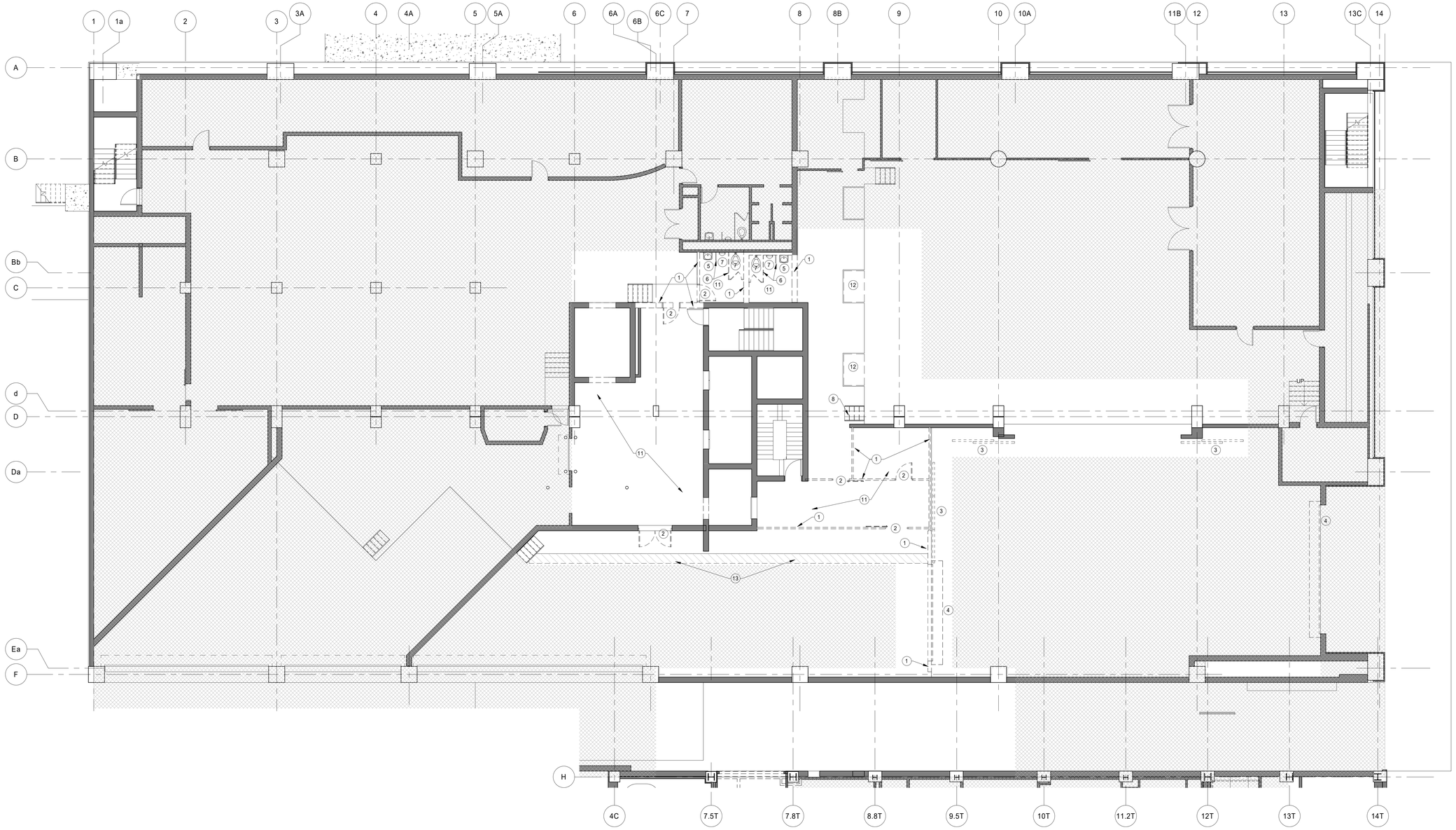

1 AD1.02-G

PHASE 1 DEMOLITION

SECOND FLOOR PLAN - GARAGE

1/8" = 1'-0"

SEE SHEET AD1.02-T FOR GENERAL DEMOLITION NOTES.

(#) - DEMOLITION PLAN NOTES - SECOND FLOOR

1. DASHED LINES INDICATE EXISTING WALLS, COLUMN CONSTRUCTION (STUDS, GYPSUM, PLASTER, CMU, CONCRETE, WIRE, GLAZING) AND ASSOCIATED ITEMS TO BE REMOVED IN THEIR ENTIRETY.
2. DASHED LINES INDICATE EXISTING DOORS, FRAMES, AND HARDWARE AND ASSOCIATED ITEMS TO BE REMOVED
3. EXISTING SECURITY PANEL DOOR SYSTEM TO BE REMOVED IN ITS ENTIRETY.
4. EXISTING WALL CONSTRUCTION TO BE REMOVED AS REQUIRED FOR NEW CONSTRUCTION. COORDIANTE EXTENT OF REMOVAL WITH FLOOR PLANS.
5. REMOVE EXISTING WALL/DISPLAY CASE CONSTRUCTION IN ITS ENTIRETY.
6. REMOVE & REPLACE 4" ROOF DRAIN (CORNER). (4) REMAING ROOF DRAINS TO BE VERIFIED FOR POSSIBLE REUSE. WALL DAMAGE TO BE REPAIRED DURING FUTURE TOWER CONSTRUCTION UNLESS REPAIRS NEEDED TO MAINTAIN WALL STABILITY. IF REQUIRED, REPAIRS TO MATCH ADJACENT CONSTRUCTION.
7. REMOVE EXISTING CEILINGS TO DECK ABOVE. SEE REFELECTED CEILING PLANS TO COORDINATE EXTENT OF REMOVAL.
8. EXISTING MARBLE FLOORING TO BE PROTECTED DURING DEMOLITION TO PREVENT DAMAGE.
9. ELEVATOR TO BE REMOVED IN ITS ENTIERTY INCLUDING ASSOCIATED ANCHORAGE AND MEP ITEMS.
10. ELEVATOR CABS TO BE DEMOLISHED. COORDINATE SCOPE WITH ELEVATOR SPECIFICATIONS.
11. REMOVE EXISTING CEILINGS TO DECK ABOVE.
12. DEMOLISH ALL PIPING AND MECHANICAL EQUIPMENT IN STAIRWELL.
13. DEMOLISH ALL ELECTRICAL CONDUITS AND CONDUCTORS IN STAIRWELL.
14. REMOVE ANY EXISTING FLOORING DOWN TO HARD SURFACE (MARBLE, TERAZZO, CONCRETE) BELOW.

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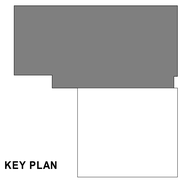

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

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FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Second Floor Demolition

AD1.02-G

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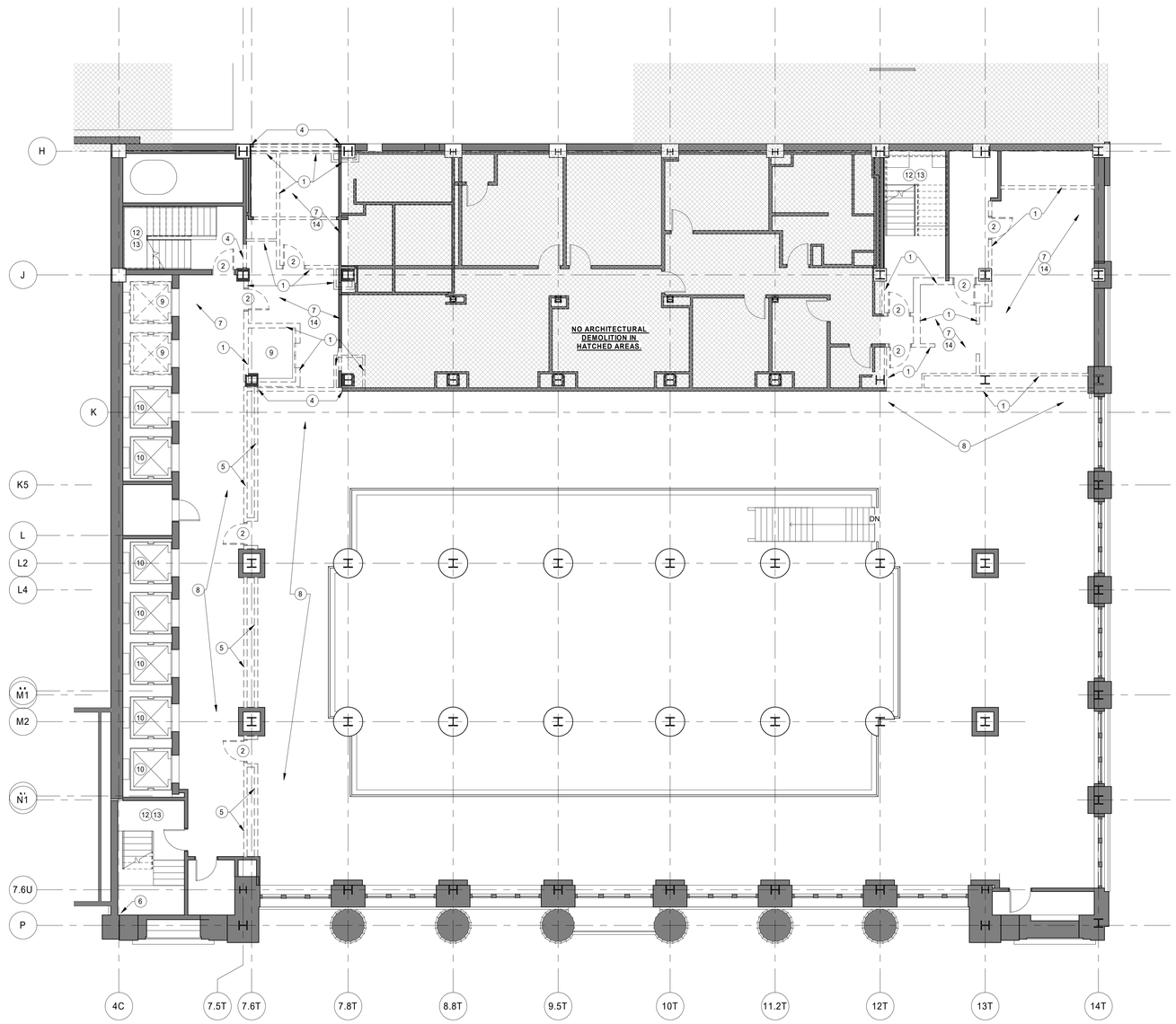

1 PHASE 1 DEMOLITION
SECOND FLOOR PLAN - TOWER
AD1.02-T 1/8" = 1'-0"

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1. WHERE MECHANICAL, ELECTRICAL OR PLUMBING SYSTEMS LOCATED ON THE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.INSTALL APPROPRIATE COVERPLATES AS REQUIRED.
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3. EQUIPMENT TO BE REMOVED INCLUDES ALL FLOOR ATTACHMENTS. GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING FINISH FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL WITH EXSITING FINISH FLOOR.
4. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION.
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2. DASHED LINES INDICATE EXISTING DOORS, FRAMES, AND HARDWARE AND ASSOCIATED ITEMS TO BE REMOVED
3. EXISTING SECURITY PANEL DOOR SYSTEM TO BE REMOVED IN ITS ENTIRETY.
4. EXISTING WALL CONSTRUCTION TO BE REMOVED AS REQUIRED FOR NEW CONSTRUCTION. COORDIANTE EXTENT OF REMOVAL WITH FLOOR PLANS.
5. REMOVE EXISTING WALL/DISPLAY CASE CONSTRUCTION IN ITS ENTIRETY.
6. REMOVE & REPLACE 4" ROOF DRAIN (CORNER). (4) REMAING ROOF DRAINS TO BE VERIFIED FOR POSSIBLE REUSE. WALL DAMAGE TO BE REPAIRED DURING FUTURE TOWER CONSTRUCTION UNLESS REPAIRS NEEDED TO MAINTAIN WALL STABILITY. IF REQUIRED, REPAIRS TO MATCH ADJACENT CONSTRUCTION.
7. REMOVE EXISTING CEILINGS TO DECK ABOVE. SEE REFELECTED CEILING PLANS TO COORDINATE EXTENT OF REMOVAL.
8. EXISTING MARBLE FLOORING TO BE PROTECTED DURING DEMOLITION TO PREVENT DAMAGE.
9. ELEVATOR TO BE REMOVED IN ITS ENTIERTY INCLUDING ASSOCIATED ANCHORAGE AND MEP ITEMS.
10. ELEVATOR CABS TO BE DEMOLISHED. COORDINATE SCOPE WITH ELEVATOR SPECIFICATIONS.
11. REMOVE EXISTING CEILINGS TO DECK ABOVE.
12. DEMOLISH ALL PIPING AND MECHANICAL EQUIPMENT IN STAIRWELL.
13. DEMOLISH ALL ELECTRICAL CONDUITS AND CONDUCTORS IN STAIRWELL.
14. REMOVE ANY EXISTING FLOORING DOWN TO HARD SURFACE (MARBLE, TERAZZO, CONCRETE) BELOW.

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Landscape Architecture
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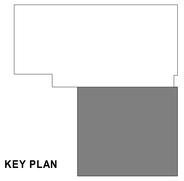

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Second Floor Demolition Plan
AD1.02-T

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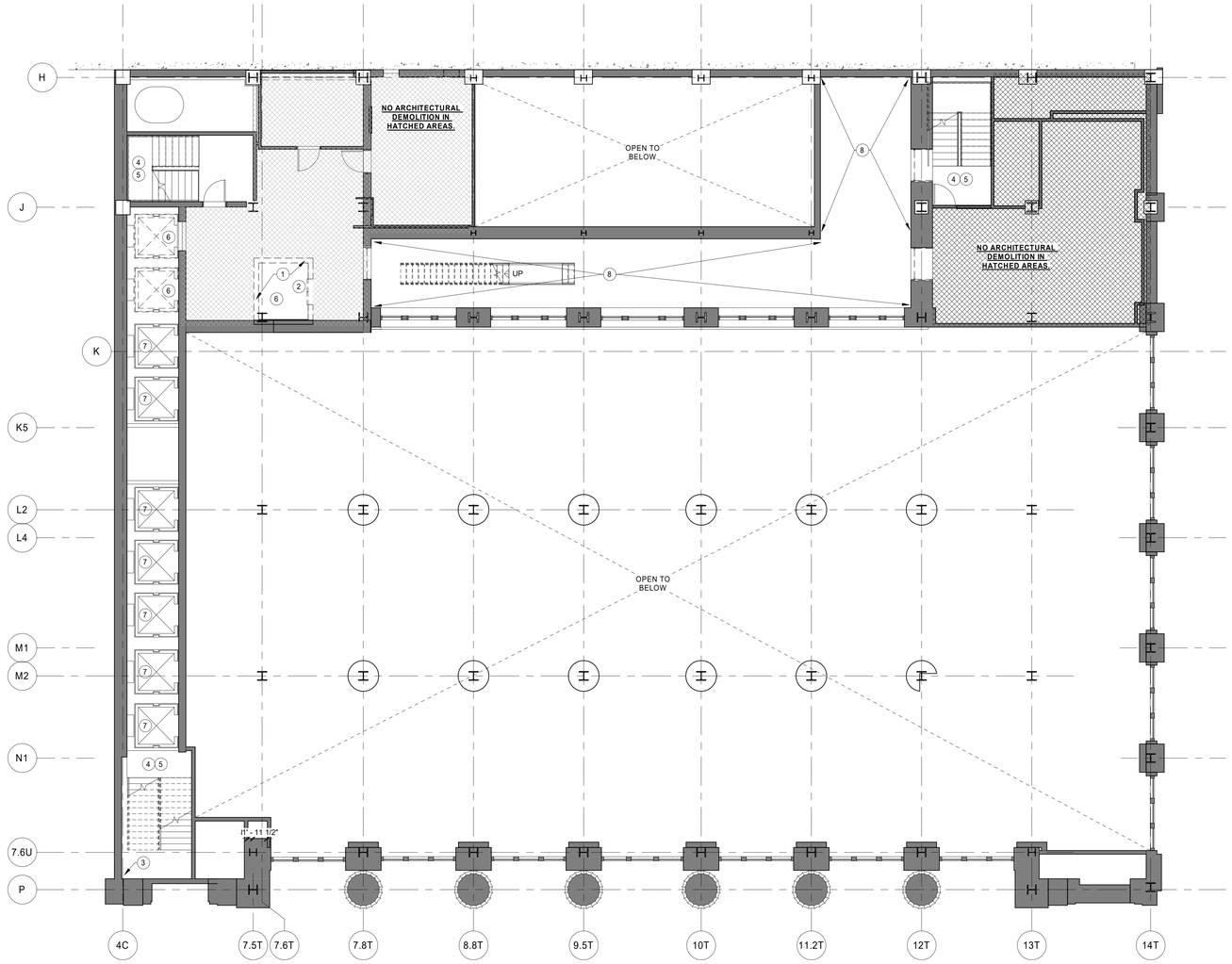

1 **PHASE 1 DEMOLITION**
FLOOR PLAN 3A - TOWER
AD1.03A-T 1/8" = 1'-0"

GENERAL DEMOLITION NOTES - MEP

1. WHERE MECHANICAL, ELECTRICAL OR PLUMBING SYSTEMS LOCATED ON THE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.INSTALL APPROPRIATE COVERPLATES AS REQUIRED.
2. OPENINGS IN THE EXISTING BUILDING WHICH REMAIN AFTER PIPING, DUCTWORK, AND OTHER PENETRATIONS HAVE BEEN REMOVED AND WHICH ARE NOT BEING REUSED AS A PART OF THE BUILDING RENOVATION ARE TO BE INFILLED FLUSH WITH THE SAME MATERIAL AS ADJACENT.
3. EQUIPMENT TO BE REMOVED INCLUDES ALL FLOOR ATTACHMENTS. GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING FINISH FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL WITH EXSIITING FINISH FLOOR.
4. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION.
5. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION OR MADE SUITABLE FOR FINAL CONSTRUCTION AS PART OF THIS CONTRACT.
6. ALL EXTERIOR WALL PENETRATIONS MADE BY PIPE CONDUIT OR OTHERWISE SHALL BE REMOVED. THE EXTERIOR WALL PENETRATION SHALL BE REPAIRED TO MATCH THE EXISTING CONSTRUCTION.
7. EXTERIOR HOSE BIBS SHALL REMAIN IN PLACE.
8. EXTERIOR FIRE DEPARTMENT CONNECTIONS SHALL BE REMOVED COMPLETE.
9. THE CONTRACTOR SHALL VERIFY THAT THERE IS NO ACTIVE NATURAL GAS MAINS OR THAT PIPES MAY HAVE NOT BEEN PURGED PROPERLY. ALL NATURAL GAS PIPE SYSTEM REMOVAL SHALL BE MADE IN A SAFE MANNER TO ENSURE THE SAFTEY OF ALL WORKERS AND GENERAL PUBLIC AND TO THE SAFTEY OF THE BUILDING.
10. ALL MECHANICAL, ELECTRICAL AND PLUMBING FLOOR PENETRATIONS SHALL BE FILLED IN COMPLETE.
11. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY LIGHTING AND POWER IN ORDER TO CREATE A SAFE WORK PLACE. INSTALLATION OF TEMPROARY SERVICES SHALL BE COORDINATED WITH THE LOCAL UTILITY. PROVIDE METERING, PANELBOARDS, SERVICE AS PER UTILITY DIRECTION.
12. THE BUILDING SHALL BE LEFT AT THE END OF THE DEMOLITION PHASE WITH NO FIRE PROTECTION OR LIFE SAFTEY SYSTEMS. THE DURATION OF THIS CONDITION IS UNKNOWN.
13. THE CONTRACTORS SHALL FIELD VERIFY ALL LEVELS AND ALL AREA PRIOR TO BID AND DEMOLITION. ANY AREA NOT INDICATED ON THE PLANS SHALL HAVE ALL SYSTEMS AND EQUIPMENT REMOVED COMPLETE SAME AS OTHER AREAS.
14. ALL MECHANICAL AND PLUMBING ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS CONTROLS, ETC. CAP ALL OPEN-ENDED PIPES AND DUCTWORK.
15. ANY INTERRUPTION OF EXISTING ELECTRICAL SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE PRESSENT BUILDING OPERATION.
16. ALL BRANCH DUCTWORK AND HVAC PIPING ON TOWER FLOORS SHALL BE REMOVED COMPLETE.
17. ALL ELECTRICAL ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, CONDUIT, WIRE, ETC. UNLESS NOTED OTHERWISE ON PLANS. DEMOLISH BRANCH CIRCUITS AND FEEDERS BACK TO THEIR ASSOCIATED CIRCUIT BREAKERS UNLESS NOTED OTHERWISE. TURN OFF AND LABEL CIRCUIT BREAKERS AS SPARES FOR NEW WORK.
18. EXTEND CONDUIT AND WIRES AS REQUIRED IN AREAS THAT ELECTRICAL DEMOLITION AFFECTS ELECTRICAL SERVICE TO DEVICES DOWNSTREAM THAT ARE TO REMAIN.

GENERAL DEMOLITION NOTES

1. THE CONTRACTOR IS TO FOLLOW AND OBEY ALL FEDERAL, STATE, AND LOCAL CODES, LAWS, SAFETY REGULATIONS, AND HAZARDOUS WASTE LAWS, ETC. WITH NO EXCEPTIONS.
2. CONTRACTOR TO OBTAIN ALL NECESSARY PERMITS, RELEASES, AND AUTHORIZATIONS BEFORE PERFORMING DEMOLITION WORK.
3. THOROUGHLY REVIEW THE CONSTRUCTION DOCUMENT SET FOR ADDITIONAL DEMOLITION COORDINATION. FIELD VERIFY CONFLICTING ITEMS WITH THE ARCHITECT PRIOR TO COMMENCEMENT OF ANY DEMOLITION WORK.
4. ALL CONTRACTORS ARE TO CONDUCT NON-STRUCTURAL EXPLORATORY DEMOLITION TO DETERMINE STRUCTURAL EFFECT ON ALL PLANNED DEMOLITION AND CONFIRM WITH THE STRUCTURAL ENGINEER BEFORE ANY DEMOLITION OCCURS.
5. DEMOLITION IS TO BE CLEAN, COMPLETE, AND IN A MANNER SUITABLE TO ACCEPT NEW FINISHES AND SURFACES. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR DESCRIPTION OF NEW MATERIALS.
6. WHERE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.
7. IF ANY MATERIAL IS ENCOUNTERED THAT IS SUSPECTED TO CONTAIN ASBESTOS, DO NOT DISTURB AND IMMEDIATELY CONTAACT THE OWNER FOR REMEDIATION.
8. THESE DRAWINGS WERE DEVELOPED FROM A VISUAL SURVEY OF THE EXISTING CONDITIONS. THE AVAILABLE ORIGINAL ARCHITECTURAL AND STRUCTURAL DRAWINGS HAVE BEEN USED FOR LOCATION OF STRUCTURAL SUPPORTS. THE INFORMATION REFLECTED IN THOSE DRAWINGS DOES NOT GUARANTEE THAT ALL THE AS-BUILT CONDITIONS HAVE BEEN REPRESENTED. ALL EXISTING CONDITIONS WITHIN THE CONTRACT DOCUMENTS, ELEVATIONS, AND DIMENSIONS ARE TO BE VERIFIED IN FIELD BY THE CONTRACTOR OR SUBCONTRACTORS PRIOR TO CONSTRUCTION OR FABRICATION. NOTIFY THE ARCHITECT OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK.
9. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION AND CONSTRUCTION PROCESS INCLUDING BUT NOT LIMITED TO ALL WALLS (STRUCTURAL AND PARTITION), CEILINGS, FLOORS, DOORS, FINISHES, ETC.
10. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION OR MADE SUITABLE FOR FINAL CONSTRUCTION AS PART OF THIS CONTRACT.
11. WALLS TO BE REMOVED SHALL BE REMOVED IN FULL, UNLESS NOTED OTHERWISE. REMOVE TO SUBFLOOR MATERIAL, ALL FLOOR ATTACHMENTS, AND GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING SUB-FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL FLUSH WITH SUBFLOOR.
12. FOR DOORS TO BE REMOVED THE CONTRACTOR SHALL REMOVE DOOR, DOOR FRAME, DOOR HARDWARE, ASSOCIATED ANCHORING, AND ALL ASSOCIATED TRANSOMS AND/OR SIDELITES AND GLAZING COMPLETE UNLESS NOTED OTHERWISE.
13. FLOOR MATERIALS TO BE REMOVED TO SOUND SUB-BASE MATERIAL (MUD SLAB AND SLEEPERS) AND ARE TO BE FREE OF GLUES, FASTENERS AND FILLERS.
14. CAP ABANDONED CONDUITS AT POINT OF TERMINATION AND MAINTAIN ANY REQUIRED FIRE SEPARATION.
15. IN AREAS TO REMAIN, EXISTING LOOSE AND OR FLAKING PAINT THAT IS NOT ENCAPSULATED IN A NEW FINISH IS TO BE SCRAPED, ABRADED AND PREPARED FLAT & SMOOTH TO RECEIVE NEW FINISH.
16. ALL LOOSE AND CRUMBLING PLASTER TO BE REMOVED TO SOLID, UNDAMAGED MATERIAL OR SUBSTRATE
17. **ALL ITEMS HANGING FROM EXISTING STRUCTURE ARE TO BE CAREFULLY CUT DOWN TO PREVENT ANY DAMAGE TO STRUCTURE ABOVE. PULLING ITEMS FROM CEILING IS NOT PERMITTED.**
18. FOLLOW THE GUIDELINES OF THE NATIONAL PARK SERVICE (NPS), PART 2 - DESCRIPTI0ON OF REHABILITATION FOR THE CARE OF ALL HISTORICAL MATERIALS.
19. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK

(#) - DEMOLITION PLAN NOTES - THIRD FLOOR

1. DASHED LINES INDICATE EXISTING WALLS, COLUMN CONSTRUCTION (STUDS, GYPSUM, PLASTER, CMU, CONCRETE, WIRE, GLAZING) AND ASSOCIATED ITEMS TO BE REMOVED IN THEIR ENTIRETY.
2. DASHED LINES INDICATE EXISTING DOORS, FRAMES, AND HARDWARE AND ASSOCIATED ITEMS TO BE REMOVED
3. REMOVE & REPLACE 4" ROOF DRAIN (CORNER). (4) REMAING ROOF DRAINS TO BE VERIFIED FOR POSSIBLE REUSE. WALL DAMAGE TO BE REPAIRED DURING FUTURE TOWER CONSTRUCTION UNLESS REPAIRS NEEDED TO MAINTAIN WALL STABILITY. IF REQUIRED, REPAIRS TO MATCH ADJACENT CONSTRUCTION.
4. DEMOLISH ALL PIPING AND MECHANICAL EQUIPMENT IN STAIRWELL.
5. DEMOLISH ALL ELECTRICAL CONDUITS AND CONDUCTORS IN STAIRWELL.
6. ELEVATOR TO BE REMOVED IN ITS ENTIRETY INCLUDING ASSOCIATED ANCHORAGE AND MEP ITEMS.
7. ELEVATOR CABS TO BE DEMOLISHED. COORDINATE SCOPE WITH ELEVATOR SPECIFICATIONS.
8. EXISTING ROOFING SYSTEM (MEMBRANE, INSULATION, FLASHING, DRAINS, TERMINATIONS, COPINGS, GUTTERS, DOWNSPOUTS, ETC.) TO BE REMOVED IN THEIR ENTIRETY TO DECK OR WALL.
9. EXISTING ROOFTOP MECHANICAL EQUIPMENT (PUMPS, CONDENSER, FANS). REMOVE EQUIPMENT, SUPPORTS, ETC. IN THEIR ENTIRETY. DEMOLISH ALL CONTROLS ASSOCIATED WITH EQUIPMENT. DEMOLISH ELECTRICAL BACK TO ASSOCIATED PANEL.

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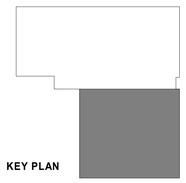

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

3A DEMOLITION FLOOR PLAN

AD1.03A-T

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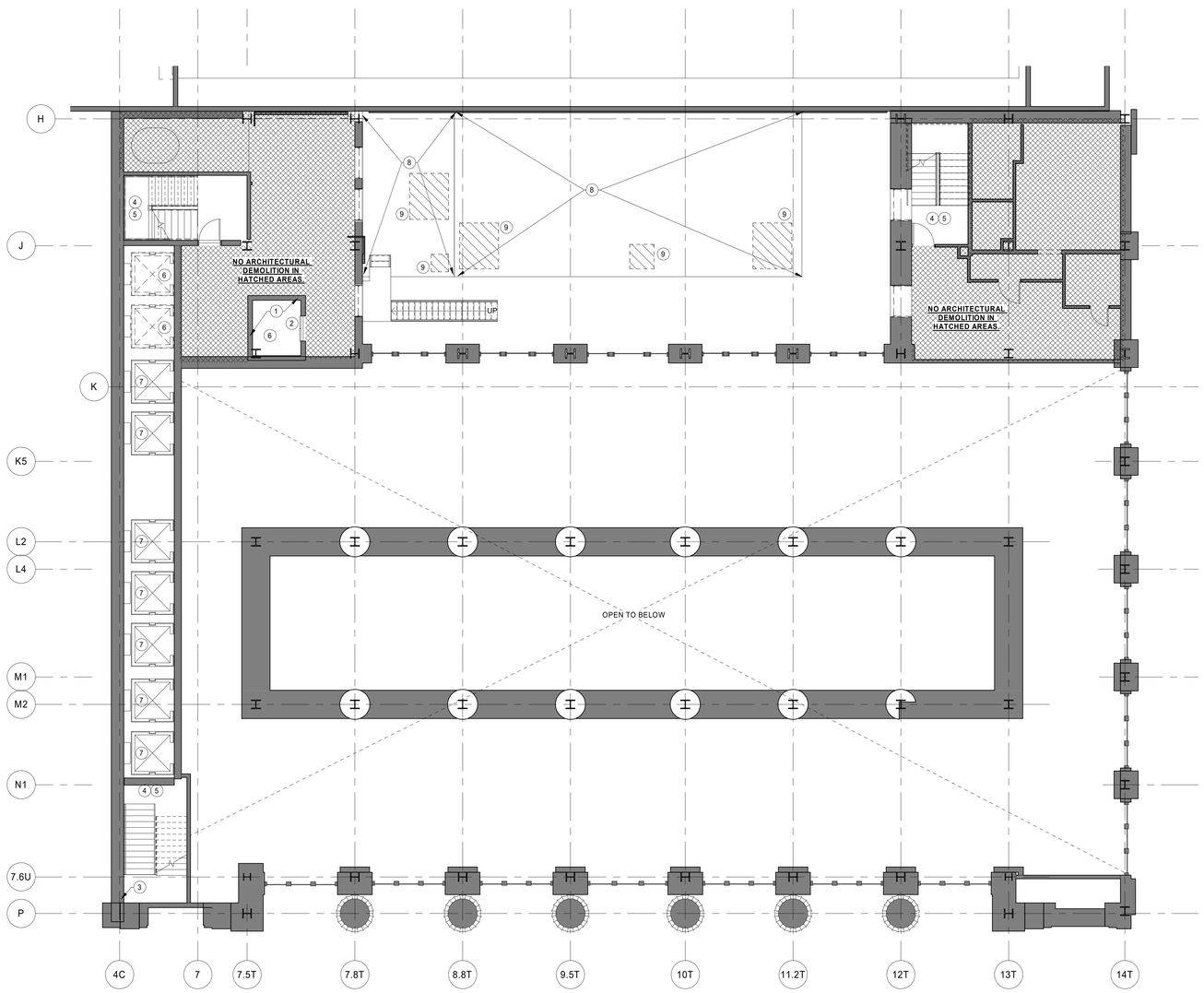

1 **PHASE 1 DEMOLITION**
FLOOR PLAN 3B - TOWER
AD1.03B-T 1/8" = 1'-0"

GENERAL DEMOLITION NOTES - MEP

1. WHERE MECHANICAL, ELECTRICAL OR PLUMBING SYSTEMS LOCATED ON THE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.INSTALL APPROPRIATE COVERPLATES AS REQUIRED.
2. OPENINGS IN THE EXISTING BUILDING WHICH REMAIN AFTER PIPING, DUCTWORK, AND OTHER PENETRATIONS HAVE BEEN REMOVED AND WHICH ARE NOT BEING REUSED AS A PART OF THE BUILDING RENOVATION ARE TO BE INFILLED FLUSH WITH THE SAME MATERIAL AS ADJACENT.
3. EQUIPMENT TO BE REMOVED INCLUDES ALL FLOOR ATTACHMENTS. GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING FINISH FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL WITH EXSIITING FINISH FLOOR.
4. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION.
5. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION OR MADE SUITABLE FOR FINAL CONSTRUCTION AS PART OF THIS CONTRACT.
6. ALL EXTERIOR WALL PENETRATIONS MADE BY PIPE CONDUIT OR OTHERWISE SHALL BE REMOVED. THE EXTERIOR WALL PENETRATION SHALL BE REPAIRED TO MATCH THE EXISTING CONSTRUCTION.
7. EXTERIOR HOSE BIBS SHALL REMAIN IN PLACE.
8. EXTERIOR FIRE DEPARTMENT CONNECTIONS SHALL BE REMOVED COMPLETE.
9. THE CONTRACTOR SHALL VERIFY THAT THERE IS NO ACTIVE NATURAL GAS MAINS OR THAT PIPES MAY HAVE NOT BEEN PURGED PROPERLY. ALL NATURAL GAS PIPE SYSTEM REMOVAL SHALL BE MADE IN A SAFE MANNER TO ENSURE THE SAFTEY OF ALL WORKERS AND GENERAL PUBLIC AND TO THE SAFTEY OF THE BUILDING.
10. ALL MECHANICAL, ELECTRICAL AND PLUMBING FLOOR PENETRATIONS SHALL BE FILLED IN COMPLETE.
11. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY LIGHTING AND POWER IN ORDER TO CREATE A SAFE WORK PLACE. INSTALLATION OF TEMPROARY SERVICES SHALL BE COORDINATED WITH THE LOCAL UTILITY. PROVIDE METERING, PANELBOARDS, SERVICE AS PER UTILITY DIRECTION.
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16. ALL BRANCH DUCTWORK AND HVAC PIPING ON TOWER FLOORS SHALL BE REMOVED COMPLETE.
17. ALL ELECTRICAL ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, CONDUIT, WIRE, ETC. UNLESS NOTED OTHERWISE ON PLANS. DEMOLISH BRANCH CIRCUITS AND FEEDERS BACK TO THEIR ASSOCIATED CIRCUIT BREAKERS UNLESS NOTED OTHERWISE. TURN OFF AND LABEL CIRCUIT BREAKERS AS SPARES FOR NEW WORK.
18. EXTEND CONDUIT AND WIRES AS REQUIRED IN AREAS THAT ELECTRICAL DEMOLITION AFFECTS ELECTRICAL SERVICE TO DEVICES DOWNSTREAM THAT ARE TO REMAIN.

GENERAL DEMOLITION NOTES

1. THE CONTRACTOR IS TO FOLLOW AND OBEY ALL FEDERAL, STATE, AND LOCAL CODES, LAWS, SAFETY REGULATIONS, AND HAZARDOUS WASTE LAWS, ETC. WITH NO EXCEPTIONS.
2. CONTRACTOR TO OBTAIN ALL NECESSARY PERMITS, RELEASES, AND AUTHORIZATIONS BEFORE PERFORMING DEMOLITION WORK.
3. THOROUGHLY REVIEW THE CONSTRUCTION DOCUMENT SET FOR ADDITIONAL DEMOLITION COORDINATION. FIELD VERIFY CONFLICTING ITEMS WITH THE ARCHITECT PRIOR TO COMMENCEMENT OF ANY DEMOLITION WORK.
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5. DEMOLITION IS TO BE CLEAN, COMPLETE, AND IN A MANNER SUITABLE TO ACCEPT NEW FINISHES AND SURFACES. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR DESCRIPTION OF NEW MATERIALS.
6. WHERE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.
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9. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION AND CONSTRUCTION PROCESS INCLUDING BUT NOT LIMITED TO ALL WALLS (STRUCTURAL AND PARTITION), CEILINGS, FLOORS, DOORS, FINISHES, ETC.
10. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION OR MADE SUITABLE FOR FINAL CONSTRUCTION AS PART OF THIS CONTRACT.
11. WALLS TO BE REMOVED SHALL BE REMOVED IN FULL, UNLESS NOTED OTHERWISE. REMOVE TO SUBFLOOR MATERIAL, ALL FLOOR ATTACHMENTS, AND GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING SUB-FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL FLUSH WITH SUBFLOOR.
12. FOR DOORS TO BE REMOVED THE CONTRACTOR SHALL REMOVE DOOR, DOOR FRAME, DOOR HARDWARE, ASSOCIATED ANCHORING, AND ALL ASSOCIATED TRANSOMS AND/OR SIDELITES AND GLAZING COMPLETE UNLESS NOTED OTHERWISE.
13. FLOOR MATERIALS TO BE REMOVED TO SOUND SUB-BASE MATERIAL (MUD SLAB AND SLEEPERS) AND ARE TO BE FREE OF GLUES, FASTENERS AND FILLERS.
14. CAP ABANDONED CONDUITS AT POINT OF TERMINATION AND MAINTAIN ANY REQUIRED FIRE SEPARATION.
15. IN AREAS TO REMAIN, EXISTING LOOSE AND OR FLAKING PAINT THAT IS NOT ENCAPSULATED IN A NEW FINISH IS TO BE SCRAPED, ABRADED AND PREPARED FLAT & SMOOTH TO RECEIVE NEW FINISH.
16. ALL LOOSE AND CRUMBLING PLASTER TO BE REMOVED TO SOLID, UNDAMAGED MATERIAL OR SUBSTRATE
17. **ALL ITEMS HANGING FROM EXISTING STRUCTURE ARE TO BE CAREFULLY CUT DOWN TO PREVENT ANY DAMAGE TO STRUCTURE ABOVE. PULLING ITEMS FROM CEILING IS NOT PERMITTED.**
18. FOLLOW THE GUIDELINES OF THE NATIONAL PARK SERVICE (NPS), PART 2 - DESCRIPTIOON OF REHABILITATION FOR THE CARE OF ALL HISTORICAL MATERIALS.
19. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK

- DEMOLITION PLAN NOTES - THIRD FLOOR

1. DASHED LINES INDICATE EXISTING WALLS, COLUMN CONSTRUCTION (STUDS, GYPSUM, PLASTER, CMU, CONCRETE, WIRE, GLAZING) AND ASSOCIATED ITEMS TO BE REMOVED IN THEIR ENTIRETY.
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4. DEMOLISH ALL PIPING AND MECHANICAL EQUIPMENT IN STAIRWELL.
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9. EXISTING ROOFTOP MECHANICAL EQUIPMENT (PUMPS, CONDENSER, FANS). REMOVE EQUIPMENT, SUPPORTS, ETC. IN THEIR ENTIRETY. DEMOLISH ALL CONTROLS ASSOCIATED WITH EQUIPMENT. DEMOLISH ELECTRICAL BACK TO ASSOCIATED PANEL.

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Landscape Architecture
Planning
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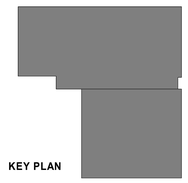

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

3B DEMOLITION FLOOR PLAN

AD1.03B-T

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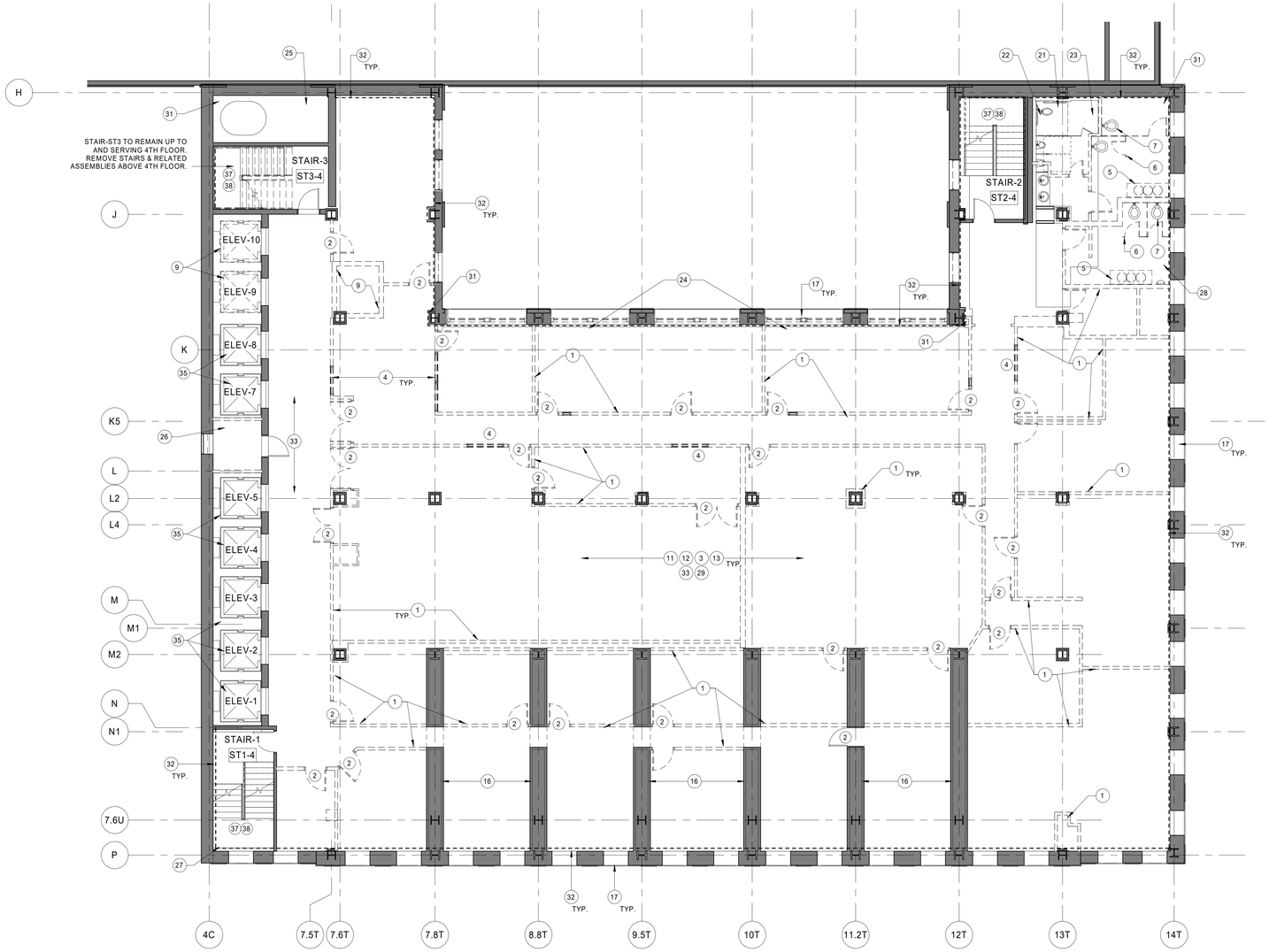

NORTH

1 — Demolition Floor Plan
Fourth Floor - Phase 1
AD1.04-T 1/8" = 1'-0"

- DEMOLITION PLAN NOTES

1. DASHED LINES INDICATE EXISTING WALLS, COLUMN WRAPS AND ASSOCIATED ITEMS TO BE REMOVED IN THEIR ENTIRETY.
2. DASHED LINES INDICATE EXISTING DOORS, FRAMES, AND HARDWARE AND ASSOCIATED ITEMS TO BE REMOVED
3. REMOVE EXISTING CASEWORK AND ASSOCIATED ITEMS COMPLETELY
4. REMOVE INTERIOR GLAZING, FRAMES AND ASSOCIATED ITEMS INDICATED BY DASHED LINES.
5. REMOVE COUNTERS, SINKS, ASSOCIATED PLUMBING COMPLETELY
6. REMOVE ALL TOILET ROOM PARTITIONS AND ACCESSORIES COMPLETELY.
7. REMOVE EXISTING TOILETS, URINALS, AND ASSOCIATE PLUMBING COMPLETELY.
8. REMOVE MOP AND/OR UTILITY SINKS AND ASSOCIATED PLUMBING COMPLETELY.
9. ELEVATOR TO BE REMOVED IN ITS ENTIERTY INCLUDING ASSOCIATED ANCHORAGE AND MEP ITEMS
10. EXISTING VAULT WALLS AND DOOR TO REMAIN..
11. REMOVE EXISTING CEILINGS TO DECK ABOVE.
12. REMOVE FLOORING & SUBFLOORING COMPLETELY TO MUD SLAB AND SLEEPERS.
13. ALL FREE STANDING EQUIPMENT, SYSTEMS FURNITURE AND ASSOCIATED MEP ITEMS.
14. REMOVE WATER FOUNTAIN/BUBBLERS AND ASSOCIATED ITEMS COMPLETELY.
15. EXISTING KITCHEN EQUIPMENT, ASSOCIATED ITEMS AND MEP TO BE REMOVED COMPLETELY.
16. STRUCTURAL BRACING AND PLASTER ENCLOSURE TO REMAIN.
17. REFER TO BDMD'S REPLACEMENT PACKAGE FOR EXTENT OF WINDOW WORK, TYPICAL AT EXTERIOR ELEVATIONS.
18. REMOVE WATER TANKS, ANCHORAGE AND ASSOCIATED MEP ITEMS COMPLETELY.
19. REMOVE LADDER, PLATFORM AND ASSOCIATED ANCHORAGE.
20. REMOVE WATER PRESSURE TANKS, ALL ASSOCIATED MEP ITEMS AND ALL ANCHORAGE
21. EXISTING DUCT BUS TO REMAIN
22. EXHAUST DUCT SIZE TO BE CONFIRMED FOR REUSE.
23. REMOVE EXISTING WASTE & VENT RISERS FLOORS 5-19. VERIFY REUSE FOR REMAINING LEVELS.
24. REMOVE EXISTING BASEBOARD HEATERS & ASSOCIATED STEAM & CONDENSATE RISERS ALONG PERIMETER WALLS, TYP.
25. ALL HVAC PIPING & BUS DUCT TO REMAIN, ALL FLOORS. CUT & CAP BRANCH PIPING AT RISERS & REMOVE ALL PIPING ON FLOOR.
26. EXISTING CHILLED WATER RISERS TO REMAIN. ALL AHU'S & ASSOCIATED DUCTWORK, PIPING & CONTROLS TO BE REMOVED.
27. REMOVE & REPLACE 4" ROOF DRAIN (CORNER). (4) REMAING ROOF DRAINS TO BE VERIFIED FOR POSSIBLE REUSE. WALL DAMAGE TO BE REPAIRED DURING FUTURE TOWER CONSTRUCTION UNLESS REPAIRS NEEDED TO MAINTAIN WALL STABILITY. IF REQUIRED, REPAIRS TO MATCH ADJACENT CONSTRUCTION.
28. REMOVE ALL AHU'S & ASSOCIATED DUCTWORK, PIPING & CONTROLS COMPLETELY.
29. REMOVE ALL MEP SYSTEMS IN THEIR ENTIRETY BACK TO PRIMARY RISER, INCLUDING DUCTWORK, VAV BOXES, PIPING, LIGHTS, DEVICES & ASSOCIATED WIRING & CONTROLS.
30. POSSIBLE EXCEPTION TO NOTE 29, 6TH FLOOR. CONTRACTOR TO PROVIDE PRICING TO SALVAGE VAV BOXES FOR REUSE ON LOWER FLOORS.
31. EXISTING 4" ROOF DRAIN TO REMAIN
32. EXISTING INTERIOR, PERIMETER, CONTEMPORARY WALL CONSTRUCTION (DRYWALL/STUDS) TO BE REMOVED TO EXTERIOR, PLASTER FINSH WALL CONSTRUCTION.
33. FOLLOW THE GUIDELINES OF THE NATIONAL PARK SERVICE, PART 2 - DESCRIPTION OF REHABILITAION, FOR THE CARE OF ALL HISTORICAL TILE & OTHER EXISTING FLOORING MATERIALS.
34. FOLLOW THE GUIDELINES OF THE NATIONAL PARK SERVICE, PART 2 - DESCRIPTION OF REHABILITAION, FOR THE CARE OF MARBLE TOILET PARTITIONS & FLOORING MATERIALS. SALVAGE AREAS FOR POSSIBLE REUSE.
35. ELEVATOR CABS TO BE DEMOLISHED. COORDINATE SCOPE WITH ELEVATOR SPECIFICATIONS.
36. REMOVE CART FLOOR BUMPERS IN THEIR ENTIRETY.
37. DEMOLISH ALL PIPING AND MECHANICAL EQUIPMENT IN STAIRWELL.
38. DEMOLISH ALL ELECTRICAL CONDUITS AND CONDUCTORS IN STAIRWELL.

GENERAL DEMOLITION NOTES - MEP

1. WHERE MECHANICAL, ELECTRICAL OR PLUMBING SYSTEMS LOCATED ON THE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.INSTALL APPROPRIATE COVERPLATES AS REQUIRED.
2. OPENINGS IN THE EXISTING BUILDING WHICH REMAIN AFTER PIPING, DUCTWORK, AND OTHER PENETRATIONS HAVE BEEN REMOVED AND WHICH ARE NOT BEING REUSED AS A PART OF THE BUILDING RENOVATION ARE TO BE INFILLED FLUSH WITH THE SAME MATERIAL AS ADJACENT.
3. EQUIPMENT TO BE REMOVED INCLUDES ALL FLOOR ATTACHMENTS. GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING FINISH FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL WITH EXSITING FINISH FLOOR.
4. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION.
5. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION OR MADE SUITABLE FOR FINAL CONSTRUCTION AS PART OF THIS CONTRACT.
6. ALL EXTERIOR WALL PENETRATIONS MADE BY PIPE CONDUIT OR OTHERWISE SHALL BE REMOVED. THE EXTERIOR WALL PENETRATION SHALL BE REPAIRED TO MATCH THE EXISTING CONSTRUCTION.
7. EXTERIOR HOSE BIBS SHALL REMAIN IN PLACE.
8. EXTERIOR FIRE DEPARTMENT CONNECTIONS SHALL BE REMOVED COMPLETE.
9. THE CONTRACTOR SHALL VERIFY THAT THERE IS NO ACTIVE NATURAL GAS MAINS OR THAT PIPES MAY HAVE NOT BEEN PURGED PROPERLY. ALL NATURAL GAS PIPE SYSTEM REMOVAL SHALL BE MADE IN A SAFE MANNER TO ENSURE THE SAFTEY OF ALL WORKERS AND GENERAL PUBLIC AND TO THE SAFTEY OF THE BUILDING.
10. ALL MECHANICAL, ELECTRICAL AND PLUMBING FLOOR PENETRATIONS SHALL BE FILLED IN COMPLETE.
11. THE CONTRACTOR SHALL PROVIDE ALL TEMPORARY LIGHTING AND POWER IN ORDER TO CREATE A SAFE WORK PLACE. INSTALLATION OF TEMPROARY SERVICES SHALL BE COORDINATED WITH THE LOCAL UTILITY. PROVIDE METERING, PANELBOARDS, SERVICE AS PER UTILITY DIRECTION.
12. THE BUILDING SHALL BE LEFT AT THE END OF THE DEMOLITION PHASE WITH NO FIRE PROTECTION OR LIFE SAFTEY SYSTEMS. THE DURATION OF THIS CONDITION IS UNKNOWN.
13. THE CONTRACTORS SHALL FIELD VERIFY ALL LEVELS AND ALL AREA PRIOR TO BID AND DEMOLITION. ANY AREA NOT INDICATED ON THE PLANS SHALL HAVE ALL SYSTEMS AND EQUIPMENT REMOVED COMPLETE SAME AS OTHER AREAS.
14. ALL MECHANICAL AND PLUMBING ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, SUPPORTS CONTROLS, ETC. CAP ALL OPEN-ENDED PIPES AND DUCTWORK.
15. ANY INTERRUPTION OF EXISTING ELECTRICAL SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE SO AS NOT TO INTERFERE WITH THE PRESSENT BUILDING OPERATION.
16. ALL BRANCH DUCTWORK AND HVAC PIPING ON TOWER FLOORS SHALL BE REMOVED COMPLETE.
17. ALL ELECTRICAL ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE WITH ALL RELATED ITEMS INCLUDING HANGERS, CONDUIT, WIRE, ETC. UNLESS NOTED OTHERWISE ON PLANS. DEMOLISH BRANCH CIRCUITS AND FEEDERS BACK TO THEIR ASSOCIATED CIRCUIT BREAKERS UNLESS NOTED OTHERWISE. TURN OFF AND LABEL CIRCUIT BREAKERS AS SPARES FOR NEW WORK.
18. EXTEND CONDUIT AND WIRES AS REQUIRED IN AREAS THAT ELECTRICAL DEMOLITION AFFECTS ELECTRICAL SERVICE TO DEVICES DOWNSTREAM THAT ARE TO REMAIN.

GENERAL DEMOLITION NOTES

1. THE CONTRACTOR IS TO FOLLOW AND OBEY ALL FEDERAL, STATE, AND LOCAL CODES, LAWS, SAFETY REGULATIONS, AND HAZARDOUS WASTE LAWS, ETC. WITH NO EXCEPTIONS.
2. CONTRACTOR TO OBTAIN ALL NECESSARY PERMITS, RELEASES, AND AUTHORIZATIONS BEFORE PERFORMING DEMOLITION WORK.
3. THOROUGHLY REVIEW THE CONSTRUCTION DOCUMENT SET FOR ADDITIONAL DEMOLITION COORDINATION. FIELD VERIFY CONFLICTING ITEMS WITH THE ARCHITECT PRIOR TO COMMENCEMENT OF ANY DEMOLITION WORK.
4. ALL CONTRACTORS ARE TO CONDUCT NON-STRUCTURAL EXPLORATORY DEMOLITION TO DETERMINE STRUCTURAL EFFECT ON ALL PLANNED DEMOLITION AND CONFIRM WITH THE STRUCTURAL ENGINEER BEFORE ANY DEMOLITION OCCURS.
5. DEMOLITION IS TO BE CLEAN, COMPLETE, AND IN A MANNER SUITABLE TO ACCEPT NEW FINISHES AND SURFACES. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR DESCRIPTION OF NEW MATERIALS.
6. WHERE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING AND AFTER DEMOLITION.
7. IF ANY MATERIAL IS ENCOUNTERED THAT IS SUSPECTED TO CONTAIN ASBESTOS, DO NOT DISTURB AND IMMEDIATELY CONTAACT THE OWNER FOR REMEDIATION.
8. THESE DRAWINGS WERE DEVELOPED FROM A VISUAL SURVEY OF THE EXISTING CONDITIONS. THE AVAILABLE ORIGINAL ARCHITECTURAL AND STRUCTURAL DRAWINGS HAVE BEEN USED FOR LOCATION OF STRUCTURAL SUPPORTS. THE INFORMATION REFLECTED IN THOSE DRAWINGS DOES NOT GUARANTEE THAT ALL THE AS-BUILT CONDITIONS HAVE BEEN REPRESENTED. ALL EXISTING CONDITIONS WITHIN THE CONTRACT DOCUMENTS, ELEVATIONS, AND DIMENSIONS ARE TO BE VERIFIED IN FIELD BY THE CONTRACTOR OR SUBCONTRACTORS PRIOR TO CONSTRUCTION OR FABRICATION. NOTIFY THE ARCHITECT OF ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK.
9. EXISTING CONSTRUCTION TO REMAIN IS TO BE PROTECTED DURING THE DEMOLITION AND CONSTRUCTION PROCESS INCLUDING BUT NOT LIMITED TO ALL WALLS (STRUCTURAL AND PARTITION), CEILINGS, FLOORS, DOORS, FINISHES, ETC.
10. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION OR MADE SUITABLE FOR FINAL CONSTRUCTION AS PART OF THIS CONTRACT.
11. WALLS TO BE REMOVED SHALL BE REMOVED IN FULL, UNLESS NOTED OTHERWISE. REMOVE TO SUBFLOOR MATERIAL, ALL FLOOR ATTACHMENTS, AND GRIND SMOOTH REMAINING ITEMS FLUSH WITH EXISTING SUB-FLOOR. PATCH AND FILL ANY VOIDS LEFT BY REMOVAL OF EXISTING WALL FLUSH WITH SUBFLOOR.
12. FOR DOORS TO BE REMOVED THE CONTRACTOR SHALL REMOVE DOOR, DOOR FRAME, DOOR HARDWARE, ASSOCIATED ANCHORING, AND ALL ASSOCIATED TRANSOMS AND/OR SIDELITES AND GLAZING COMPLETE UNLESS NOTED OTHERWISE.
13. FLOOR MATERIALS TO BE REMOVED TO SOUND SUB-BASE MATERIAL (MUD SLAB AND SLEEPERS) AND ARE TO BE FREE OF GLUES, FASTENERS AND FILLERS.
14. CAP ABANDONED CONDUITS AT POINT OF TERMINATION AND MAINTAIN ANY REQUIRED FIRE SEPARATION.
15. IN AREAS TO REMAIN, EXISTING LOOSE AND OR FLAKING PAINT THAT IS NOT ENCAPSULATED IN A NEW FINISH IS TO BE SCRAPED, ABRADED AND PREPARED FLAT & SMOOTH TO RECEIVE NEW FINISH.
16. ALL LOOSE AND CRUMBLING PLASTER TO BE REMOVED TO SOLID, UNDAMAGED MATERIAL OR SUBSTRATE
17. **ALL ITEMS HANGING FROM EXISTING STRUCTURE ARE TO BE CAREFULLY CUT DOWN TO PREVENT ANY DAMAGE TO STRUCTURE ABOVE. PULLING ITEMS FROM CEILING IS NOT PERMITTED.**
18. FOLLOW THE GUIDELINES OF THE NATIONAL PARK SERVICE (NPS), PART 2 - DESCRIPTIO0N OF REHABILITATION FOR THE CARE OF ALL HISTORICAL MATERIALS.
19. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK

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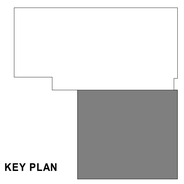

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: SH, JF
Checked By: SH
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Fourth Floor
Demolition Plan

AD1.04-T

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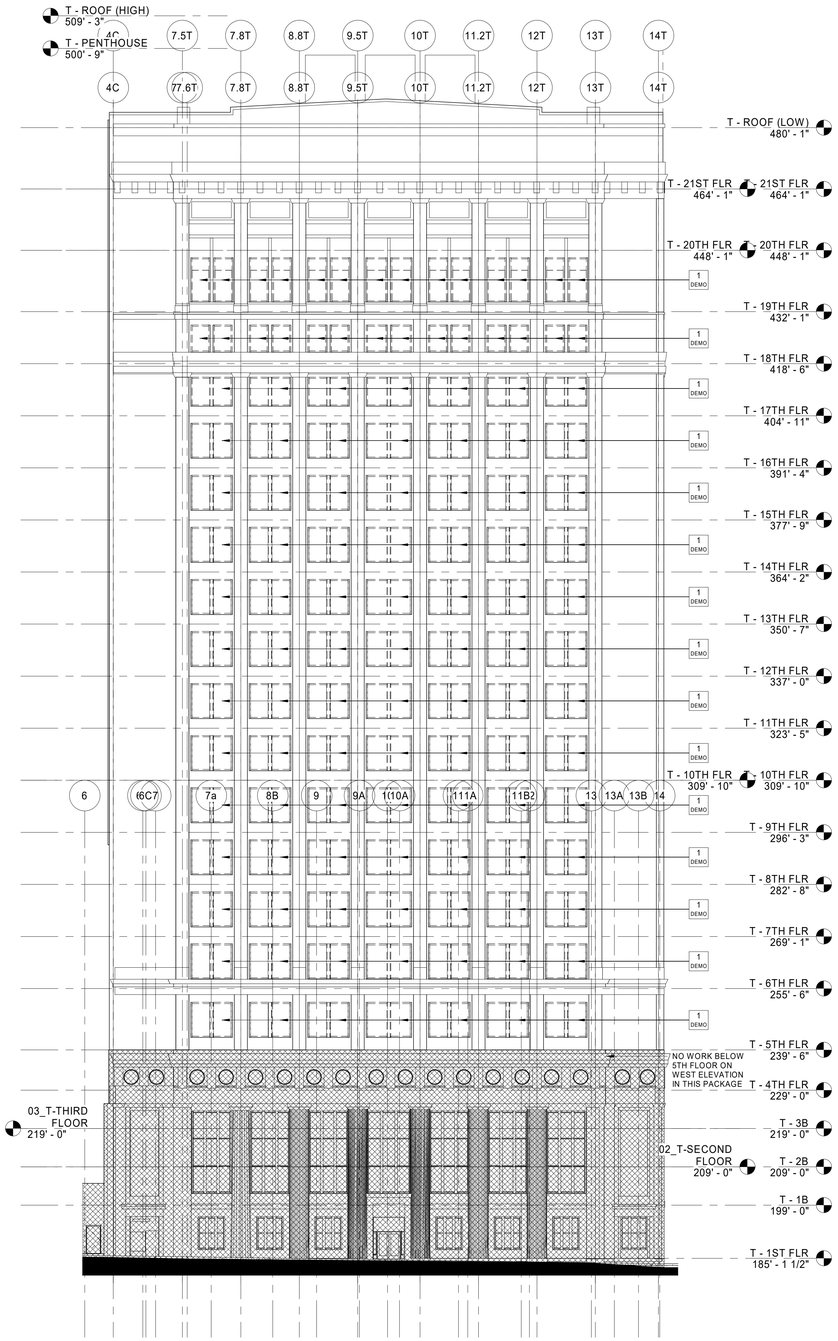
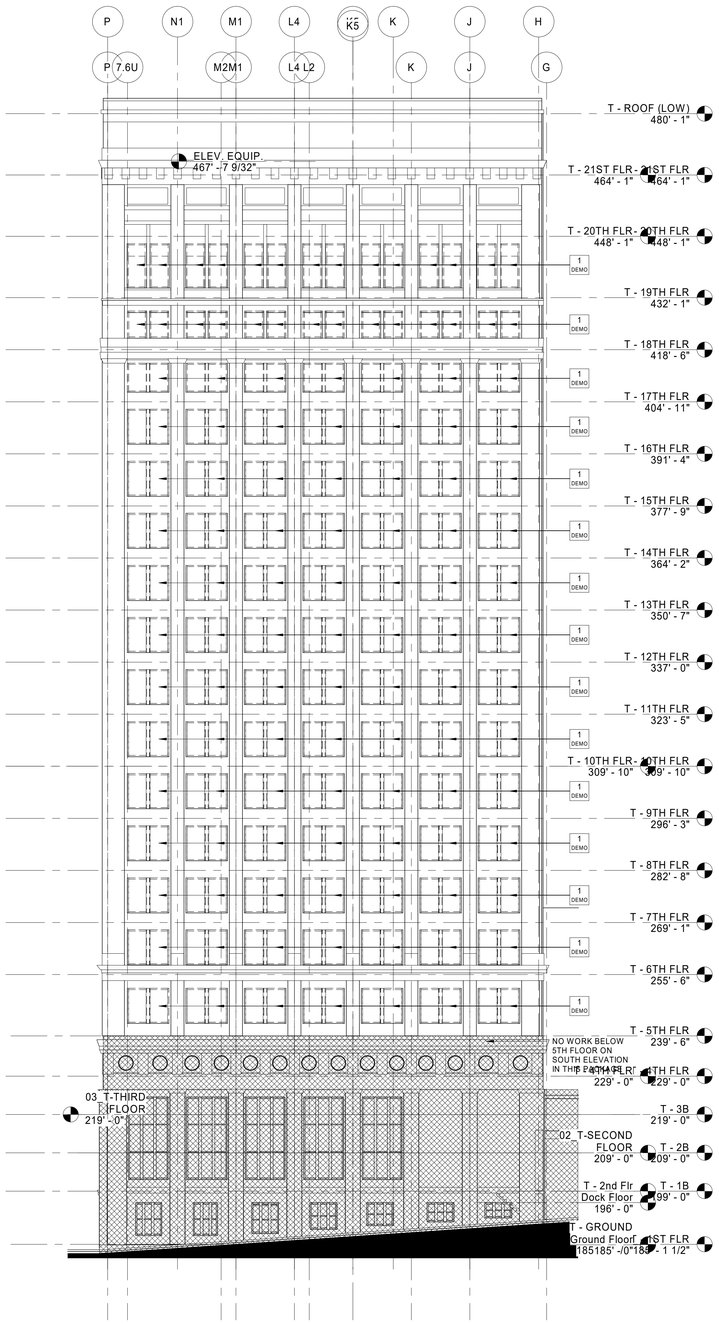


1 West Elevation - Windows - Demo

AD2.10 1/16" = 1'-0"



2 South Elevation - Windows - Demo

AD2.10 1/16" = 1'-0"

GENERAL DEMOLITION NOTES

1. THOROUGHLY REVIEW THE CONSTRUCTION DOCUMENT SET FOR ADDITIONAL DEMOLITION COORDINATION. VERIFY CONFLICTING ITEMS WITH THE ARCHITCT PRIOR TO COMMENCEMENT OF ANY DEMOLITION WORK.
2. DEMOLITION IS TO BE CLEAN, COMPLETE, AND IN A MANNER SUITABLE TO ACCEPT NEW FINISHES AND SURFACES. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR DESCRIPTION OF NEW MATERIALS.
3. WHERE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING DEMOLITION.
4. IF ANY MATERIAL IS ENCOUNTERED THAT IS SUSPECTED TO CONTAIN ASBESTOS DO NOT DISTUB AND IMMEDIATELY CONTACT THE OWNER FOR REMEDIATION.
5. THE CONTRACTOR IS TO FOLLOW AND OBEY ALL FEDERAL, STATE, AND LOCAL CODES, LAWS, SAFETY REGULATIONS, AND HAZARDOUS WASTE LAWS ETC.. CONTRACTOR IS TO OBTAIN ALL NECESSARY PERMITS, RELEASES, AND AUTHORIZATIONS BEFORE PERFORMING DEMOLITION WORK.
6. ALL CONTRACTORS ARE TO CONDUCT NON-STRUCTURAL EXPLORATORY DEMOLITION TO DETERMINE STRUCTURAL EFFECT ON ALL PLANNED DEMOLITION AND CONFIRM WITH THE STRUCTURAL ENGINEER BEFORE ANY DEMOLITION OCCURS.
7. FURNISH AND INSTALL TEMPORARY BARRICADES AND HANDRAILS AT ALL OPENINGS DURING DEMOLITION AND CONSTRUCTION.
8. THESE DRAWINGS WERE DEVELOPED FROM A VISUAL SURVEY OF THE EXISTING CONDITIONS. THE AVAILABLE ORIGINAL ARCHITECTURAL AND STRUCTURAL DRAWINGS HAVE BEEN USED FOR LOCATION OF STRUCTURAL SUPPORTS. THE INFORMATION REFLECTED IN THOSE DRAWINGS DOES NOT GUARANTEE THAT ALL THE AS-BUILT CONDITIONS HAVE BEEN REPRESENTED. ALL EXISTING CONDTIONS, ELEVATIONS, AND DIMENSIONS ARE TO BE VERIFIED IN FIELD BY THE CONTRACTOR OR SUBCONTRACTORS PRIOR TO CONSTRUCTION OR FABRICATION.
9. THE CONTRACTOR IS TO FIELD VERIFY ALL EXISTING CONDITIONS WITH THE CONTRACT DOCUMENTS. NOTIFY THE ARCHITECT OF ANY DISCREPANCIES IN WRITING BEFORE PROCEEDING WITH THE WORK.
10. EXISTING CONSTRUCTION TO REMAIN ARE TO BE PROTECTED DURING THE DEMOLITION AND CONSTRUCTION PROCESS INCLUDING BUT NOT LIMITED TO ALL WALLS (STRUCTURAL AND PARTITION), CEILINGS, FLOORS, DOORS, FINISHES, ETC.
11. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION AS PART OF THIS CONTRACT.
12. CONTRACTOR TO PROVIDE FILTRATION IN THE EXISTING AND OR NEW MECHANICAL SYSTEMS TO ELIMINATE DEMOLITION AND CONSTRUCTION DUST FROM ENTERING ADJACENT PORTIONS OF THE BUILDING.

CODED DEMOLITION NOTES

1 DEMO	REMOVE WINDOW SYSTEM IN ITS ENTIRETY. THIS INCLUDES GLAZING, ALUMINUM FRAME, FASTENERS, SHEET METAL WRAPS, SPANDREL PANELS, SEALANT, AND ALL OTHER RELATED COMPONENTS.
2 DEMO	BASE BID: REMOVE WINDOW SYSTEM IN ITS ENTIRETY. THIS INCLUDES GLAZING, ALUMINUM FRAME, FASTENERS, SHEET METAL WRAPS, SPANDREL PANELS, SEALANT, AND ALL OTHER RELATED COMPONENTS: ALTERNATE BID: WINDOWS TO REMAIN.

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Civil Engineer's Name
Civil Engineer

Street Number and Name
City, State and Zip
Phone: (012) 345-6789
Website: www.website.com

CERTIFICATION

Construction Documents
Window Package

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: JWY
Checked By: JWY
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE

Rev. #	Revision Description	Issue Date

Exterior Window Elevations - Demolition

AD2.10

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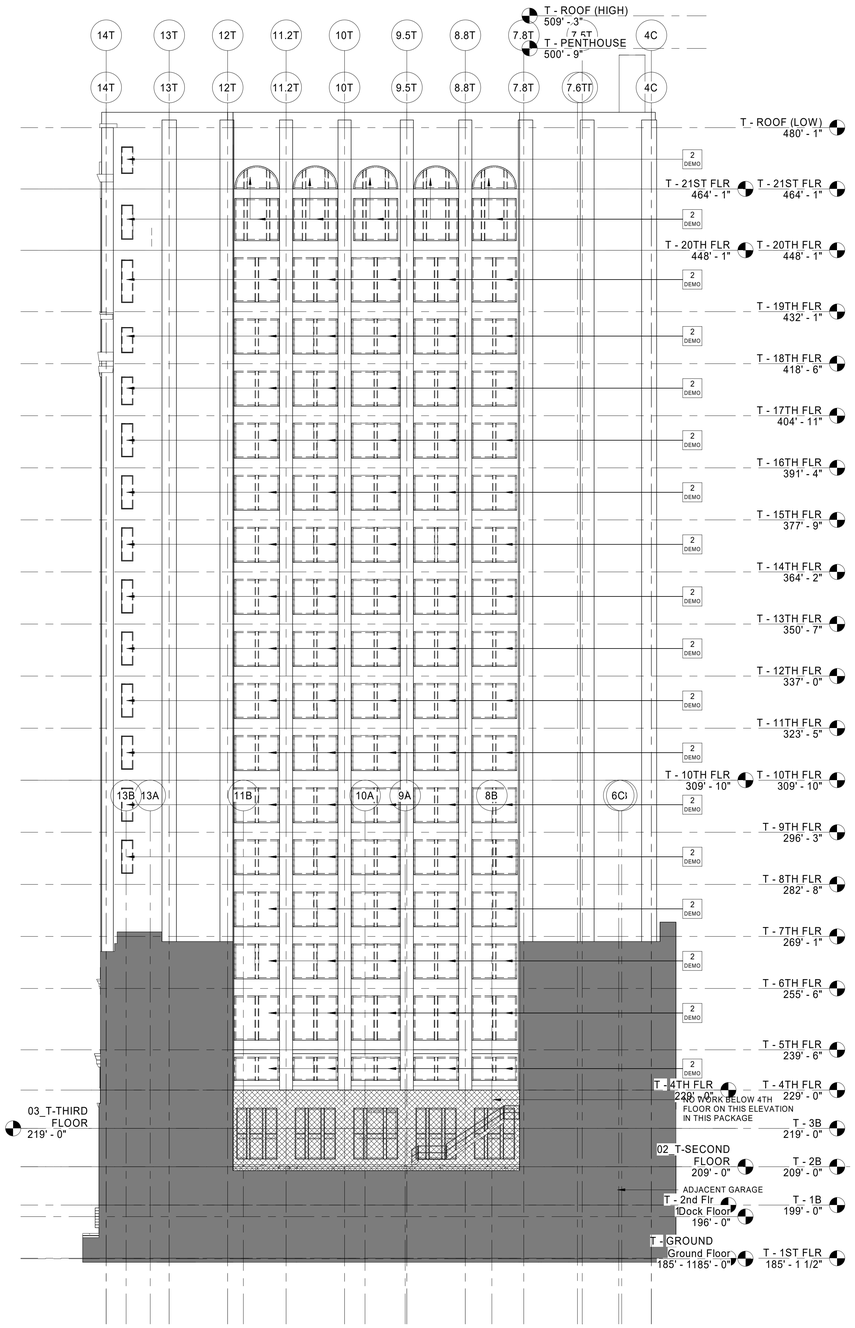
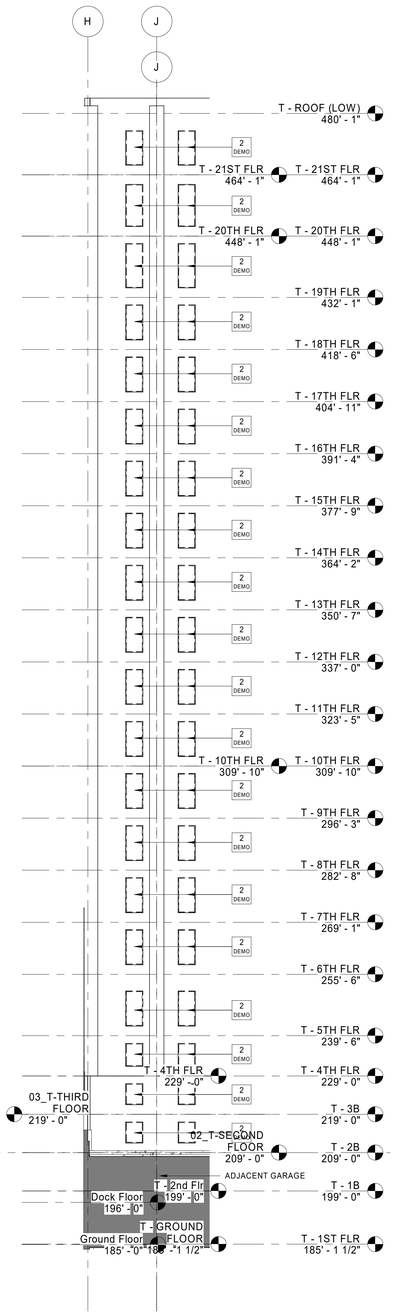
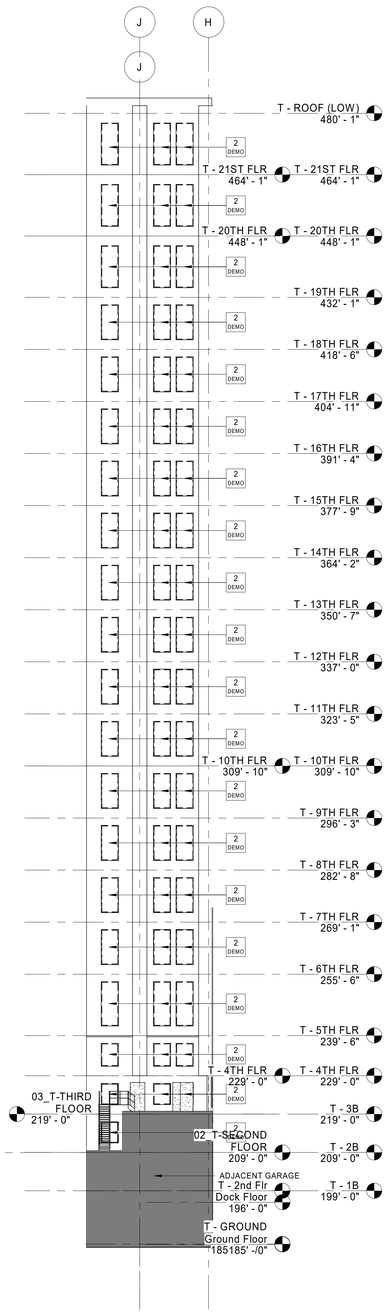


1 East Elevation - Windows - Demo
AD2.11 1/16" = 1'-0"



2 E Elevation (N Face) - Windows - Demo
AD2.11 1/16" = 1'-0"



3 E Elevation (S Face) - Windows - Demo
AD2.11 1/16" = 1'-0"

GENERAL DEMOLITION NOTES

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2. DEMOLITION IS TO BE CLEAN, COMPLETE, AND IN A MANNER SUITABLE TO ACCEPT NEW FINISHES AND SURFACES. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR DESCRIPTION OF NEW MATERIALS.
3. WHERE EXTERIOR SKIN OF THE EXISTING BUILDING IS TO BE REMOVED OR MODIFIED THE CONTRACTOR SHALL TAKE PRECAUTIONS TO ENSURE THAT THE BUILDING REMAINS WEATHERTIGHT DURING DEMOLITION.
4. IF ANY MATERIAL IS ENCOUNTERED THAT IS SUSPECTED TO CONTAIN ASBESTOS DO NOT DISTUB AND IMMEDIATELY CONTACT THE OWNER FOR REMEDIATION.
5. THE CONTRACTOR IS TO FOLLOW AND OBEY ALL FEDERAL, STATE, AND LOCAL CODES, LAWS, SAFETY REGULATIONS, AND HAZARDOUS WASTE LAWS ETC.. CONTRACTOR IS TO OBTAIN ALL NECESSARY PERMITS, RELEASES, AND AUTHORIZATIONS BEFORE PERFORMING DEMOLITION WORK.
6. ALL CONTRACTORS ARE TO CONDUCT NON-STRUCTURAL EXPLORATORY DEMOLITION TO DETERMINE STRUCTURAL EFFECT ON ALL PLANNED DEMOLITION AND CONFIRM WITH THE STRUCTURAL ENGINEER BEFORE ANY DEMOLITION OCCURS.
7. FURNISH AND INSTALL TEMPORARY BARRICADES AND HANDRAILS AT ALL OPENINGS DURING DEMOLITION AND CONSTRUCTION.
8. THESE DRAWINGS WERE DEVELOPED FROM A VISUAL SURVEY OF THE EXISTING CONDITIONS. THE AVAILABLE ORIGINAL ARCHITECTURAL AND STRUCTURAL DRAWINGS HAVE BEEN USED FOR LOCATION OF STRUCTURAL SUPPORTS. THE INFORMATION REFLECTED IN THOSE DRAWINGS DOES NOT GUARANTEE THAT ALL THE AS-BUILT CONDITIONS HAVE BEEN REPRESENTED. ALL EXISTING CONDTIONS, ELEVATIONS, AND DIMENSIONS ARE TO BE VERIFIED IN FIELD BY THE CONTRACTOR OR SUBCONTRACTORS PRIOR TO CONSTRUCTION OR FABRICATION.
9. THE CONTRACTOR IS TO FIELD VERIFY ALL EXISTING CONDITIONS WITH THE CONTRACT DOCUMENTS. NOTIFY THE ARCHITECT OF ANY DISCREPANCIES IN WRITING BEFORE PROCEEDING WITH THE WORK.
10. EXISTING CONSTRUCTION TO REMAIN ARE TO BE PROTECTED DURING THE DEMOLITION AND CONSTRUCTION PROCESS INCLUDING BUT NOT LIMITED TO ALL WALLS (STRUCTURAL AND PARTITION), CEILINGS, FLOORS, DOORS, FINISHES, ETC.
11. DEMOLITION IS TO BE CONDUCTED IN A MEANS THAT DOES NOT DAMAGE THE IMMEDIATELY ADJACENT EXISTING CONSTRUCTION TO REMAIN. ANY DAMAGE INCURRED DURING DEMOLITION TO EXISTING CONSTRUCTION TO REMAIN IS TO BE REPAIRED BACK TO ORIGINAL CONDITION AS PART OF THIS CONTRACT.
12. CONTRACTOR TO PROVIDE FILTRATION IN THE EXISTING AND OR NEW MECHANICAL SYSTEMS TO ELIMINATE DEMOLITION AND CONSTRUCTION DUST FROM ENTERING ADJACENT PORTIONS OF THE BUILDING.

CODED DEMOLITION NOTES

1 DEMO	REMOVE WINDOW SYSTEM IN ITS ENTIRETY. THIS INCLUDES GLAZING, ALUMINUM FRAME, FASTENERS, SHEET METAL WRAPS, SPANDREL PANELS, SEALANT, AND ALL OTHER RELATED COMPONENTS.
2 DEMO	BASE BID: REMOVE WINDOW SYSTEM IN ITS ENTIRETY. THIS INCLUDES GLAZING, ALUMINUM FRAME, FASTENERS, SHEET METAL WRAPS, SPANDREL PANELS, SEALANT, AND ALL OTHER RELATED COMPONENTS. ALTERNATE BID: WINDOWS TO REMAIN.

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Civil Engineer's Name
Civil Engineer
Street Number and Name
City, State and Zip
Phone: (012) 345-6789
Website: www.website.com

CERTIFICATION

Construction Documents
Window Package

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: JWY
Checked By: JWY
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Exterior Window Elevations - Demolition

AD2.11

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GENERAL WALL TYPE NOTES

1. PROVIDE MOISTURE RESISTANT GYP. BD. AT TOILET ROOMS, KITCHENS, JANITOR'S CLOSETS, COUNTERTOPS WITH SINKS, AND OTHER SIMILAR LOCATIONS.
2. PROVIDE TILE BACKER BOARD ON WALL SURFACES TO RECEIVE A TILE FINISH. BOARD TO BE FLUSH TO ADJACENT GYP. BRD. SEE INTERIOR FINISH SPECIFICATIONS, SCHEDULES AND DETAILS.
3. PROVIDE FIRE-SAFING AT EXPOSED WALL CAVITIES AND AROUND ALL WALL PENETRATIONS. SEE SPECIFICATIONS.
4. SEE SPECIFICATION FOR MATERIALS INDICATED ON THE WALL TYPE LEGEND.
5. SEE INTERIOR FINISH SPECIFICATIONS, SCHEDULES, AND DETAILS FOR ADDITIONAL WALL FINISH MATERIAL REQUIREMENTS.
6. PROVIDE ADDITIONAL LAYERS OF GYP. BD., BLOCKING, OR FRAMING AS NEEDED TO ACCOUNT FOR ALIGNING OF WALL TYPES OR FLUSH CONDITIONS.
7. WALL FRAMING, SHEATHING, AND INSULATION TO EXTEND FROM TOP OF SLAB TIGHT TO UNDERSIDE OF DECK UNLESS NOTED OTHERWISE.
8. VERIFY FIRE RATINGS OF WALLS WITH LIFE SAFETY (LS SHEETS), BUILDING SUMMARY AND OTHER NOTATIONS THROUGHOUT THE DRAWING SET.
9. VERIFY STRUCTURAL LOAD BEARING COMPONENTS OF WALLS WITH STRUCTURAL DRAWINGS.
10. STUD CONTRACTOR TO PROVIDE IN-WALL BLOCKING FOR CONTRACTOR PROVIDED ITEMS AND FOR OWNER PROVIDED ITEMS. COORDINATE WITH OWNER.
11. CONTRACTOR TO DETERMINE GAUGING AND RELATED ENGINEERING FOR STUDS NOT OTHERWISE ESTABLISHED IN THE STRUCTURAL DRAWINGS. CONTRACTOR TO NOTIFY ARCHITECT OF ANY DISCREPANCIES.
12. CONTRACTOR TO FULLY COMPLY WITH CONSTRUCTION REQUIREMENTS OF FIRE RATED ASSEMBLIES AS ESTABLISHED BY UL.
14. CONTRACTOR TO FULLY COMPLY WITH CONSTRUCTION REQUIREMENTS TO OBTAIN DESIGNATED STC RATINGS AS ESTABLISHED BY THE GYPSUM ASSOCIATION.
15. EACH FLOOR TRACK OF WALL ASSEMBLIES DESIGNATED WITH AN STC RATING ARE TO BE SET IN A CONTINUOUS BED OF SEALANT.
16. FIRE RESISTANCE RATED WALLS SHALL USE RATED FIRE RESISTANT FILL MATERIALS IN CONJUNCTION WITH APPROPRIATELY RATED FIRE STOPPING SYSTEM. NON-FIRE-RATED WALLS SHALL USE ACOUSTICAL SEALANT.
17. EXTERIOR WALLS AND FIRE RESISTANCE RATED WALLS SHALL USE MINERAL WOOL INSULATION. NON-RATED WALLS REQUIRING SOUND ATTENUATION SHALL USE SOUND ATTENUATION BLANKETS.
18. RETURN GYP. BD. AND INTERIOR FINISHES INTO OPENINGS IN WALLS.
19. FIRE PARTITIONS OF THE SAME FIRE RATING MAY HAVE A COMMON DRAFT-STOPPED CAVITY. FIRE BARRIERS MAY NOT SHARE A COMMON CAVITY WITH OTHER ASSEMBLIES AND UNINTERRUPTED CONTINUITY OF THE FIRE BARRIER ASSEMBLY MUST BE MAINTAINED FOR THE FULL EXTENT OF THAT WALL.
20. SEE STRUCTURAL DRAWINGS FOR LOCATIONS WHERE ADDITIONAL LAYERS OF SHEATHING ARE REQUIRED.
21. FIRE RATED ASSEMBLIES ARE TO CONTAIN 5/8" TYPE-X GYP. BD.
22. BATHROOM PERIMETER WALLS WITHIN EACH GUESTROOM TO RECEIVE SOUND BATT INSULATION.

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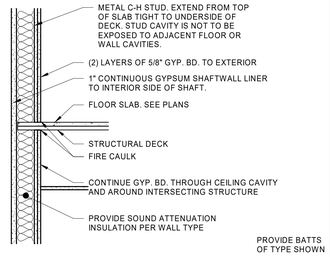
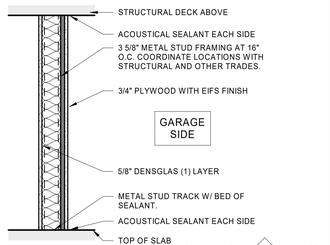


STUD SIZE	FIRE RATINGS
S42 2 1/2" C-H STUD S44 4" C-H STUD S46 6" C-H STUD S48 8" C-H STUD	CONTRACTOR TO FULLY COMPLY WITH UL INSTALLATION AND CONSTRUCTION REQUIREMENTS S4 2-HR FIRE BARRIER UL: U415

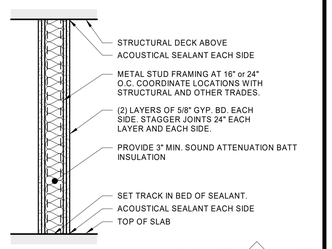
S4 SHAFTWALL ASSEMBLY — STC: 50 W/ 3" SAB



SECTION — PROVIDE BATTS OF TYPE SHOWN (ML) — NO BATTS (0)

STUD SIZE	FIRE RATINGS
ML SEE DETAIL ML2 3 5/8" STUD ML6 ML4 ML1 ML8 ML2 ML6	CONTRACTOR TO FULLY COMPLY WITH UL INSTALLATION AND CONSTRUCTION REQUIREMENTS ML

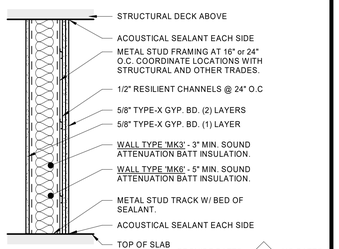
ML METAL STUD WALL TYPE



SECTION — PROVIDE BATTS OF TYPE SHOWN (MJ) — NO BATTS (0)

STUD SIZE	FIRE RATINGS
MJ SEE DETAIL MJ3 3 5/8" STUD MJ2 7/8" FURRING MJ4 4" STUD MJ1 1 1/2" MJ6 6" STUD MJ2 2 1/2" STUD MJ8 8" STUD	CONTRACTOR TO FULLY COMPLY WITH UL INSTALLATION AND CONSTRUCTION REQUIREMENTS MJ 2-HR FIRE PARTITION UL: U419

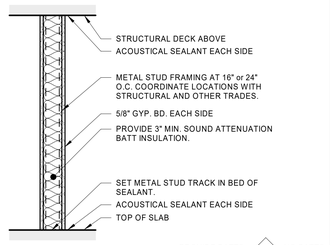
MJ METAL STUD WALL TYPE — STC: 55 W/ 3" SAB, GYPSUM ASSOCIATION: WP-1522



SECTION — PROVIDE BATTS OF TYPE SHOWN (MK) — NO BATTS (0)

STUD SIZE	FIRE RATINGS
MK SEE DETAIL MK3 3 5/8" STUD MK2 7/8" FURRING MK4 4" STUD MK1 1 1/2" MK6 6" STUD MK2 2 1/2" STUD MK8 8" STUD	CONTRACTOR TO FULLY COMPLY WITH UL INSTALLATION AND CONSTRUCTION REQUIREMENTS MK 1-HR FIRE PARTITION UL: U419

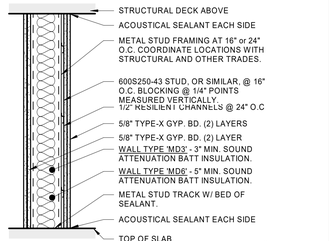
MK METAL STUD WALL TYPE — STC: 54 (MK3) 60 (MK6) W/ SAB, GYPSUM ASSOCIATION: WP-1520



SECTION — PROVIDE BATTS OF TYPE SHOWN (ME) — NO BATTS (0)

STUD SIZE	FIRE RATINGS
ME SEE DETAIL ME3 3 5/8" STUD ME2 7/8" FURRING ME4 4" STUD ME1 1 1/2" ME6 6" STUD ME2 2 1/2" STUD ME8 8" STUD	CONTRACTOR TO FULLY COMPLY WITH UL INSTALLATION AND CONSTRUCTION REQUIREMENTS ME 1-HR FIRE PARTITION UL: U-419

ME METAL STUD WALL TYPE — STC: 45 to 49 WITH 3" SAB, GYPSUM ASSOCIATION WP-1070

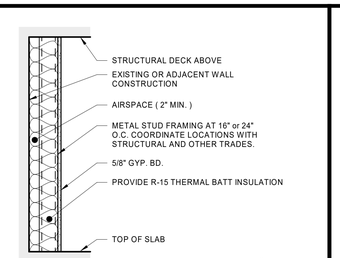


NOTE:

SECTION — PROVIDE BATTS OF TYPE SHOWN (MD) — NO BATTS (0)

STUD SIZE	FIRE RATINGS
MD SEE DETAIL MD3 3 5/8" STUD MD2 7/8" FURRING MD4 4" STUD MD1 1 1/2" MD6 6" STUD MD2 2 1/2" STUD MD8 8" STUD	CONTRACTOR TO FULLY COMPLY WITH UL INSTALLATION AND CONSTRUCTION REQUIREMENTS MD 2-HR FIRE PARTITION UL: U419

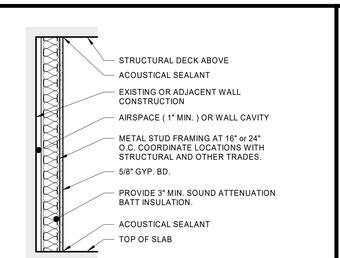
MD METAL STUD WALL TYPE — STC: 54 (MK3) 60 (MK6) W/ SAB, GYPSUM ASSOCIATION: WP-1520



SECTION — PROVIDE BATTS OF TYPE SHOWN (MC) — NO BATTS (0)

STUD SIZE	FIRE RATINGS
MC SEE DETAIL MC3 3 5/8" STUD MC2 7/8" FURRING MC4 4" STUD MC1 1 1/2" MC6 6" STUD MC2 2 1/2" STUD MC8 8" STUD	CONTRACTOR TO FULLY COMPLY WITH UL INSTALLATION AND CONSTRUCTION REQUIREMENTS MC

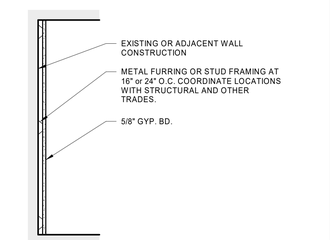
MC METAL STUD WALL TYPE



SECTION — PROVIDE BATTS OF TYPE SHOWN (MB) — NO BATTS (0)

STUD SIZE	FIRE RATINGS
MB SEE DETAIL MB3 3 5/8" STUD MB MB4 4" STUD MB1 1 5/8" STUD MB6 6" STUD MB2 2 1/2" STUD MB8 8" STUD	CONTRACTOR TO FULLY COMPLY WITH UL INSTALLATION AND CONSTRUCTION REQUIREMENTS MB

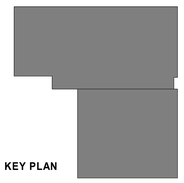
MB METAL STUD WALL TYPE



SECTION — PROVIDE BATTS OF TYPE SHOWN (MA) — NO BATTS (0)

STUD SIZE	FIRE RATINGS
MA SEE DETAIL MA3 3 5/8" STUD MA2 7/8" FURRING MA4 4" STUD MA1 1 1/2" MA6 6" STUD MA2 2 1/2" STUD MA8 8" STUD	CONTRACTOR TO FULLY COMPLY WITH UL INSTALLATION AND CONSTRUCTION REQUIREMENTS MA

MA METAL FURRING



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
LICENSED PROFESSIONAL ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE

Rev. #	Revision Description	Issue Date

Wall Types

A0.10

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Table 224.2 Guest Rooms With Mobility Features

Total Number of Guest Rooms Provided	Minimum Number of Required Rooms Without Roll-in Showers	Minimum Number of Required Rooms With Roll-in Showers	Total Number of Required Rooms
1 to 25	1	0	1
26 to 50	2	0	2
51 to 75	3	1	4
76 to 100	4	1	5
101 to 150	5	2	7
151 to 200	6	2	8
201 to 300	7	3	10
301 to 400	8	4	12
401 to 500	9	4	13
501 to 1000	2 percent of total	1 percent of total	3 percent of total
1001 and over	20, plus 1 for each 100, or fraction thereof, over 1,000	10, plus 1 for each 100, or fraction thereof, over 1,000	30, plus 2 for each 100, or fraction thereof, over 1,000

Table 224.4 Guest Rooms With Communication Features

Total Number of Guest Rooms Provided	Minimum Number of Required Guest Rooms With Communication Features
2 to 25	2
26 to 50	4
51 to 75	7
76 to 100	9
101 to 150	12
151 to 200	14
201 to 300	17
301 to 400	20
401 to 500	22
501 to 1000	5 percent of total
1001 and over	50, plus 3 for each 100 over 1,000

GUEST ROOM TYPES

KING

ROOM TYPE (COUNT)	ROOM NUMBER		
KING - STANDARD (124)	507, 512, 513, 514, 515, 516, 518, 519 612, 613, 614, 615, 616, 618 707, 712, 713, 714, 715, 716, 717, 718, 719 807, 812, 813, 814, 815, 816, 818, 819 907, 912, 913, 914, 915, 916, 918, 919 1007, 1012, 1013, 1014, 1015, 1016, 1017, 1018, 1019 1107, 1112, 1113, 1114, 1115, 1116, 1118 1207, 1212, 1213, 1214, 1215, 1216, 1218, 1219 1307, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319 1407, 1412, 1413, 1414, 1415, 1416, 1418, 1419 1507, 1512, 1513, 1514, 1515, 1516, 1518, 1519 1607, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619 1707, 1712, 1713, 1714, 1715, 1716, 1718, 1719 1807, 1812, 1813, 1814 ,1815, 1816, 1817, 1818, 1819 1907, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919		
KING - STUDIO (51)	508, 510, 511 608, 609, 610,619 708, 709, 710, 711 808, 810, 811 908, 909, 910	1008, 1009, 1010 1011 1108, 1110, 1111 1208, 1209, 1210 1308, 1309, 1310, 1311 1408, 1410, 1411	1508, 1509, 1510 1608, 1609, 1610, 1611 1708, 1710, 1711 1808, 1809,1810, 1811 1908, 1909, 1910, 1911
KING - MOBILITY (6)	911, 917 1211, 1217	1511, 1517	
KING - COMMUNICATION (11)	509, 517 607	809, 817 1109, 1117	1409, 1417 1709, 1717
KING - MOBILITY & COMM (2)	611, 617		
KING - CONNECTING ROOMS	508 & 509, 510 & 511 608 & 609, 610 & 611 708 & 709, 710 & 711 808 & 809, 810 & 811 908 & 909, 910 & 911 1008 & 1009, 1010 & 1011 1108 & 1109, 1110 & 1111 1208 & 1209, 1210 & 1211		1308 & 1309, 1310 & 1311 1408 & 1409, 1410 & 1411 1508 & 1509, 1510 & 1511 1608 & 1609, 1610 & 1611 1708 & 1709, 1710 & 1711 1808 & 1809, 1810 & 1811 1908 & 1909, 1910 & 1911

QUEEN DBL.

ROOM TYPE (COUNT)	ROOM NUMBER			
DBL QUEEN - STANDARD (81)	501, 503, 504, 505, 506 601, 603, 604, 605, 606 701, 702, 703, 704, 705, 706 801, 803, 804, 805, 806 901, 903, 904, 905, 906 1001, 1002, 1003, 1004, 1005, 1006 1101, 1103, 1104, 1105, 1106 1201, 1203, 1204, 1205, 1206 1301, 1302, 1303, 1304, 1305, 1306 1401, 1403, 1404, 1405, 1406 1501, 1503, 1504, 1505, 1506 1601, 1602, 1603, 1604, 1605, 1606 1701, 1703, 1704, 1705, 1706 1801, 1802, 1803, 1804, 1805, 1806 1901, 1902, 1903, 1904, 1905, 1906			
DBL QUEEN - MOBILITY (4)	602 902	1202 1502		
DBL QUEEN - COMMUNICATION (5)	502 802	1102 1402	1702	
DBL QUEEN - CONNECTING ROOMS	501 & 502, 505 & 506 601 & 602, 605 & 606 701 & 702, 705 & 706 801 & 802, 805 & 806 901 & 902, 905 & 906 1001 & 1002, 1005 & 1006 1101 & 1102, 1105 & 1106 1201 &1202, 1205 & 1206	1301 & 1302, 1305 & 1306 1401 & 1402, 1405 & 1406 1501 & 1502, 1505 & 1506 1601 & 1602, 1605 & 1606 1701 & 1702, 1705 & 1706 1801 & 1802, 1805 & 1806 1901 & 1902, 1905 & 1906		

INTERIORS GUESTROOM TYPES / SUBAREAS

ROOM TYPE / SUBAREA		ROOM NUMBER			
King Studio	K1	509, 510, 511 609, 610 709, 710, 711 809, 810, 811 909, 910 1009, 1010, 1011 1109, 1110, 1111 1209, 1210		1309, 1310, 1311 1409, 1410, 1411 1509, 1510 1609, 1610, 1611 1709, 1710, 1711 1809, 1810, 1811 1909, 1910, 1911	
King	K2	513, 514, 516, 517 613, 614, 616 713, 714, 716, 717 813, 814, 816, 817 913, 914, 916 1013, 1014, 1016 1017 1113, 1114, 1116, 1117 1213, 1214, 1216		1313, 1314, 1316, 1317 1413, 1414, 1416, 1417 1513, 1514, 1516 1613, 1614, 1616, 1617 1713, 1714, 1716, 1717 1813, 1814,1816, 1817 1913, 1914, 1916, 1917	
King	K3	515, 519 615 715, 719 815, 819 915, 919 1015, 1019 1115 1215, 1219		1315, 1319 1415, 1419 1515, 1519 1615, 1619 1715, 1719 1815, 1819 1915, 1919	
King ADA - Shwr	K4	617			
King Corner	K5	507 607 707 807 907	1007 1107 1207 1307 1407	1507 1607 1707 1807 1907	
King Corner	K6	512 612 712 812 912	1012 1112 1212 1312 1412	1512 1612 1712 1812 1912	
King	K7	508 608 708 808 908	1008 1108 1208 1308 1408	1508 1608 1708 1808 1908	
King	K8	518 618 718 818 918	1018 1118 1218 1318 1418	1518 1618 1718 1818 1918	
King Vault	K9	619			
King Studio ADA	K10	611 911	1211 1511		
King ADA - Tub	K11	917 1217	1517		
Dbl Queen - Tub	QQ1	501 601 701 801 901	1001 1101 1201 1301 1401	1501 1601 1701 1801 1901	
Dbl Queen - Tub	QQ2	502, 503, 504, 505, 506 603, 604, 605, 606 702, 703, 704, 705, 706 802, 803, 804, 805, 806 903, 904, 905, 906 1002, 1003, 1004, 1005, 1006 1102, 1103, 1104, 1105, 1106 1203, 1204, 1205, 1206			1302, 1303, 1304, 1305, 1306 1402, 1403, 1404, 1405, 1406 1503, 1504, 1505, 1506 1602, 1603, 1604, 1605, 1606 1702, 1703, 1704, 1705, 1706 1802, 1803, 1804, 1805, 1806 1902, 1903, 1904, 1905, 1906
Dbl Queen ADA - Shwr	QQ3	602			
Dbl Queen ADA - Tub	QQ4	902	1202	1502	

ROOM TYPE MATRIX

FLOOR	DOUBLE QUEEN ADA/SHWR (ROLL-IN)	DOUBLE QUEEN ADA/SHWR-TUB	DOUBLE QUEEN COMM/SHWR-TUB	DOUBLE QUEEN SHWR-TUB	KING ADA/SHWR-TUB	KING ADA/COMM/SHWR (ROLL-IN)	KING COMM/SHWR	KING SHWR	KING STUDIO ADA/SHWR-TUB	KING STUDIO ADA/COMM/SHWR (ROLL-IN)	KING STUDIO COMM/SHWR	KING STUDIO SHWR	TOTAL KEYS
21													
20													
19				6				9				4	19
18				6				9				4	19
17			1 [1702]	5			1 [1717]	8			1 [1709]	3	19
16				6				9				4	19
15		1 [1502]		5	1 [1517]			8	1 [1511]			3	19
14			1 [1402]	5			1 [1417]	8			1 [1409]	3	19
13				6				9				4	19
12		1 [1202]		5	1 [1217]			8	1 [1211]			3	19
11			1 [1102]	5			1 [1117]	7			1 [1109]	3	18
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9		1 [902]		5	1 [917]			8	1 [911]			3	19
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7				6				9				4	19
6	1 [602]			5		1 [617]	1 [607]	6		1 [611]		4	19
5			1 [502]	5			1 [517]	8			1 [509]	3	19
4													
3													
2													
1													
B													
	1	3	5	81	3	1	6	123	3	1	5	52	284

90 TOTAL DQ Rooms
- 1 ADA w/ Roll-in Shower
- 3 ADA w/ Shower/Tub
- 5 Communication & Shower/Tub
- 81 Shower/Tub

133 TOTAL K Rooms
- 3 ADA w/ Shower/Tub
- 1 ADA w/ Communication & Roll-in Shower
- 6 Communication & Shower
- 123 Shower

61 TOTAL K Studio Rooms
- 3 ADA w/ Shower/Tub
- 1 ADA w/ Communication & Roll-in Shower
- 5 Communication & Shower
- 52 Shower

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MO Certificate of Authority: W00923182

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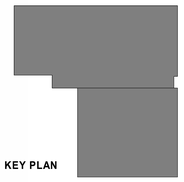

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
SCHEMATIC DESIGN

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Guest Room Types

A0.20

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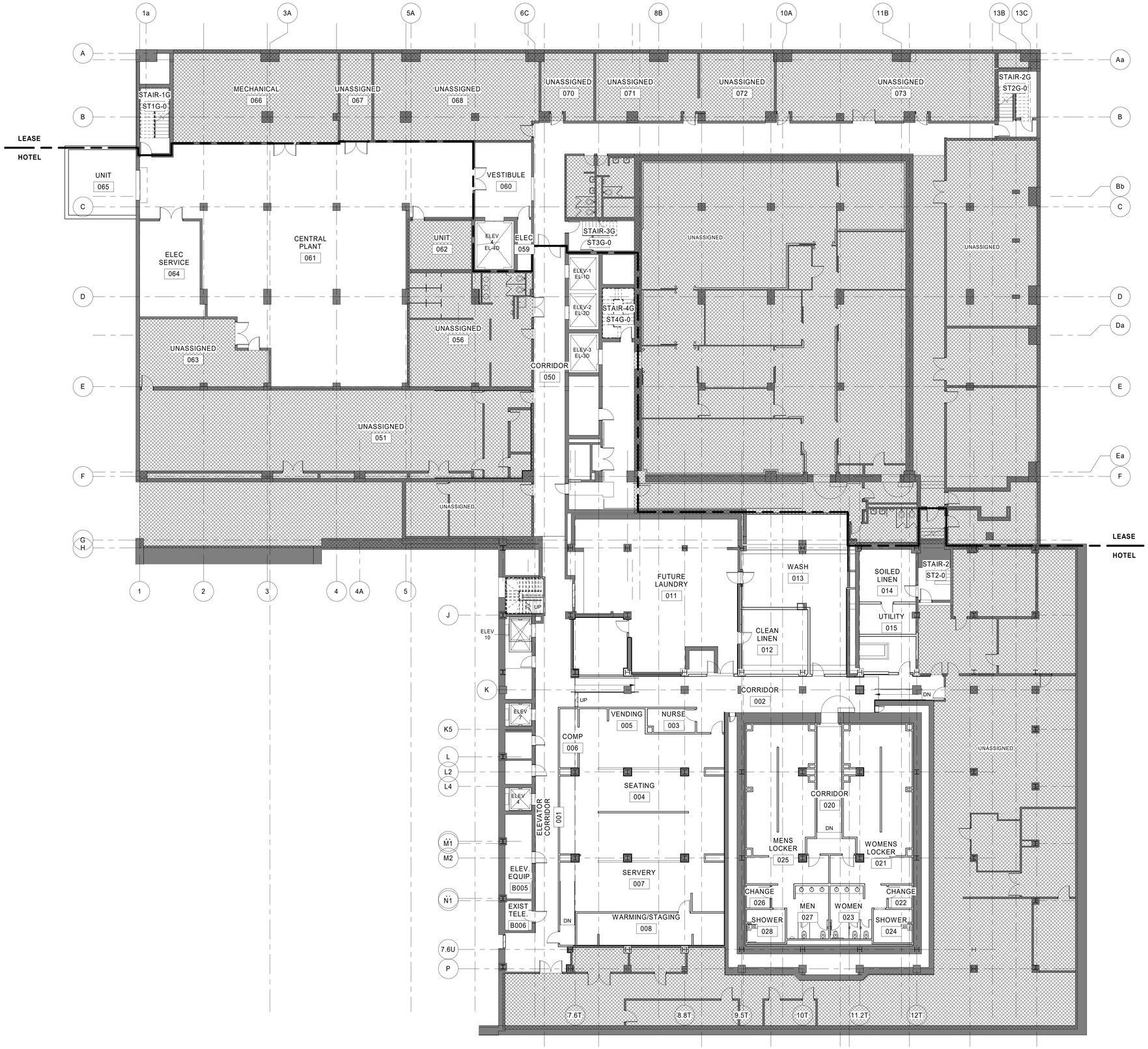

1 Floor Plan
A1.00-OAB

Overall Basement Level

3/32" = 1'-0"

NORTH

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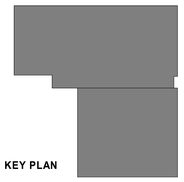

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Overall Plan - Basement

A1.00-OAB

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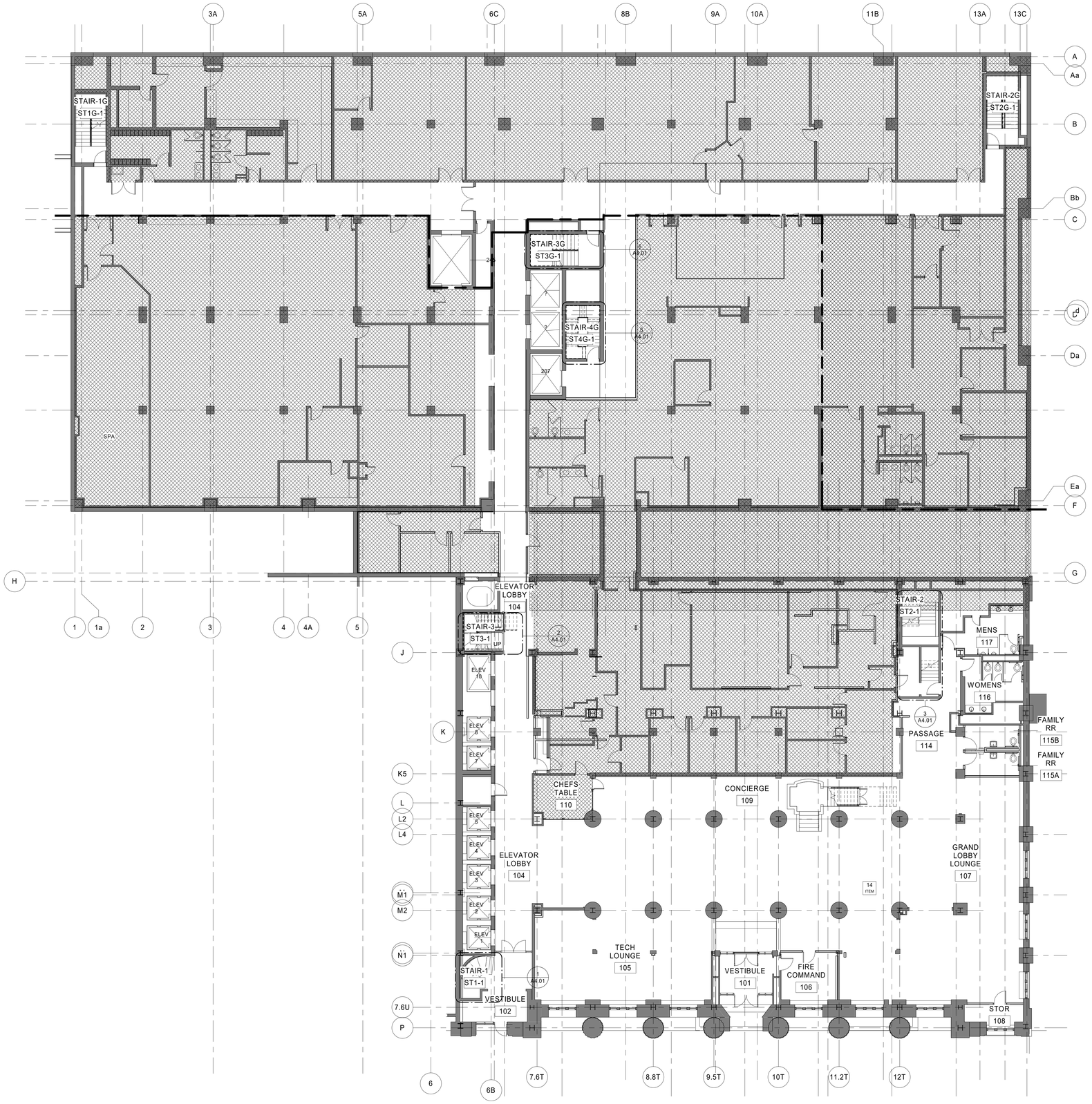

1 Floor Plan
Overall Ground Level
A1.00-OAG 3/32" = 1'-0"

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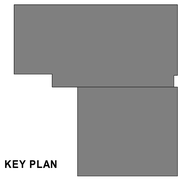

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Overall Plan - Ground Floor

A1.00-OAG

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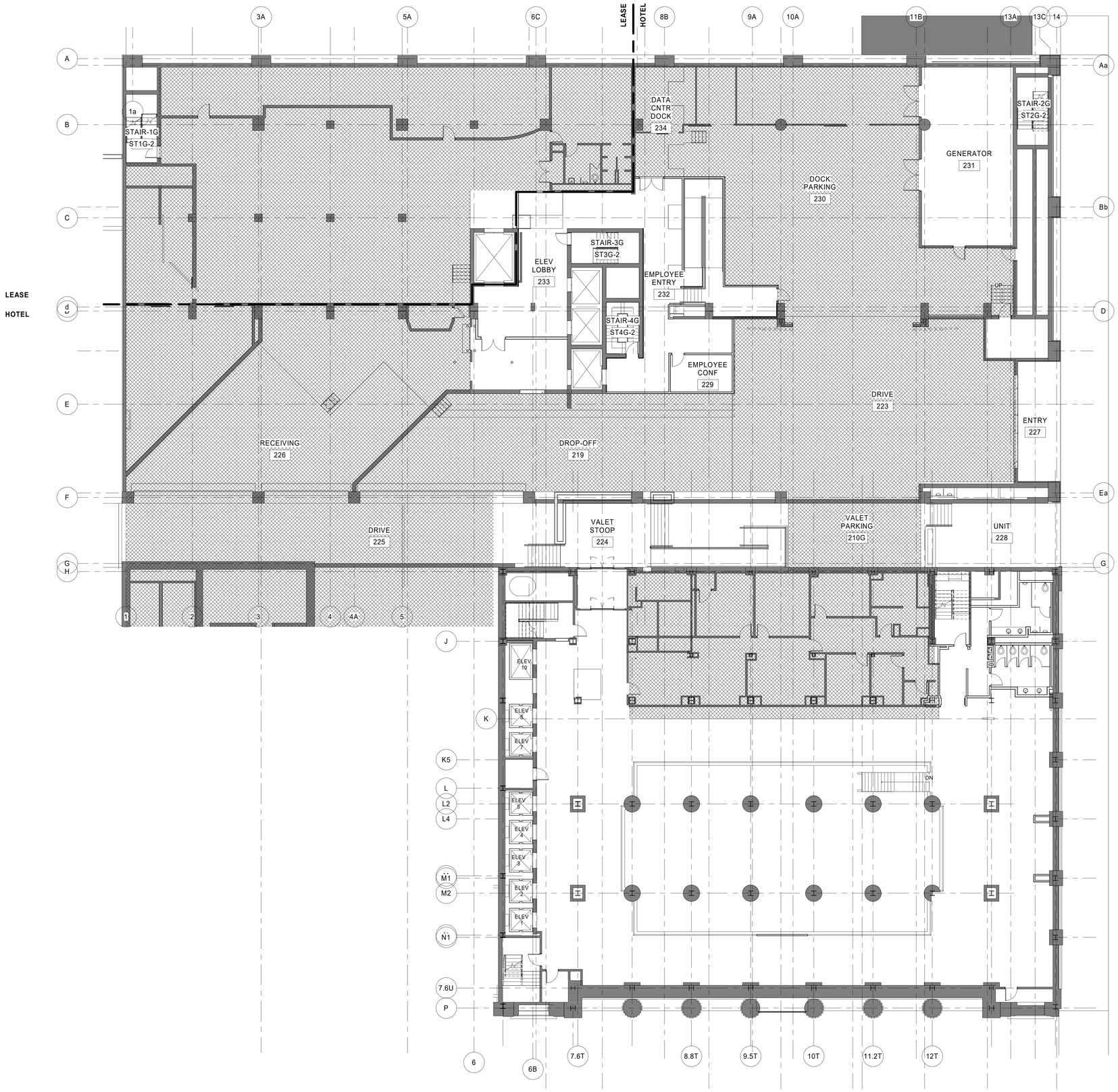

1 Floor Plan
Overall Mezzanine Level
A1.00-OAM 3/32" = 1'-0"

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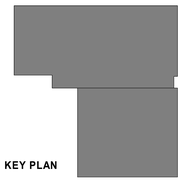
KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Overall Plan - Mezzanine

A1.00-OAM

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- PHASE 1 PLAN NOTES

1. FINISH WALLS ADJACET TO EXISTING WALLS TO MATCH EXISTING WALLS.
2. EXISTING ELEVATOR DOOR TO REMAIN. REFINISH DOOR TO MATCH ORIGINAL FINISH.
3. NEW ELEVATOR DOOR. DOOR TO MATCH EXISTING ELEVATOR DOORS.
4. INFILL FLOOR WHERE ELEVATOR WAS DEMOLISHED. REFER TO STRUCTURAL DRAWINGS.
5. PROVIDE TEMPORARY DOOR. PROVIDE 20 MIN DOOR CLOSER AND LOCK.
6. ROOM WALLS TO REMAIN AS EXISTING. PREP FOR NEW FINISH.
7. NEW SERVICE ELEVATOR. REFER TO SPECIFICATIONS
8. BRONZE MAILBOX TO REMAIN. REFINISH TO ORIGINAL FINISH.

CODED BUILDING ITEM NOTES

1 ITEM	NO WORK TO BE COMPLETED IN POCHE'D AREAS IN THIS PHASE. MEP MAY HAVE LIMITED WORK IN THESE AREAS. COORDINATE WITH MEP DRAWINGS.
2 ITEM	EXISTING DOORS IN CORRIDORS TO REMAIN. CONTRACTOR TO VERIFY THAT EXISTING HARDWARE FUNCTIONS AND DOORS ARE IN OPERABLE CONDITION. DOORS TO BE REPAINTED.
3 ITEM	NEW RAMP. RAMP TO HAVE NUMUMUM 1/12 SLOPE. HANDRAILS REQUIRED ON BOTH SIDES TO COMPLY WITH ADA SECTION 403.
4 ITEM	NEW STAIR TO HAVE 2 RISERS @ 5" WITH 11" TREADS. STAIRS TO COMPLY WITH ADA SECTION 504.
5 ITEM	COORDINATE REQUIREMENTS THIS AREA WITH MEP
6 ITEM	42" HIGH TEMPERED GLASS GUARDRAIL 3" OFFSET FROM EXISTING RAILING.
7 ITEM	AREA OF FLOOR TO BE INFILLED. COORDINATE WITH STRUCTURAL AND MEP DRAWINGS.
8 ITEM	EXISTING TERRAZZO FLOOR TO REMAIN AND TO BE REFINISHED.
9 ITEM	PATCH AND REPAIR COLUMNS AS REQUIRED TO MATCH SURROUNDING SURFACES.
10 ITEM	PROVIDE FOAM INSULATION MULLIONS FULL HEIGHT AT THESE LOCATIONS FOR SOUND ATTENUATION.
11 ITEM	FURNITURE SHOWN FOR REFERENCE ONLY.
12 ITEM	42" HIGH TEMPERED GLASS GUARDRAIL. OFFSET NEW GLASS GUARDRAIL 3" FROM EXISTING RAILING.
13 ITEM	EXISTING ELEVATORS TO BE REFURBISHED. REFER TO SPECIFICATIONS & ELEVATOR REPORT
14 ITEM	REPAIR EXISTING FLOORING AS REQUIRED.
15 ITEM	EXISTING STAIRS. REFER TO A4.01 FOR FINISH DETAILS.
16 ITEM	REFINISH EXISTING TERRAZZO FLOORING AND BASE.
17 ITEM	GARAGE WALL TO BE OPENED UP IN PHASE II OF THIS PROJECT. REFER TO LIFE SAFETY PLANS.
18 ITEM	REFER TO MEP DRAWINGS FOR NOTES FOR THIS AREA.

GENERAL PLAN NOTES

1. DO NOT SCALE DRAWINGS.
2. DIMENSIONS ARE TAKEN TO FACE OF STUD, FACE OF CONCRETE, FACE OF MASONRY, FACE OF EXISTING FINISHES, AND COLUMN LINES UNLESS SPECIFICALLY NOTED OTHERWISE. FINISHED (FIN, FD) OR CLEAR (CLR) DIMENSIONS INDICATE FINISH SURFACE TO FINISH SURFACE SPANS BETWEEN WALLS OR FROM FINISH SURFACE OF WALL TO LATCH/HINGE OF ADJACENT DOOR OR CENTERLINE OF PLUMBING FIXTURES.
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10. ALL NEW INTERIOR WALLS ALONG THE EXISTING EXTERIOR WALLS ARE TO RECEIVE A MINIMUM R-13 INSULATION W/ CONT VAPOR BARRIER.
11. RENOVATIONS TO STAIRWELLS ST-1, ST-2 & ALL ELEVATORS (IN GRAY POCHE) WILL BE ISSUED IN FUTURE DRAWING PACKAGE.

1 Garage - Basement
A1.01-G0 1/8" = 1'-0"

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KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
REGISTERED ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage - Floor Plan - Basement

A1.01-G0

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SYMBOL LEGEND

1 CATEGORY	CODED NOTES OF VARYING TYPES: SEE SCHEDULES ON THIS SHEET
101	DOOR TAG: SEE SHEET A8-SERIES DRAWINGS
1A	WALL TAG: SEE SHEET A0.10 and A0.11 FOR WALL TYPE AND FIRE RATING REQUIREMENTS. SEE A4 SERIES DRAWINGS FOR WALL FINISHES.
[S: 101A]	SIGN TAG: SEE SIGNAGE PACKAGE
W1	WINDOW TAG: SEE A8-SERIES DRAWINGS

- PHASE 1 PLAN NOTES

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1 Garage - Ground Floor East
A1.01-G1 1/8" = 1'-0"

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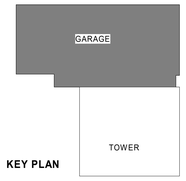

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
REGISTERED ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage - Floor Plan - 1st

A1.01-G1

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- PHASE 1 PLAN NOTES

1. FINISH WALLS ADJACET TO EXISTING WALLS TO MATCH EXISTING WALLS.
2. EXISTING ELEVATOR DOOR TO REMAIN. REFINISH DOOR TO MATCH ORIGINAL FINISH.
3. NEW ELEVATOR DOOR. DOOR TO MATCH EXISTING ELEVATOR DOORS.
4. INFILL FLOOR WHERE ELEVATOR WAS DEMOLISHED. REFER TO STRUCTURAL DRAWINGS.
5. PROVIDE TEMPORARY DOOR. PROVIDE 20 MIN DOOR CLOSER AND LOCK.
6. ROOM WALLS TO REMAIN AS EXISTING. PREP FOR NEW FINISH.
7. NEW SERVICE ELEVATOR. REFER TO SPECIFICATIONS
8. BRONZE MAILBOX TO REMAIN. REFINISH TO ORIGINAL FINISH.

CODED BUILDING ITEM NOTES

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18 ITEM — REFER TO MEP DRAWINGS FOR NOTES FOR THIS AREA.

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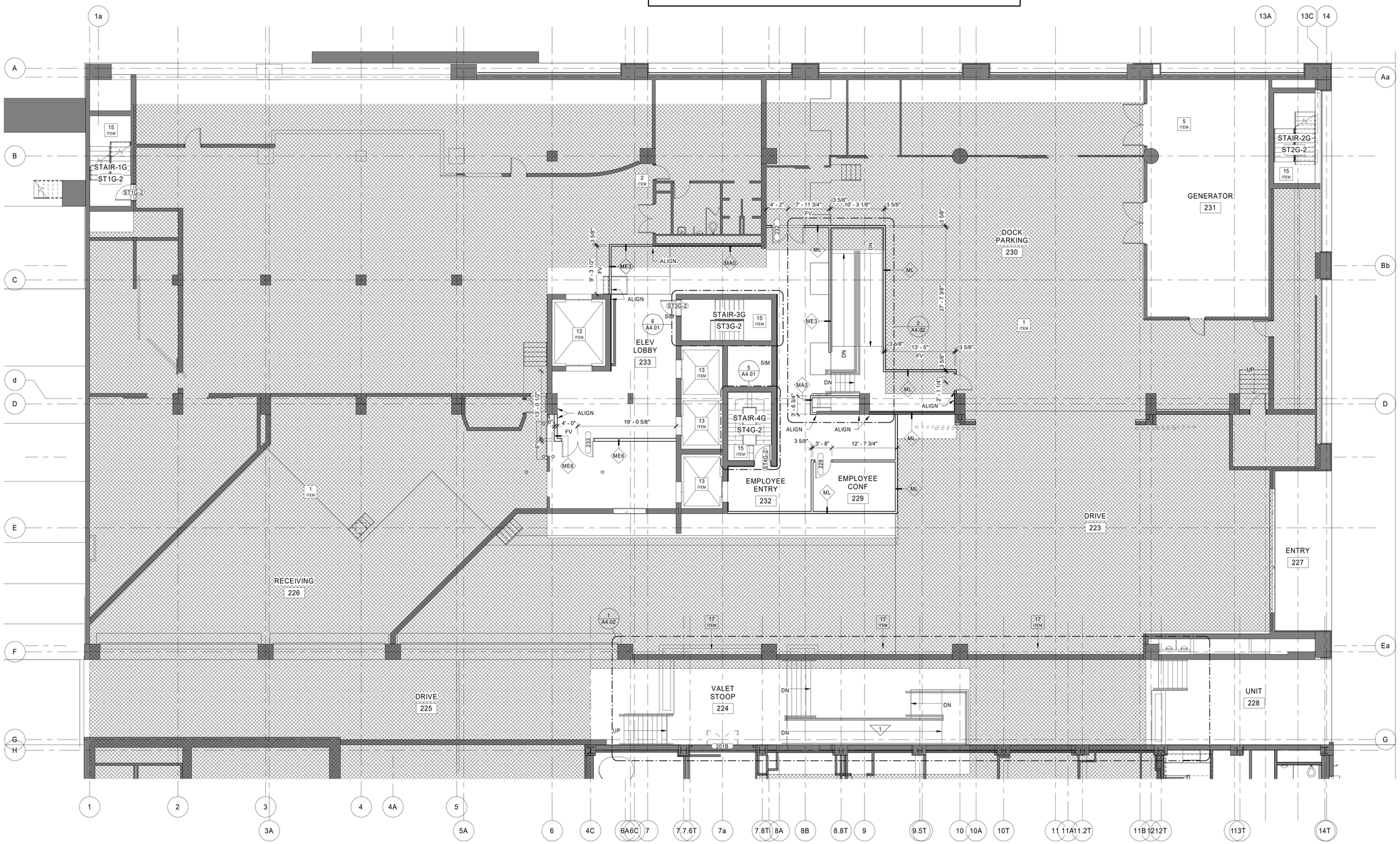

1 Garage - Dock
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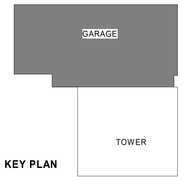

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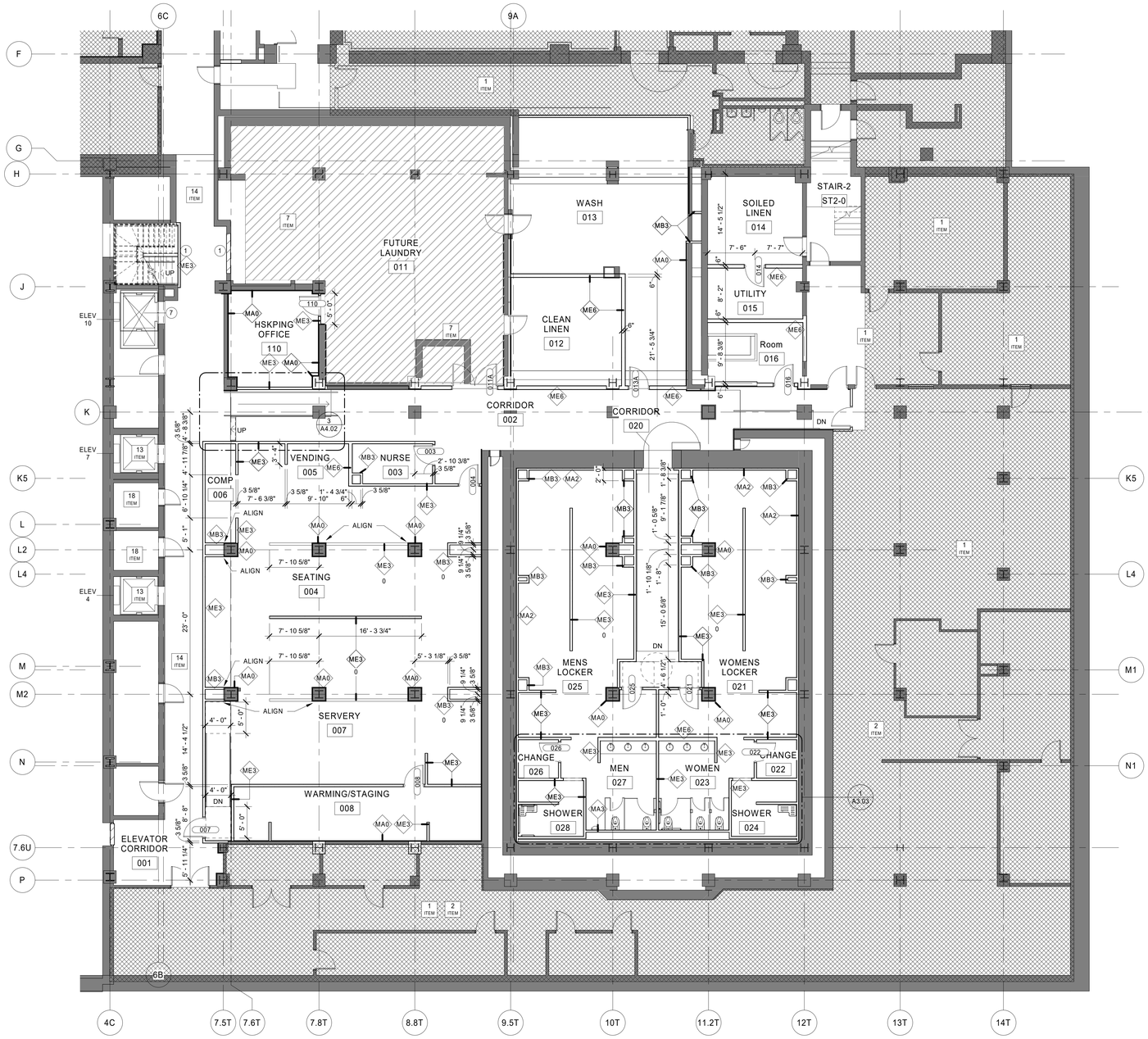

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SYMBOL LEGEND

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[S: 101A]	SIGN TAG: SEE SIGNAGE PACKAGE
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1 A1.01-T0 Tower-0 Basement
1/8" = 1'-0"

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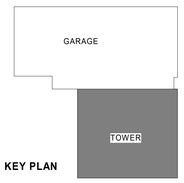

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Liscense number: 2008029200

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Tower - Floor Plan - Basement

A1.01-T0

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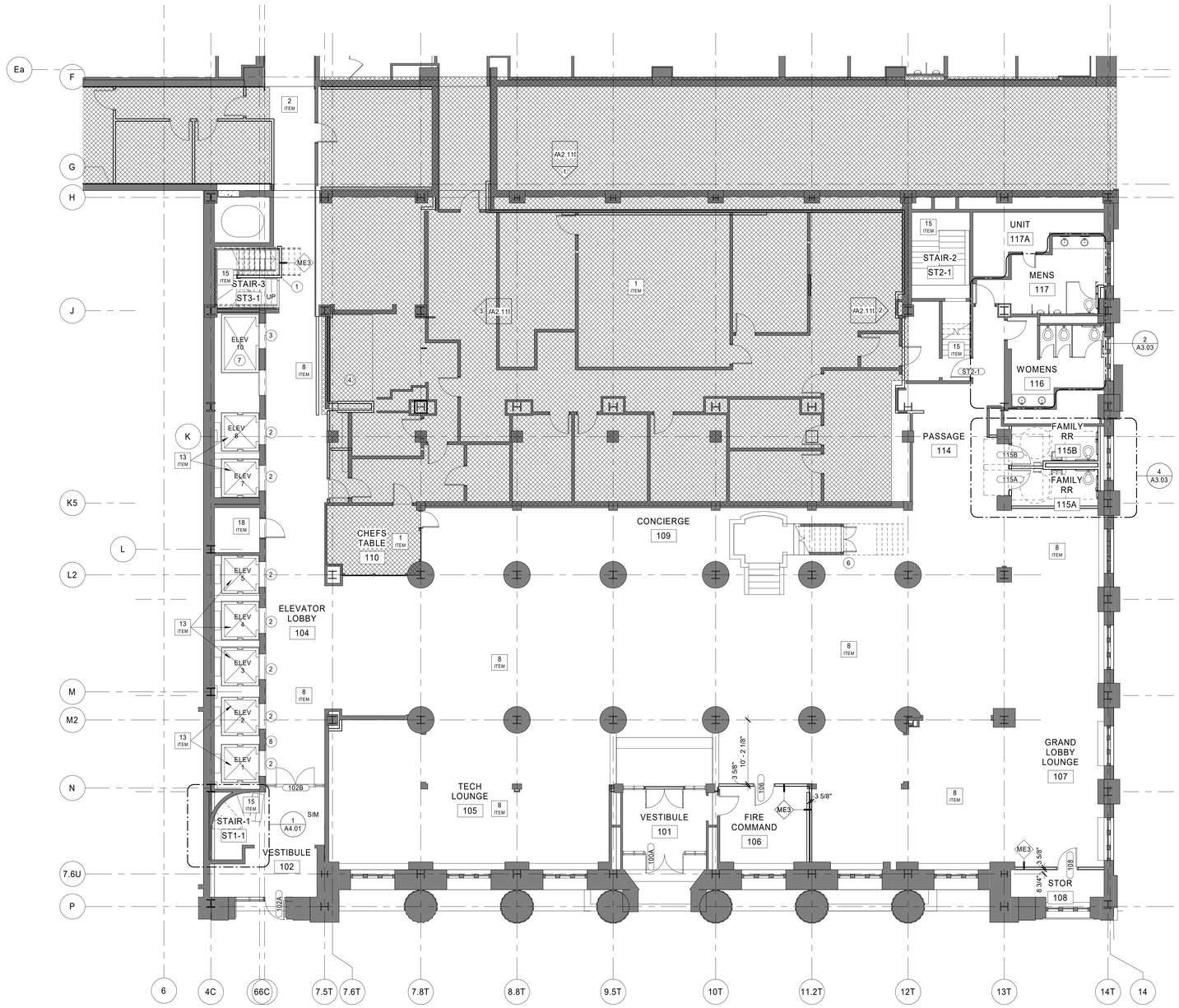

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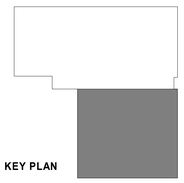

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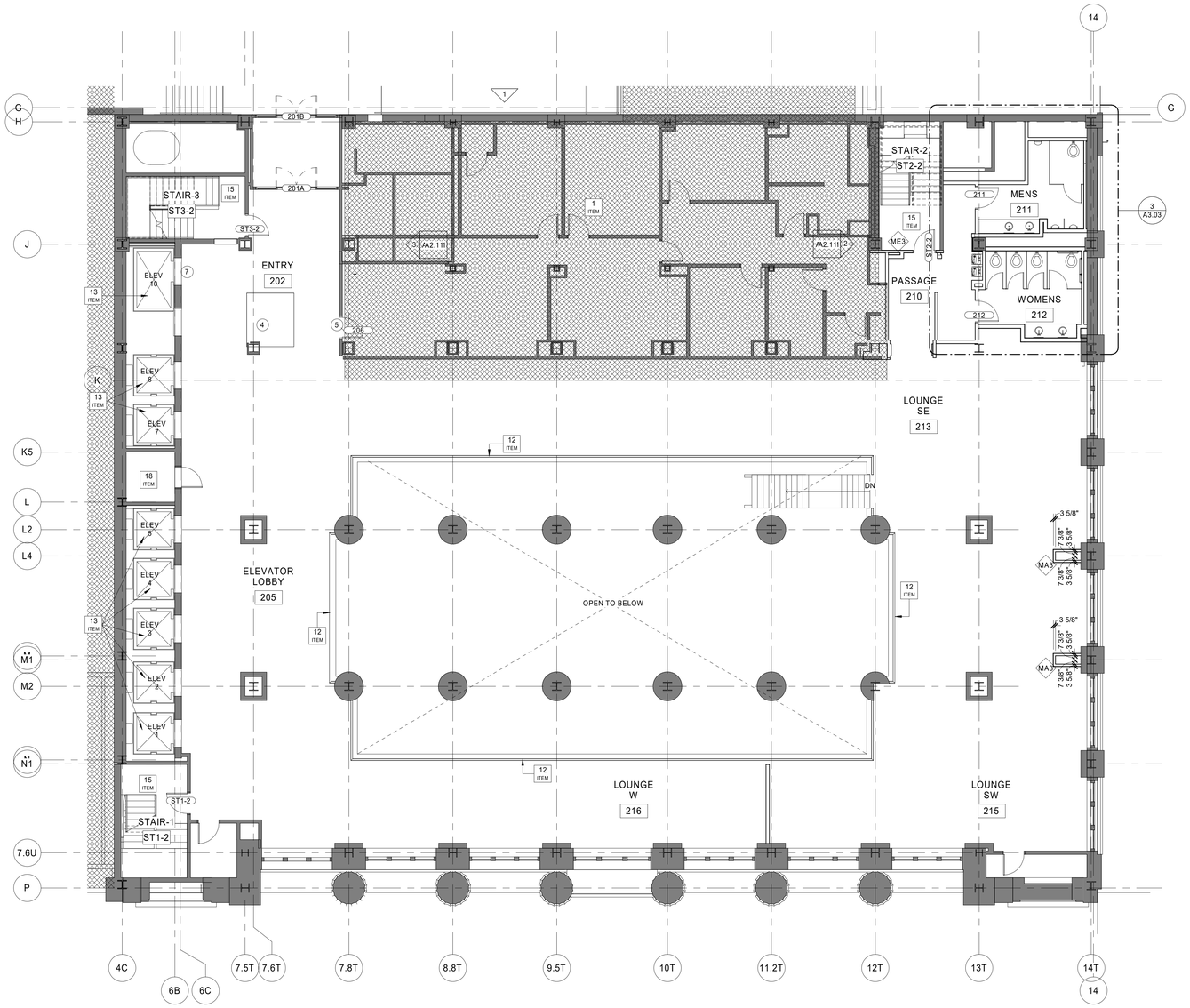

1 Tower - Mezzanine
A1.01-T2 1/8" = 1'-0"

NORTH

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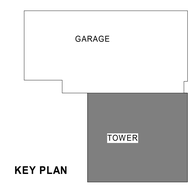
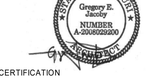


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plan - Mezzanine

A1.01-T2

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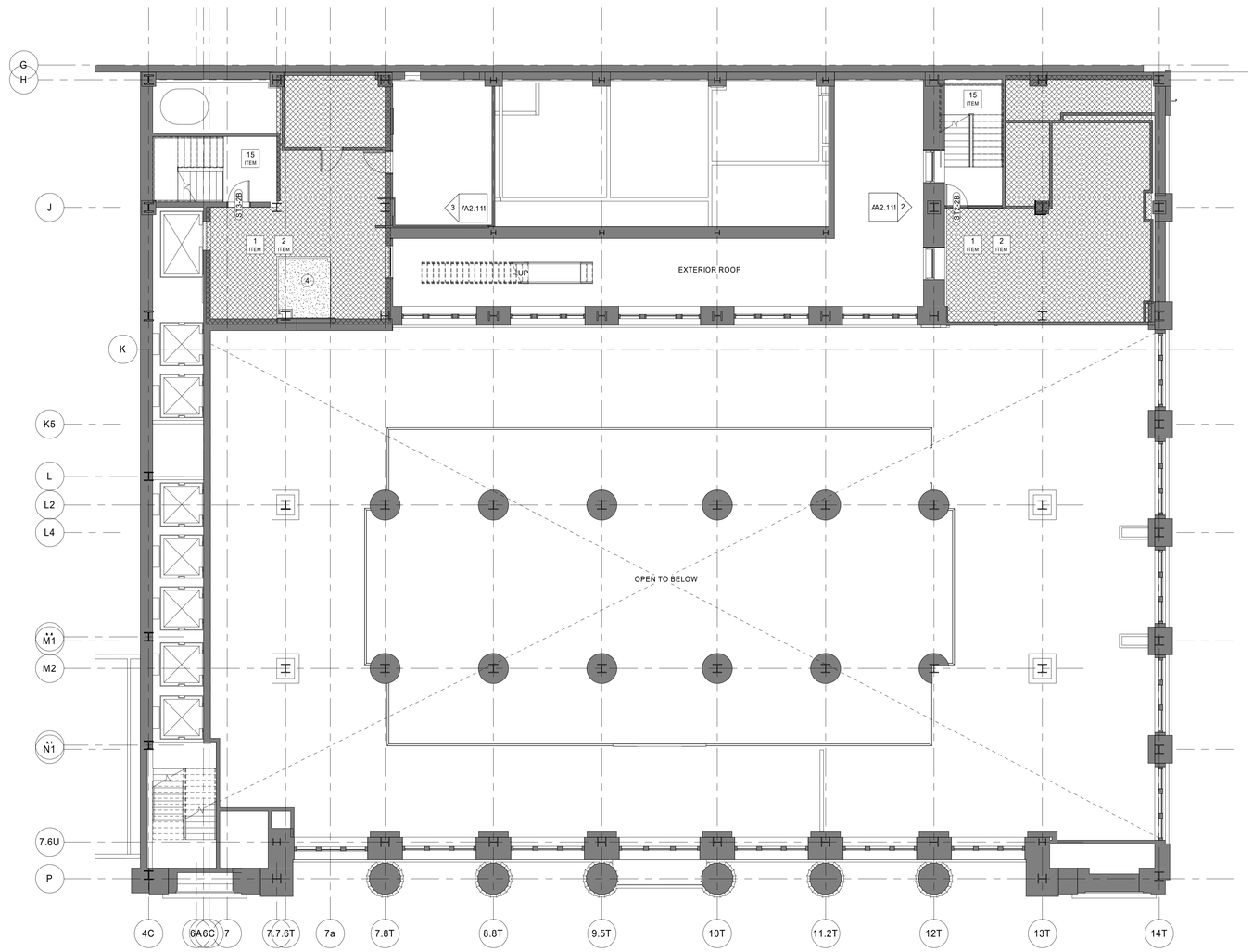

1 A1.01-T2B — T - 2B 1/8" = 1'-0"

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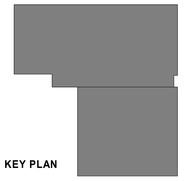

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plan - 2nd

A1.01-T2B

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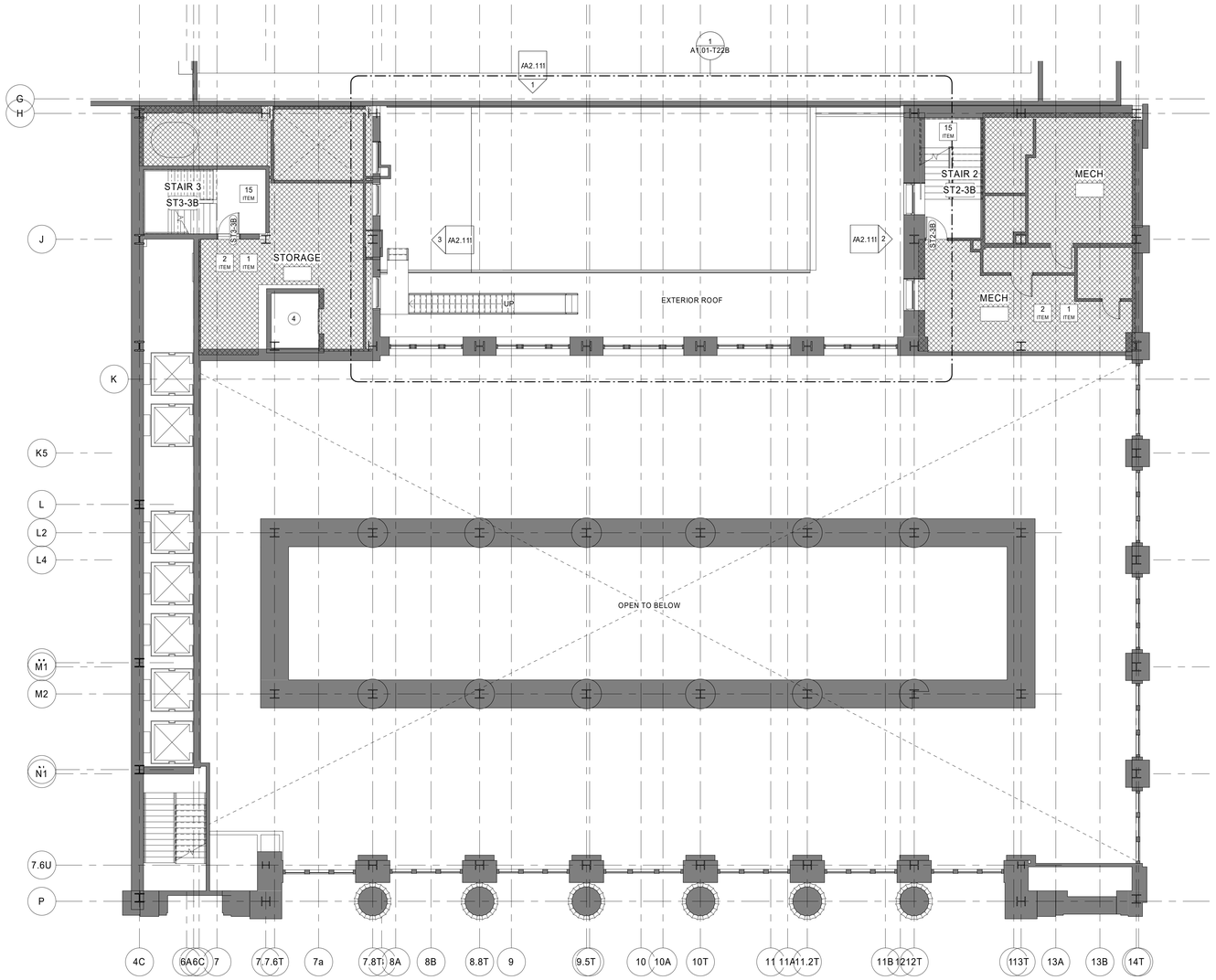

1 A1.01-T22B

1 A1.01-T3B — T - 3B — 1/8" = 1'-0"

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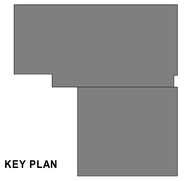

KEY PLAN

SEAL
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Liscense number: 2008029200

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Tower - Floor Plan - 3rd

A1.01-T3B

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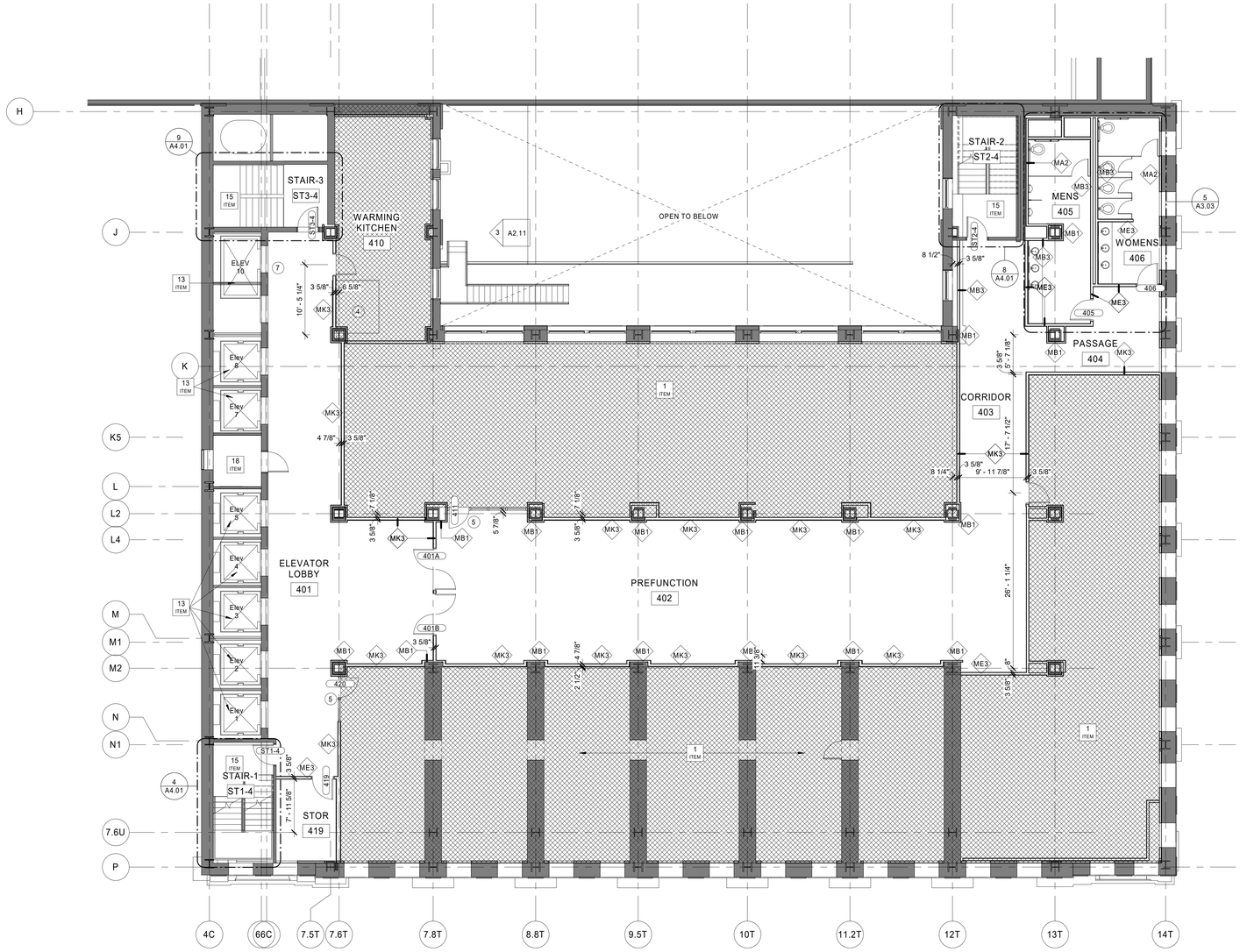

1 Floor Plan
A1.01-T4
Fourth Floor
1/8" = 1'-0"

NORTH

CODED BUILDING ITEM NOTES

1 ITEM	NO WORK TO BE COMPLETED IN POCHE'D AREAS IN THIS PHASE. MEP MAY HAVE LIMITED WORK IN THESE AREAS. COORDINATE WITH MEP DRAWINGS.
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SYMBOL LEGEND

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[S: 101A]	SIGN TAG: SEE SIGNAGE PACKAGE
W1	WINDOW TAG: SEE A8-SERIES DRAWINGS

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MO Certificate of Authority: W00923182

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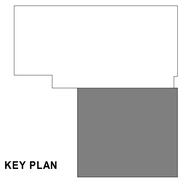

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plan - 4th

A1.01-T4

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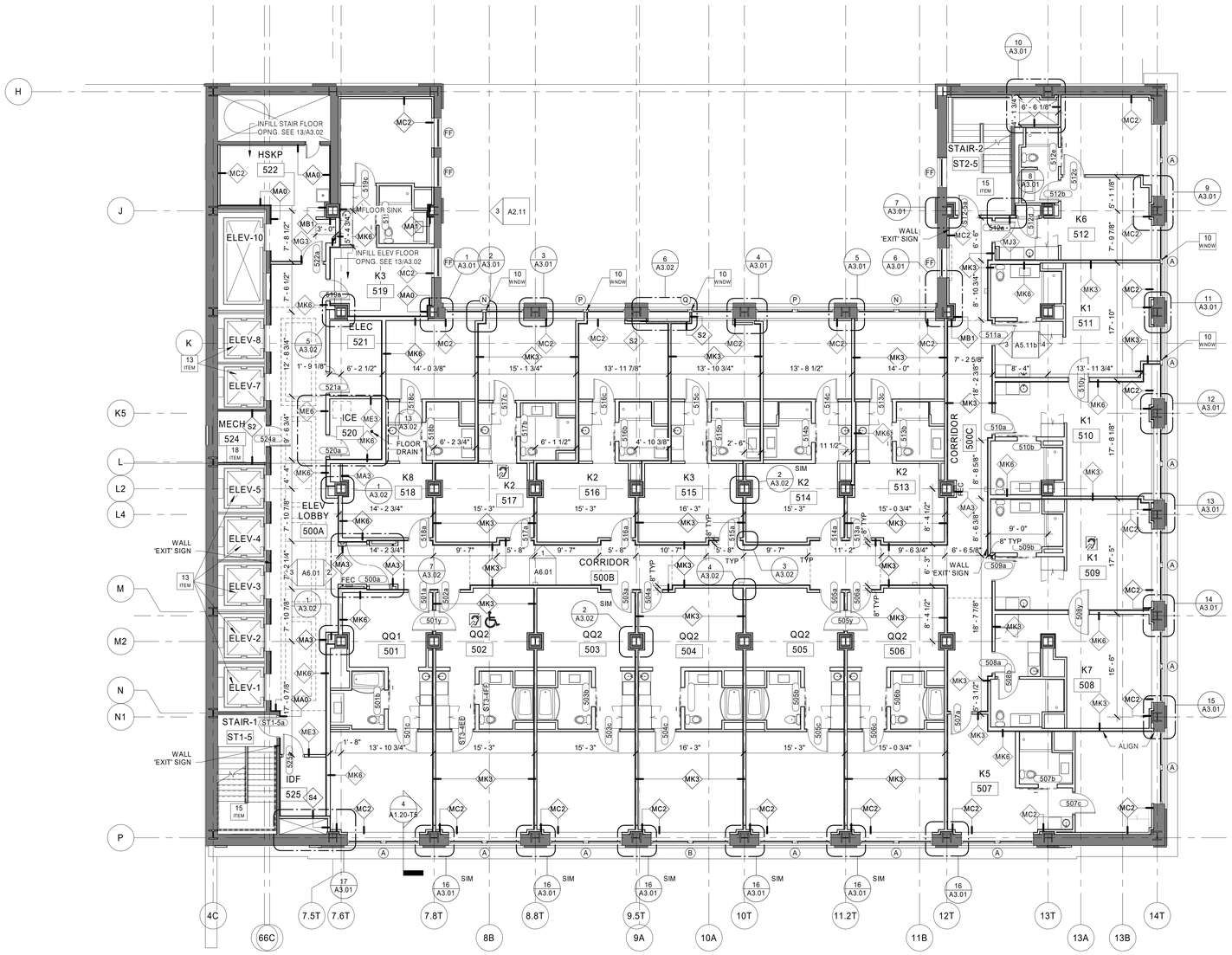

1 Floor Plan
A1.01-T5
Fifth Floor
1/8" = 1'-0"

NORTH

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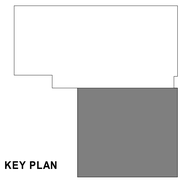

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
REGISTERED ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plan - 5th

A1.01-T5

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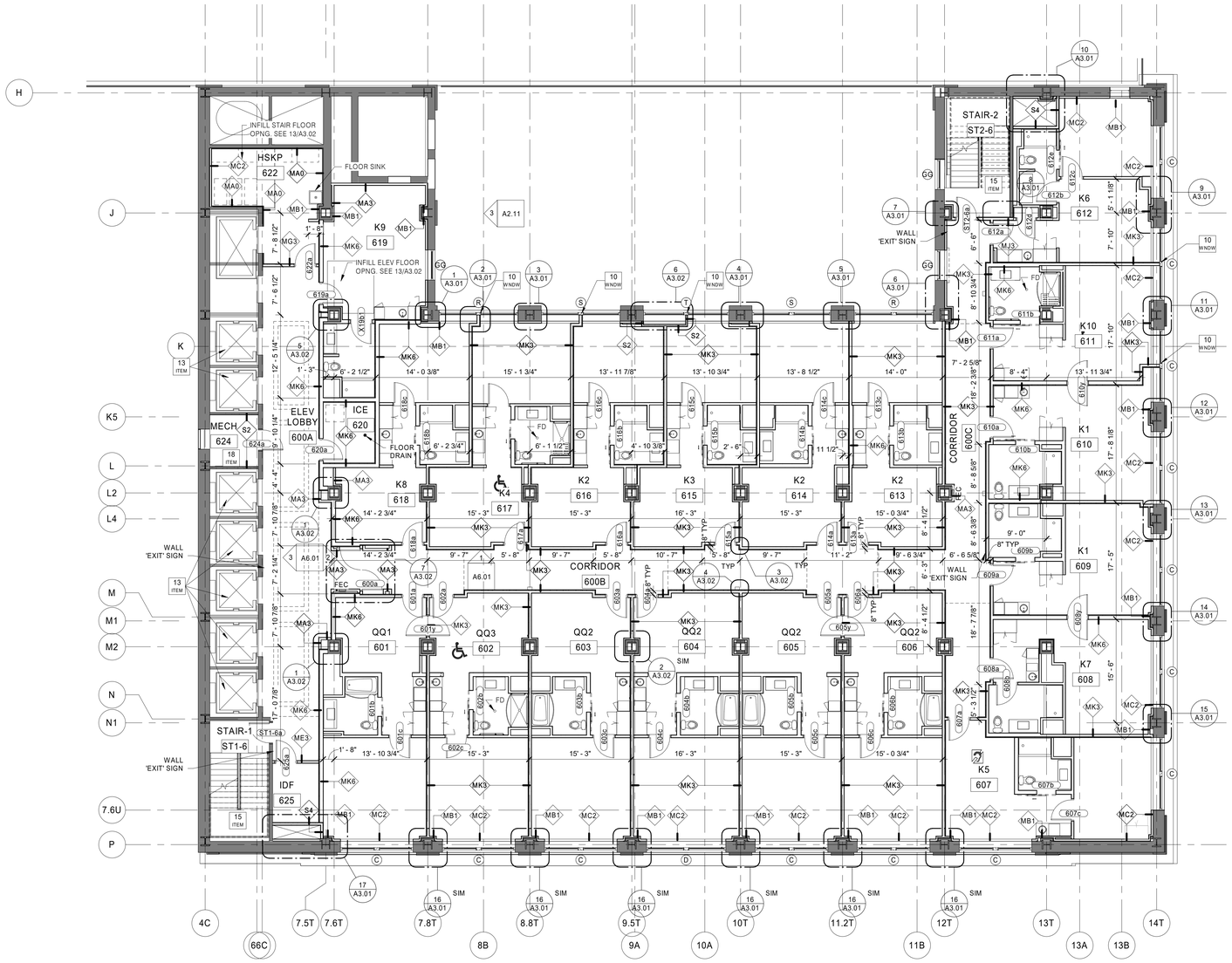

1 Floor Plan
A1.01-T6
Sixth Floor
1/8" = 1'-0"

NORTH

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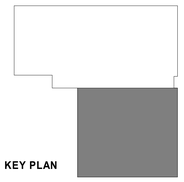

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

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Kansas City, MO 64198

Project No.: 18A023
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Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plan - 6th

A1.01-T6

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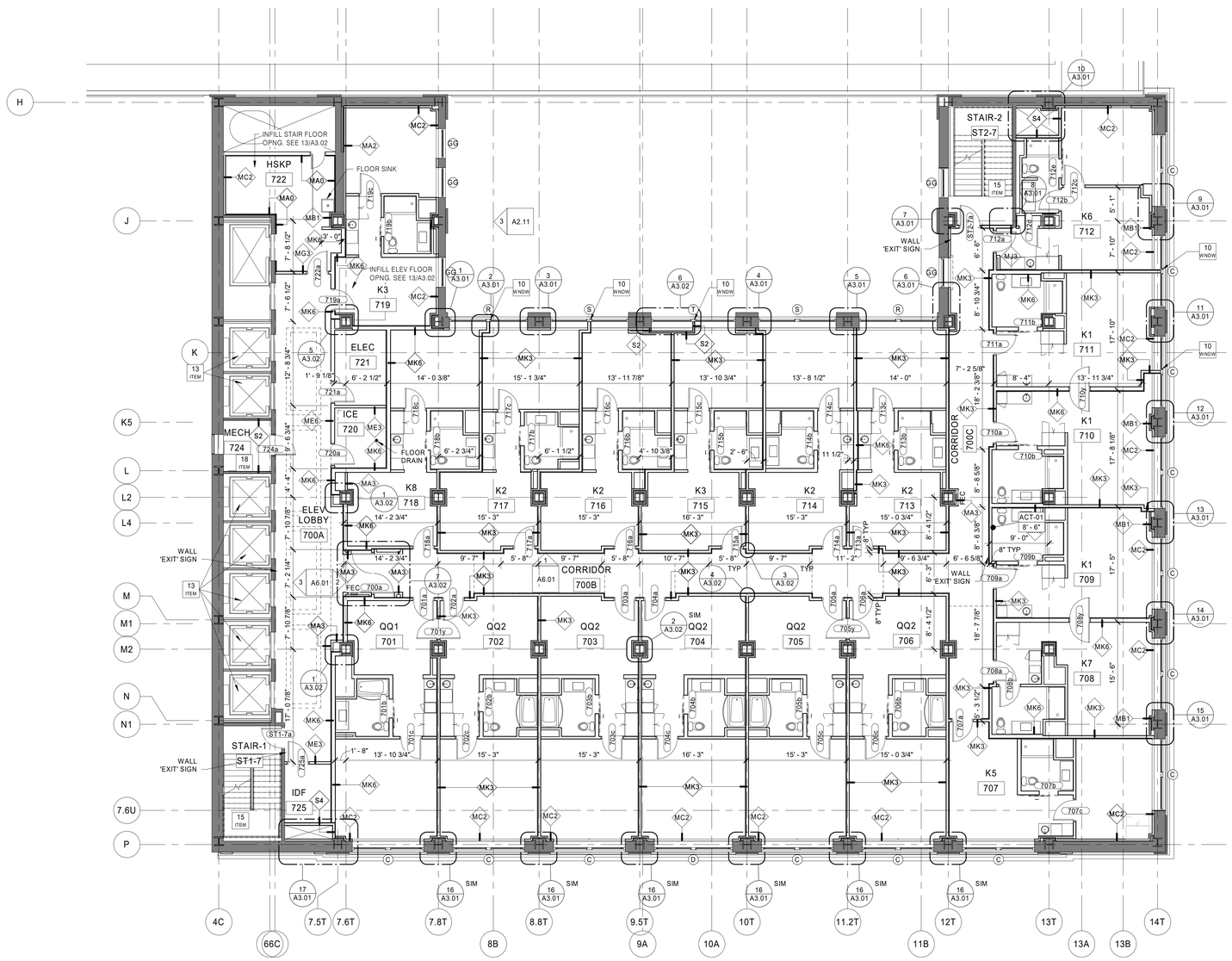

1 Floor Plan
7th, 10th, 13th, 16th, 19th Floor Plans
A1.01-T7 1/8" = 1'-0"

NORTH

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UNIT PLAN LAYOUT SIMILAR FOR FLOORS 10, 13, 16, AND 19

REFER TO BUILDING ELEVATIONS FOR 19TH FLOOR WINDOW TYPES.

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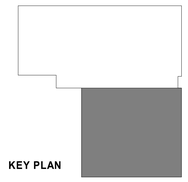

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plans - 7th, 10th, 13th, 16th, 19th

A1.01-T7

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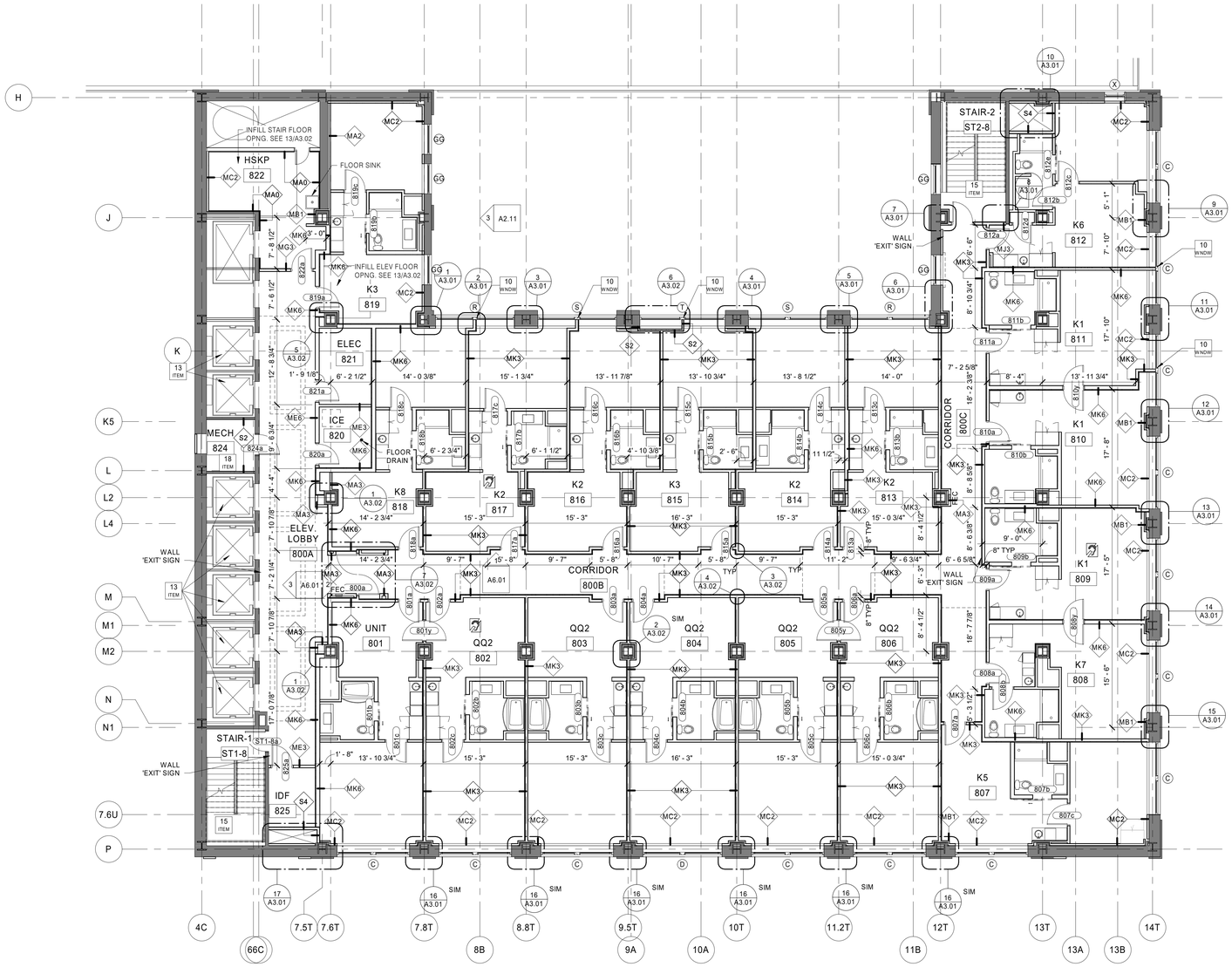

UNIT PLAN LAYOUT SIMILAR FOR FLOORS 14 AND 17

1 Floor Plan
A1.01-T8 8th, 14th, 17th Floors
1/8" = 1'-0"

NORTH

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

Browning Day Mullins Dierdorf Architects
Architecture
Landscape Architecture
Planning
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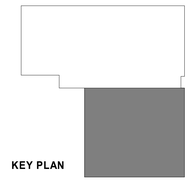

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SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
NOTARY PUBLIC

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FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
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Project No.: 18A023
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Tower - Floor Plans - 8th, 14th, 17th

A1.01-T8

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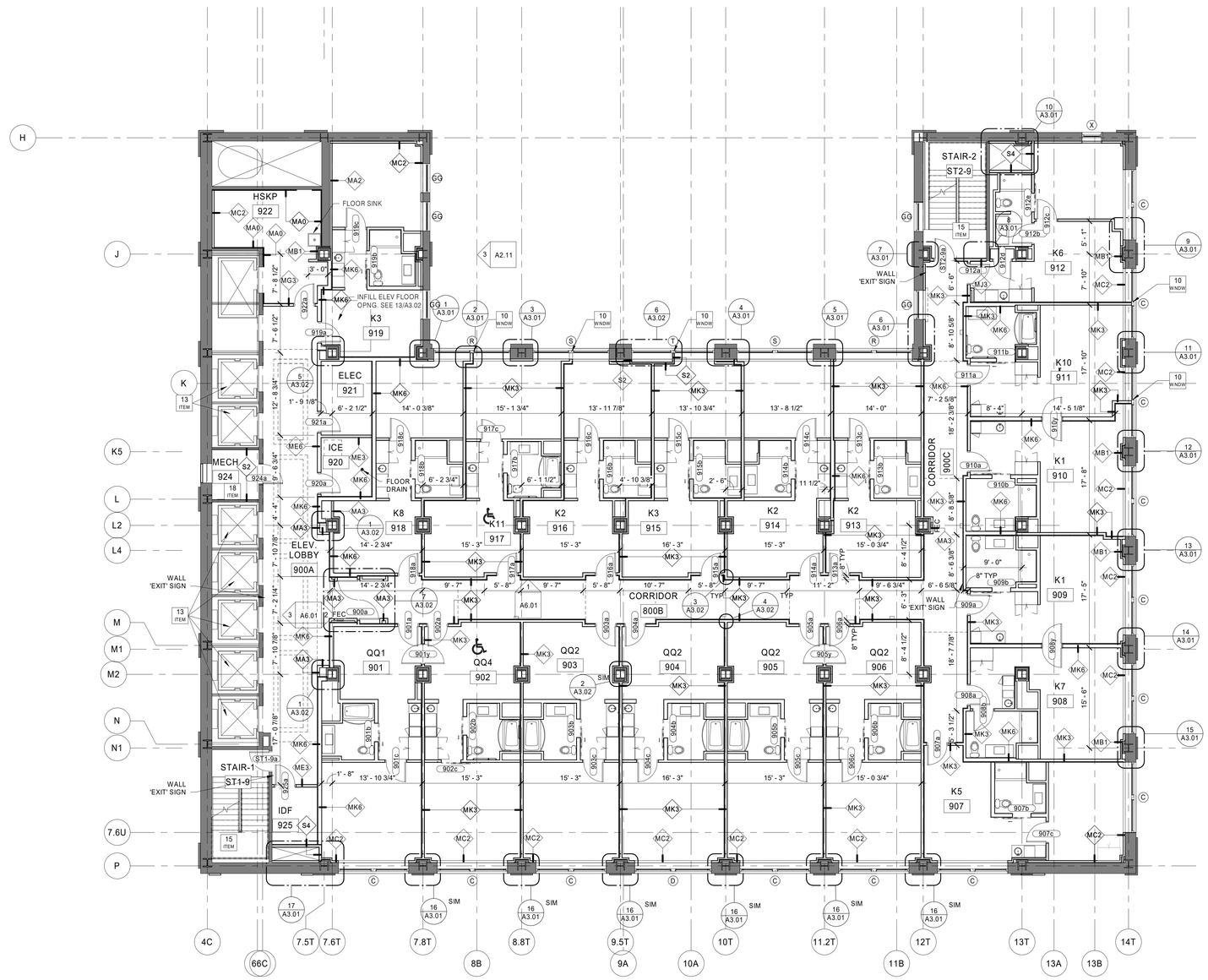

UNIT PLAN LAYOUT SIMILAR FOR FLOORS 12 AND 15

1 Floor Plan
9th, 12th, 15th Floors
A1.01-T9 1/8" = 1'-0"

NORTH

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Browning Day Mullins Dierdorf Architects
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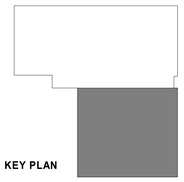

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
REGISTERED ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plans - 9th, 12th, 15th

A1.01-T9

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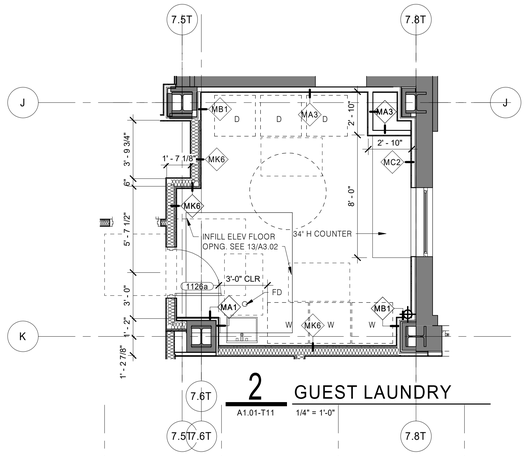
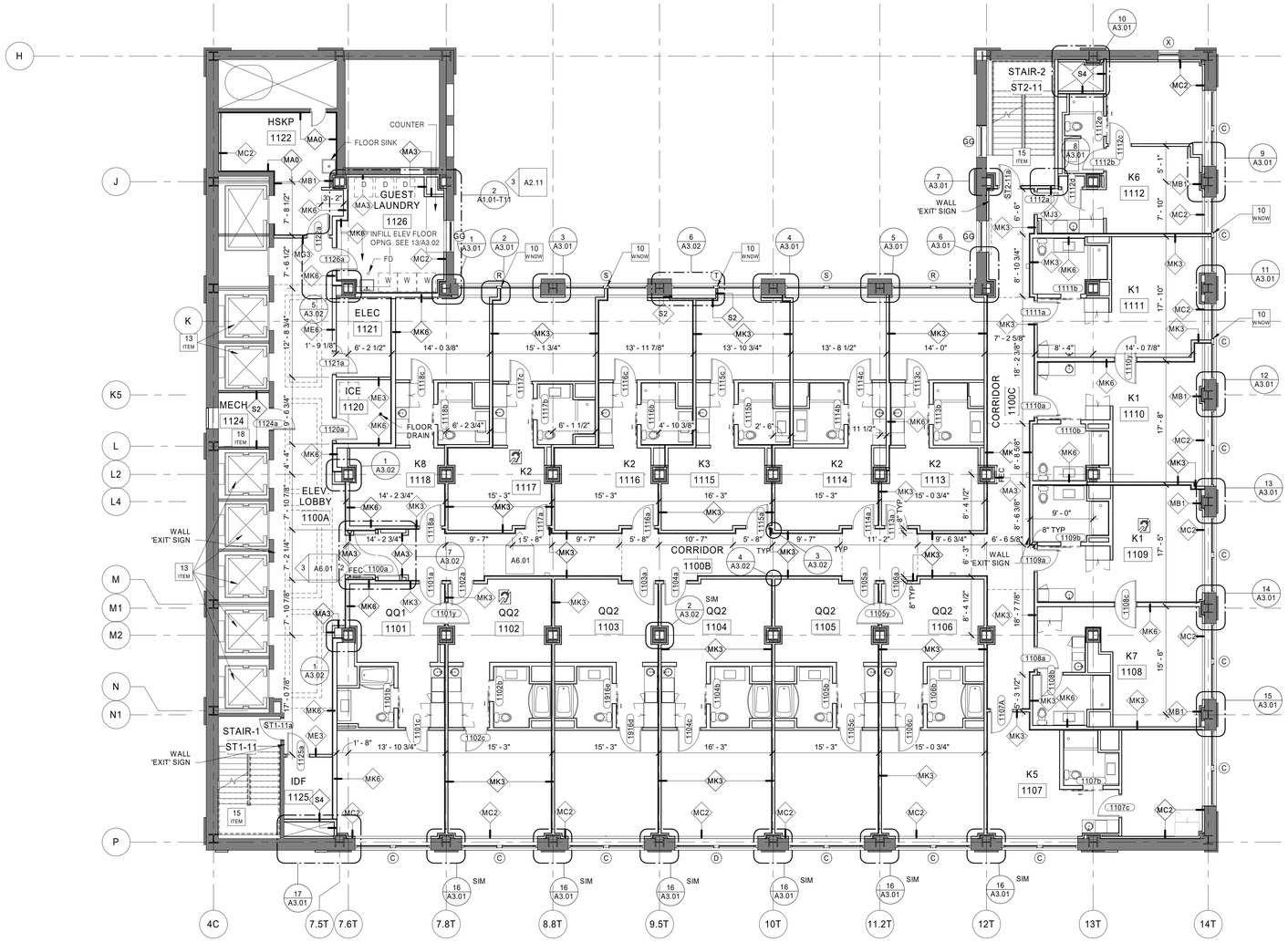


2 GUEST LAUNDRY
A1.01-T11 1/4" = 1'-0"



1 Floor Plan
Eleventh Floor
A1.01-T11 1/8" = 1'-0"

NORTH

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SYMBOL LEGEND

1 CATEGORY	CODED NOTES OF VARYING TYPES: SEE SCHEDULES ON THIS SHEET
101	DOOR TAG: SEE SHEET A8-SERIES DRAWINGS
1A	WALL TAG: SEE SHEET A0.10 and A0.11 FOR WALL TYPE AND FIRE RATING REQUIREMENTS. SEE A4 SERIES DRAWINGS FOR WALL FINISHES.
[$: 101A]	SIGN TAG: SEE SIGNAGE PACKAGE
W1	WINDOW TAG: SEE A8-SERIES DRAWINGS

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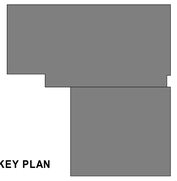

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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plan - 11th

A1.01-T11

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8 ITEM	EXISTING TERRAZZO FLOOR TO REMAIN AND TO BE REFINISHED.
9 ITEM	PATCH AND REPAIR COLUMNS AS REQUIRED TO MATCH SURROUNDING SURFACES.
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15 ITEM	EXISTING STAIRS. REFER TO A4.01 FOR FINISH DETAILS.
16 ITEM	REFINISH EXISTING TERRAZZO FLOORING AND BASE.
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18 ITEM	REFER TO MEP DRAWINGS FOR NOTES FOR THIS AREA.

SYMBOL LEGEND

1 CATEGORY	CODED NOTES OF VARYING TYPES: SEE SCHEDULES ON THIS SHEET
101	DOOR TAG: SEE SHEET A8-SERIES DRAWINGS
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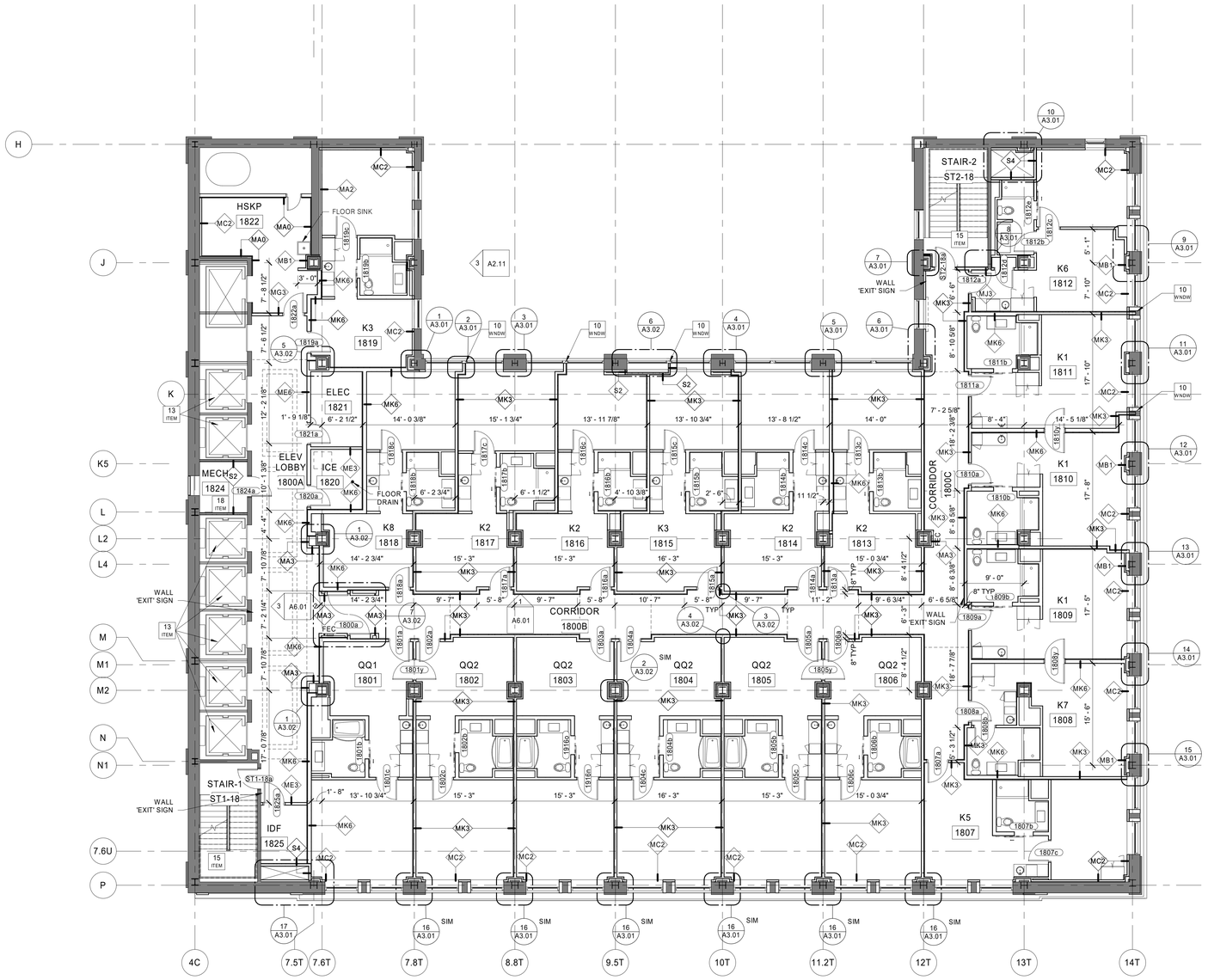
[S: 101A]	SIGN TAG: SEE SIGNAGE PACKAGE
W1	WINDOW TAG: SEE A8-SERIES DRAWINGS



1 Floor Plan
A1.01-T18
Eighteenth Floor
1/8" = 1'-0"

NORTH

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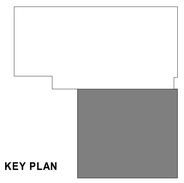

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
LICENSED PROFESSIONAL ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plan - 18th

A1.01-T18

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(#) - PHASE 1 PLAN NOTES

1. FINISH WALLS ADJACET TO EXISTING WALLS TO MATCH EXISTING WALLS.
2. EXISTING ELEVATOR DOOR TO REMAIN. REFINISH DOOR TO MATCH ORIGINAL FINISH.
3. NEW ELEVATOR DOOR. DOOR TO MATCH EXISTING ELEVATOR DOORS.
4. INFILL FLOOR WHERE ELEVATOR WAS DEMOLISHED. REFER TO STRUCTURAL DRAWINGS.
5. PROVIDE TEMPORARY DOOR. PROVIDE 20 MIN DOOR CLOSER AND LOCK.
6. ROOM WALLS TO REMAIN AS EXISTING. PREP FOR NEW FINISH.
7. NEW SERVICE ELEVATOR. REFER TO SPECIFICATIONS
8. BRONZE MAILBOX TO REMAIN. REFINISH TO ORIGINAL FINISH.

GENERAL PLAN NOTES

1. DO NOT SCALE DRAWINGS.
2. DIMENSIONS ARE TAKEN TO FACE OF STUD, FACE OF CONCRETE, FACE OF MASONRY, FACE OF EXISTING FINISHES, AND COLUMN LINES UNLESS SPECIFICALLY NOTED OTHERWISE. FINISHED (FIN, FD) OR CLEAR (CLR) DIMENSIONS INDICATE FINISH SURFACE TO FINISH SURFACE SPANS BETWEEN WALLS OR FROM FINISH SURFACE OF WALL TO LATCH/HINGE OF ADJACENT DOOR OR CENTERLINE OF PLUMBING FIXTURES.
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7. REFER TO SPECIFICATIONS FOR EACH ITEM REPRESENTED WITHIN THE DRAWING SET.
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2 ITEM	EXISTING DOORS IN CORRIDORS TO REMAIN. CONTRACTOR TO VERIFY THAT EXISTING HARDWARE FUNCTIONS AND DOORS ARE IN OPERABLE CONDITION. DOORS TO BE REPAINTED.
3 ITEM	NEW RAMP. RAMP TO HAVE NUMUMUM 1/12 SLOPE. HANDRAILS REQUIRED ON BOTH SIDES TO COMPLY WITH ADA SECTION 403.
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1 Floor Plan
A1.01-T20 Twentieth Floor
1/8" = 1'-0"

NORTH

SYMBOL LEGEND

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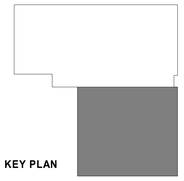
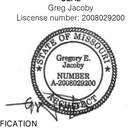


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plan - 20th

A1.01-T20

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1 Floor Plan
A1.01-T21 Twenty First Floor
1/8" = 1'-0"

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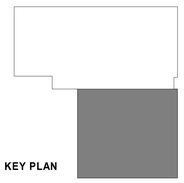

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plan - 21st

A1.01-T21

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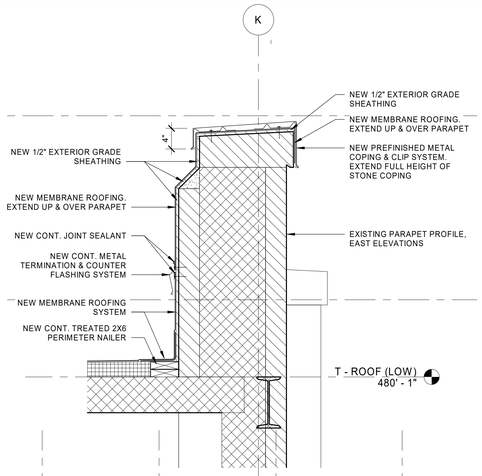
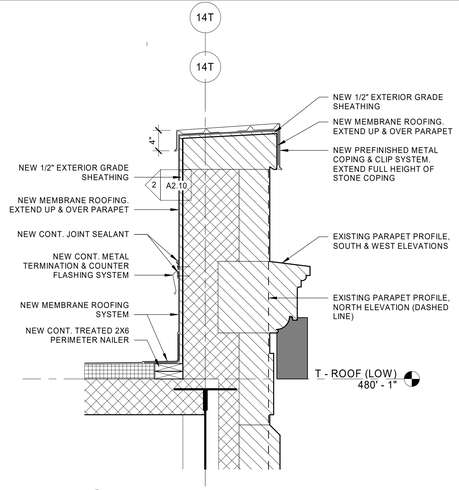
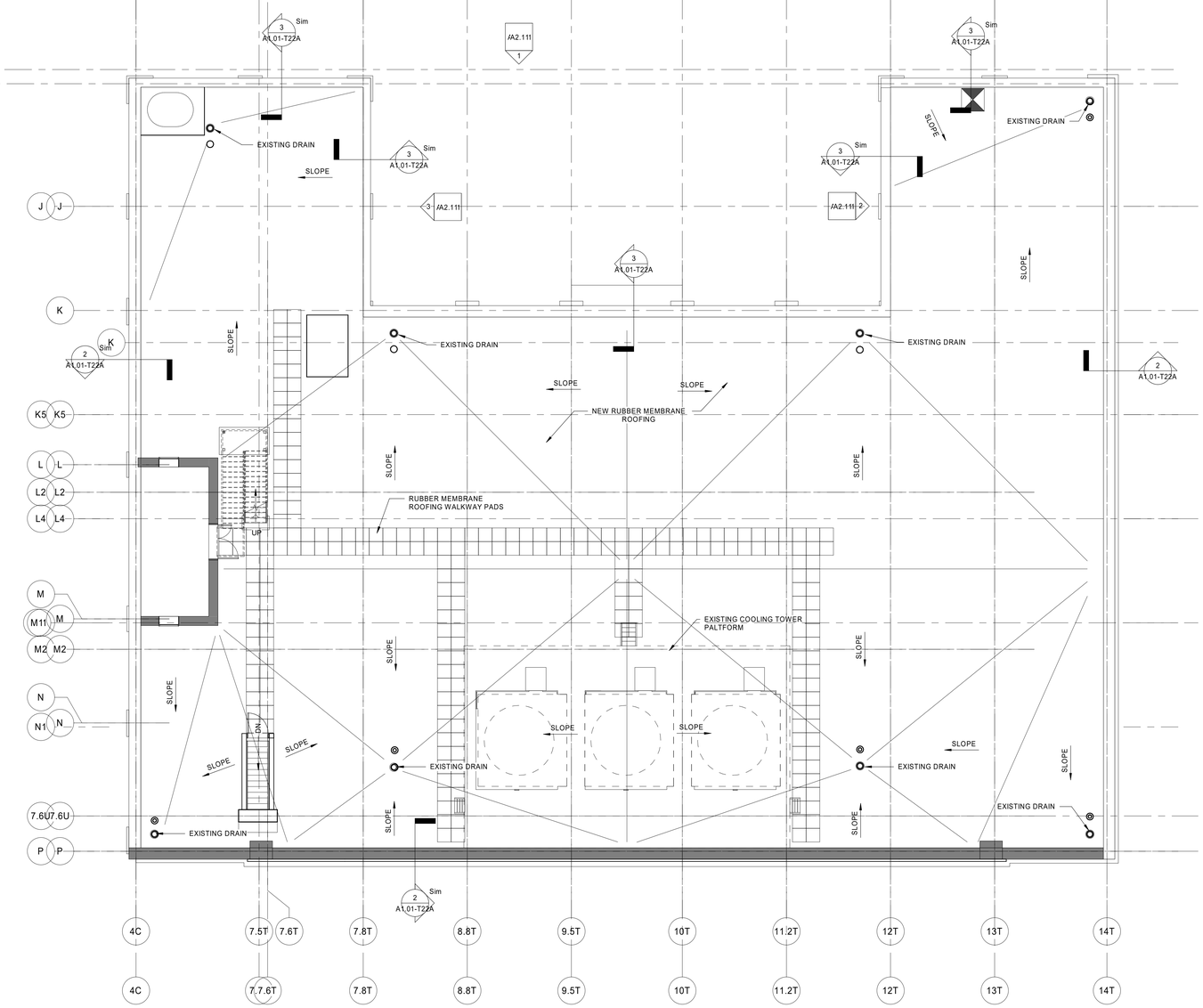


3 Roof Parapet - East
A1.01-T22A 1" = 1'-0"



2 Roof Parapet - South & West
A1.01-T22A 1" = 1'-0"



1 Tower-Roof (High)
A1.01-T22A 1/8" = 1'-0"

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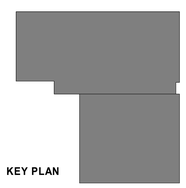

KEY PLAN

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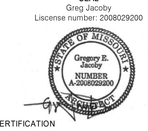

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Project No.: 18A023
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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Main Roof Plan

A1.01-T22A

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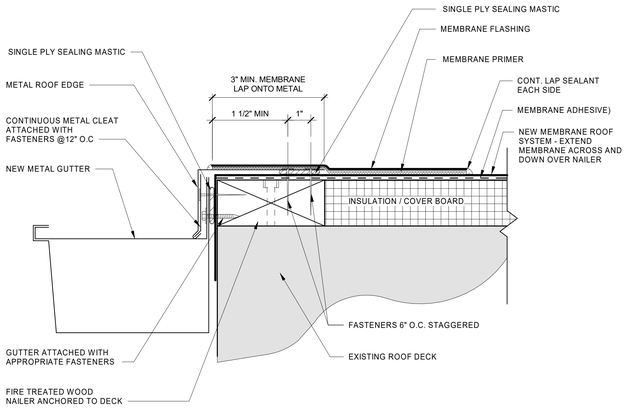
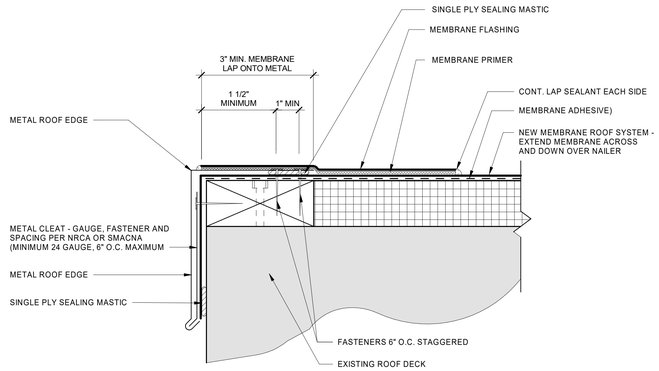
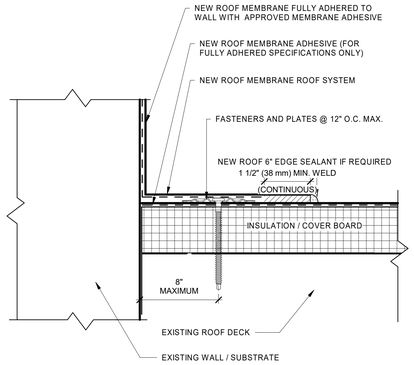


2 GUTTER & METAL EDGE DETAIL
A1.01-T22B 6" = 1'-0"



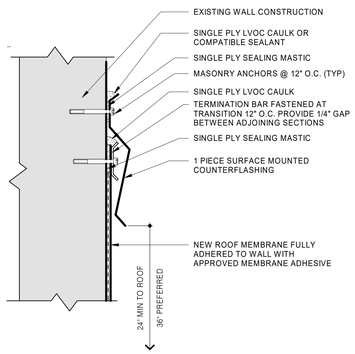
3 METAL DRIP EDGE DETAIL
A1.01-T22B 6" = 1'-0"



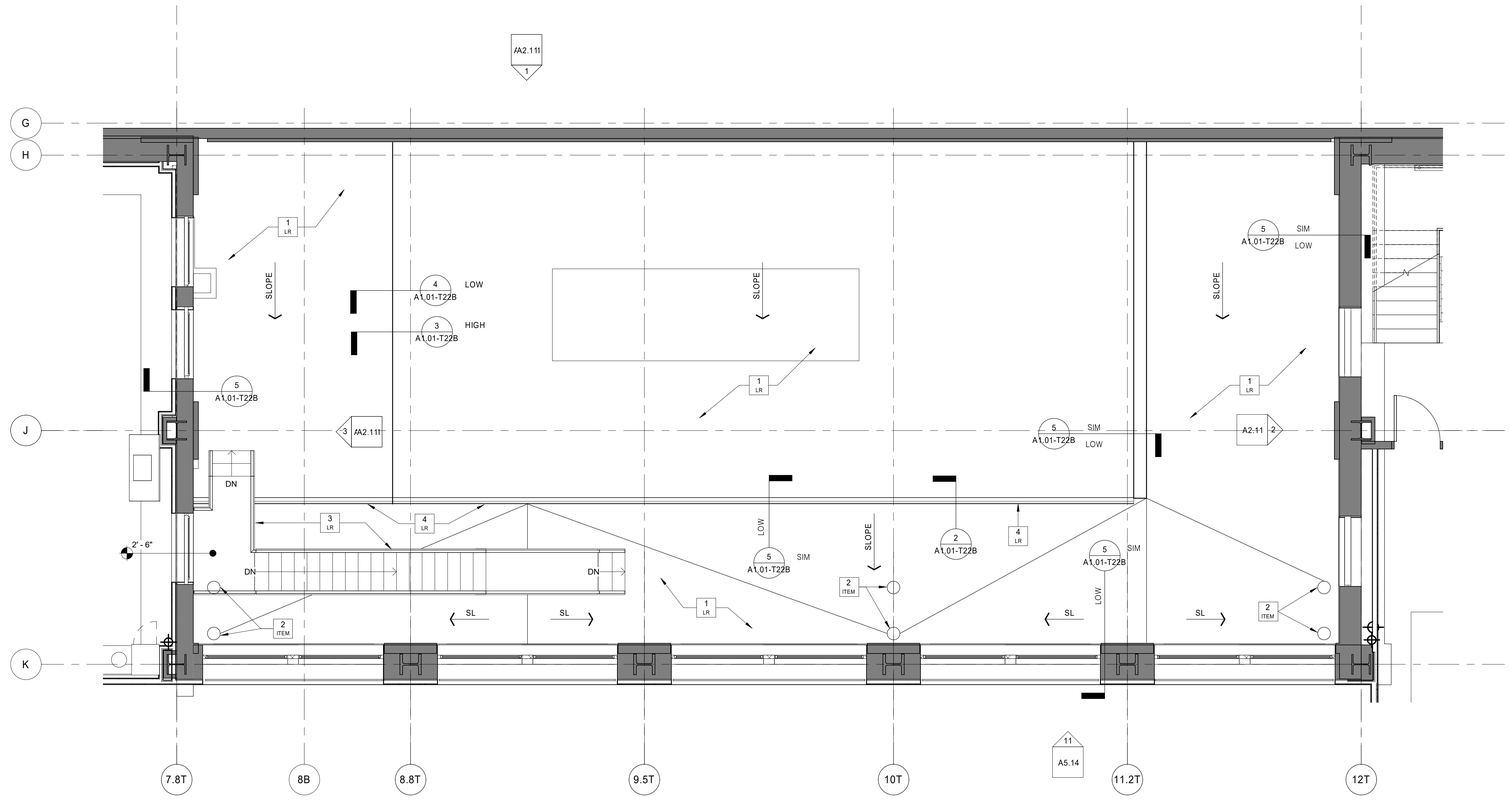
4 BASE FLASHING DETAIL
A1.01-T22B 6" = 1'-0"

CODED LOWER ROOF NOTES

1 LR	NEW MEMBRANE ROOF SYSTEM
2 LR	REPLACE EXISTING ROOF DRAIN AND ADD NEW OVERFLOW DRAIN - VERIFY NUMBER AND LOCATIONS
3 LR	EXISTING STEEL STAIR. CLEAN AND PAINT PER SPECIFICATIONS
4 LR	NEW METAL GUTTERS and DOWNSPOUTS



5 VERTICAL TERMINATION
A1.01-T22B 6" = 1'-0"



1 Lower Roof - 4th Level
A1.01-T22B 1/4" = 1'-0"

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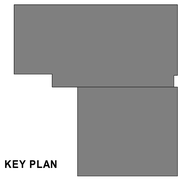

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Lower Roof plan

A1.01-T22B

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SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-01 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2X2 - BACK OF HOUSE/ADMIN
ACT-2 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - PUBLIC AREAS / BALLROOM
ACT-4 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - GUEST CORRIDOR
ACT-5 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - BACK OF HOUSE AT TOWER
ACT-6 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - SCRUBABLE/WIPEABLE

CODED CEILING NOTES

1 CEIL	NO WORK TO BE COMPLETED IN POCHE'D AREAS IN THIS PHASE. MEP MAY HAVE LIMITED WORK IN THESE AREAS. COORDINATE WITH MEP DRAWINGS.
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1 A1.20-G0 Basement RCP - Garage

1/8" = 1'-0"

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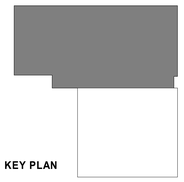

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage - RCP - Basement

A1.20-G0

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SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-01 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2X2 - BACK OF HOUSE/ADMIN
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1 Ground Floor RCP - Garage
A1.20-G1 1/8" = 1'-0"

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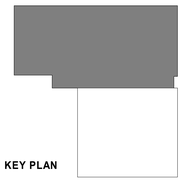

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage - RCP - 1st Floor

A1.20-G1

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SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-01 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2X2 - BACK OF HOUSE/ADMIN
ACT-2 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - PUBLIC AREAS / BALLROOM
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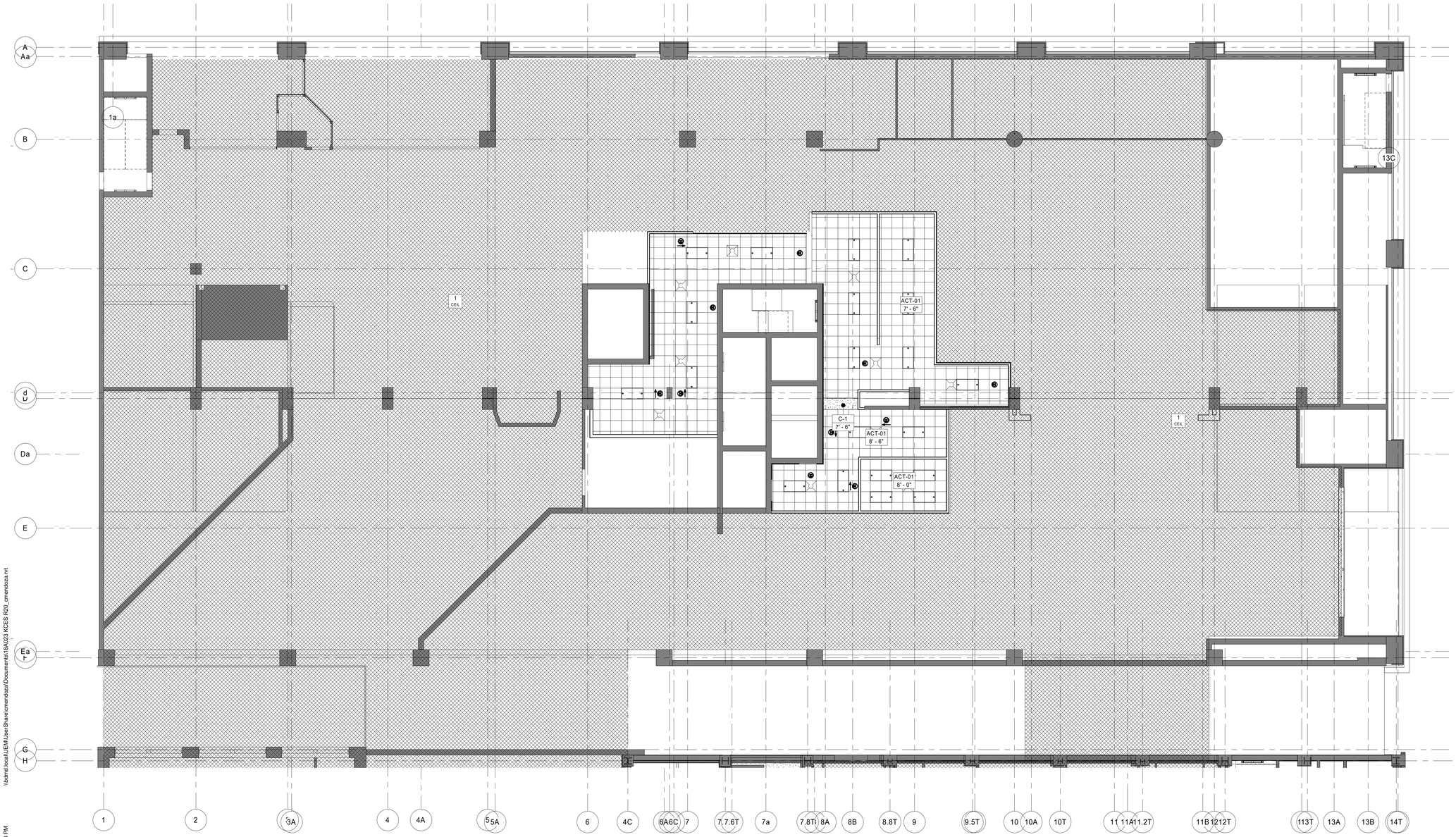

1 Mezzanine RCP - Garage
A1.20-G2 1/8" = 1'-0"

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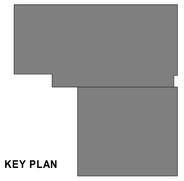

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

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REVISION SCHEDULE		
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Garage - RCP - Mezzanine

A1.20-G2

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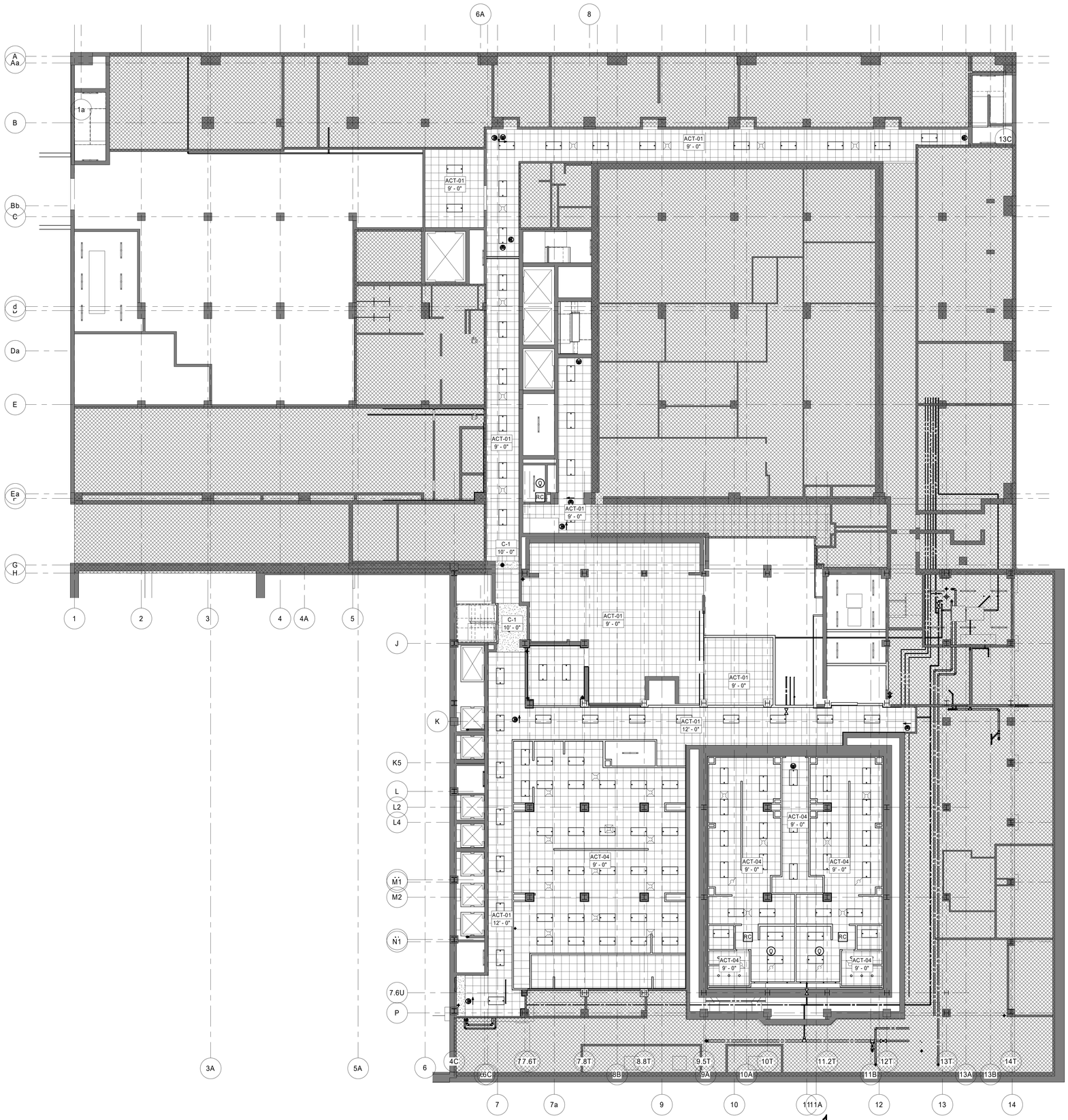

1 Basement
A1.20-OAB 3/32" = 1'-0"

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SYMBOL LEGEND

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Website: www.h-be.com

SK Design Group, Inc.
Civil Engineer

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Phone: (913) 451-1818
Website: www.skdesigngroup.net

Matchline Design Group, LLC
Interior Design

10300 North Central Expressway, Suite 335
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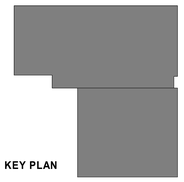
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Overall RCP - Basement

A1.20-OAB

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1 T - GROUND FLR OA

A1.20-OAG 3/32" = 1'-0"

GENERAL CEILING PLAN NOTES

1. DO NOT SCALE DRAWINGS.
2. UNLIKE FLOOR PLAN DIMENSIONS, DIMENSIONS SHOWN ON THE REFLECTED CEILING PLAN ARE FINISHED DIMENSIONS UNLESS NOTED OTHERWISE.
3. DIMENSIONS TO LIGHT FIXTURES ARE TO THE CENTERPOINT OF THE FIXTURE, TO THE FINISHED EDGE OF FIXTURE, OR TO THE CENTERLINE OF ASSOCIATED CEILING GRID SYSTEM.
4. ALL DESIGN TEAM DRAWINGS SHALL BE USED TO LOCATE BUILDING ELEMENTS. CONTACT THE ARCHITECT WITH CONFLICTS, DISCREPANCIES, AND OMISSIONS PRIOR TO COMMENCEMENT OF WORK.
5. REFER TO SPECIFICATIONS FOR EACH ITEM REPRESENTED WITHIN THE DRAWING SET.
6. NOT ALL LIGHT FIXTURES MAY BE REPRESENTED ON THE ARCHITECTURAL DRAWINGS. SEE ELECTRICAL & INTERIOR DESIGN DRAWINGS FOR ADDITIONAL LIGHT FIXTURE TYPES AND LOCATIONS. CONFIRM ANY DESCREPANCIES BETWEEN DRAWINGS WITH THE ARCHITECT PRIOR TO COMMENCEMENT OF WORK.
7. WHERE GYP. BD. CEILINGS ARE INDICATED TO BE LOWER THAN ADJACENT ACT CEILINGS THE CONTRACTOR IS TO PROVIDE A FINISHED VERTICAL GYP. BD. BULKHEAD RETURN FROM THE LOWER FINISHED GYP. BD. CEILING TO A MINIMIMUM OF 6" ABOVE THE ADJACENT ACT CEILING UNLESS NOTED OTHERWISE. SEE FLOOR PLANS AND LIFE SAFETY PLANS.

8. WHERE GYP. BD. CEILINGS ARE INDICATED TO BE LOWER THAN ADJACENT GYP. DB. CEILINGS THE CONTRACTOR IS TO PROVIDE A CONTINUOUS FINISHED VERTICAL GYP. BD. BULKHEAD RETURN TO THE ADJACENT FINISHED GYP. BD. CEILING.

9. REFER TO INDIVIDUAL GUESTROOM SHEETS RCP FOR LIGHT LOCATIONS IN THOSE ROOMS.
10. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UINTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
11. RENOVATIONS TO STAIRWELLS ST-1, ST-2 & ALL ELEVATORS (IN GRAY POCHE) WILL BE ISSUED IN FUTURE DRAWING PACKAGE.

CODED CEILING NOTES

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4 CEIL	PATCH AND REPAINT EXISTING GYP. BD. COFFER CEILINGS IN THESE AREAS. COORDIANTE WITH MEP.
5 CEIL	MATCH EXISTING GYP. BD. COFFER CEILING IN THESE AREAS. COORDINATE WITH MEP.

SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-01 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2X2 - BACK OF HOUSE/ADMIN
ACT-2 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - PUBLIC AREAS / BALLROOM
ACT-4 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - GUEST CORRIDOR
ACT-5 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - BACK OF HOUSE AT TOWER
ACT-6 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - SCRUBABLE/WIPEABLE

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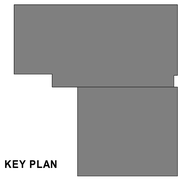
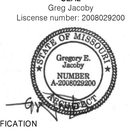


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



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The Grand Reserve

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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Overall RCP - Ground Floor

A1.20-OAG

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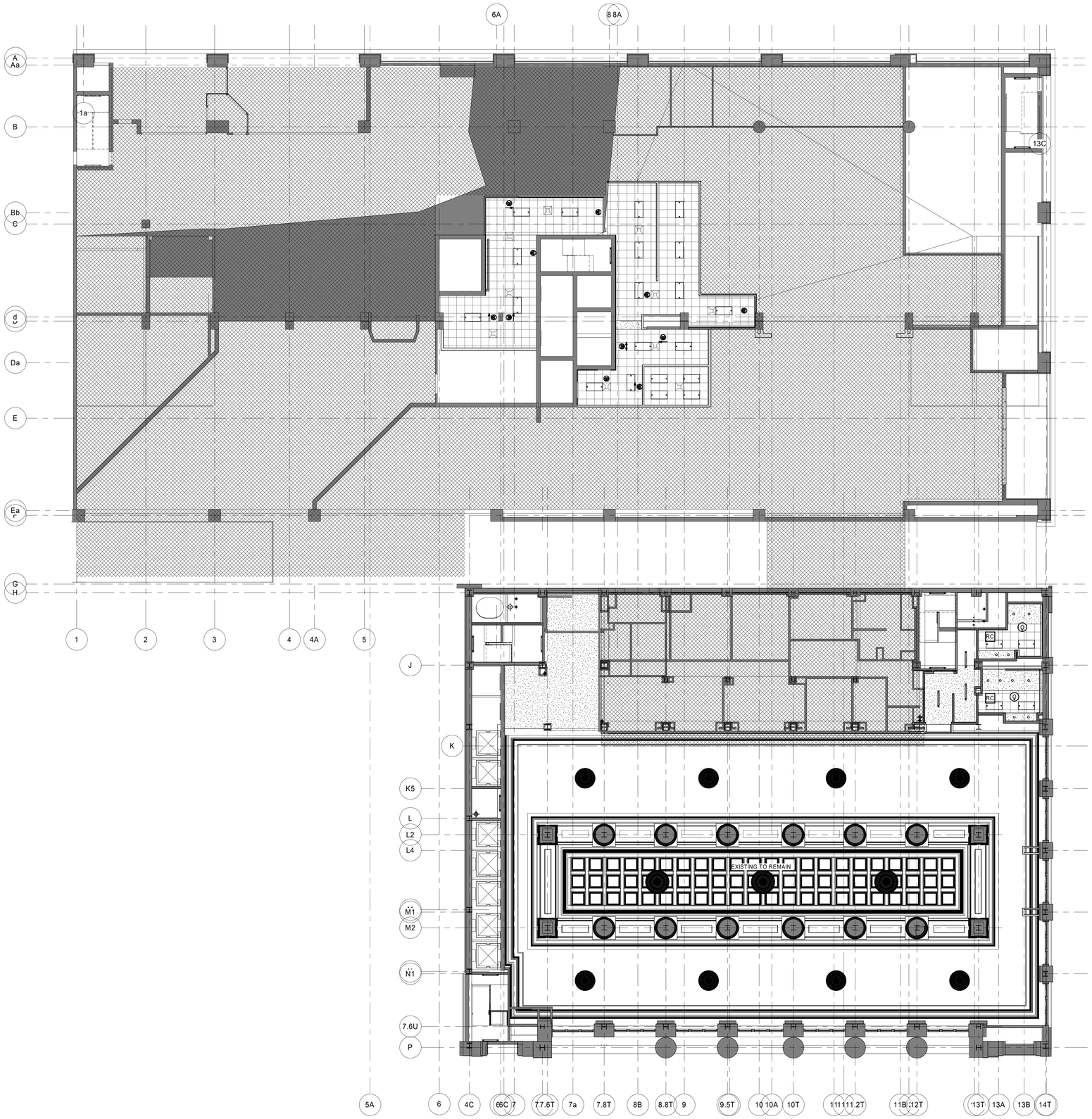

1 T - 2nd Overall
A1.20-OAM 3/32" = 1'-0"

GENERAL CEILING PLAN NOTES

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8. WHERE GYP. BD. CEILINGS ARE INDICATED TO BE LOWER THAN ADJACENT GYP. DB. CEILINGS THE CONTRACTOR IS TO PROVIDE A CONTINUOUS FINISHED VERTICAL GYP. BD. BULKHEAD RETURN TO THE ADJACENT FINISHED GYP. BD. CEILING.

9. REFER TO INDIVIDUAL GUESTROOM SHEETS RCP FOR LIGHT LOCATIONS IN THOSE ROOMS.
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SYMBOL LEGEND

C1 X'-X"	C1 - GYPSUM BOARD CEILING
ACT-01 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2X2 - BACK OF HOUSE/ADMIN
ACT-2 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - PUBLIC AREAS / BALLROOM
ACT-4 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - GUEST CORRIDOR
ACT-5 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - BACK OF HOUSE AT TOWER
ACT-6 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - SCRUBABLE/WIPEABLE

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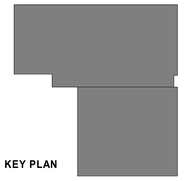
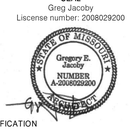


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Overall RCP - Mezzainine

A1.20-OAM

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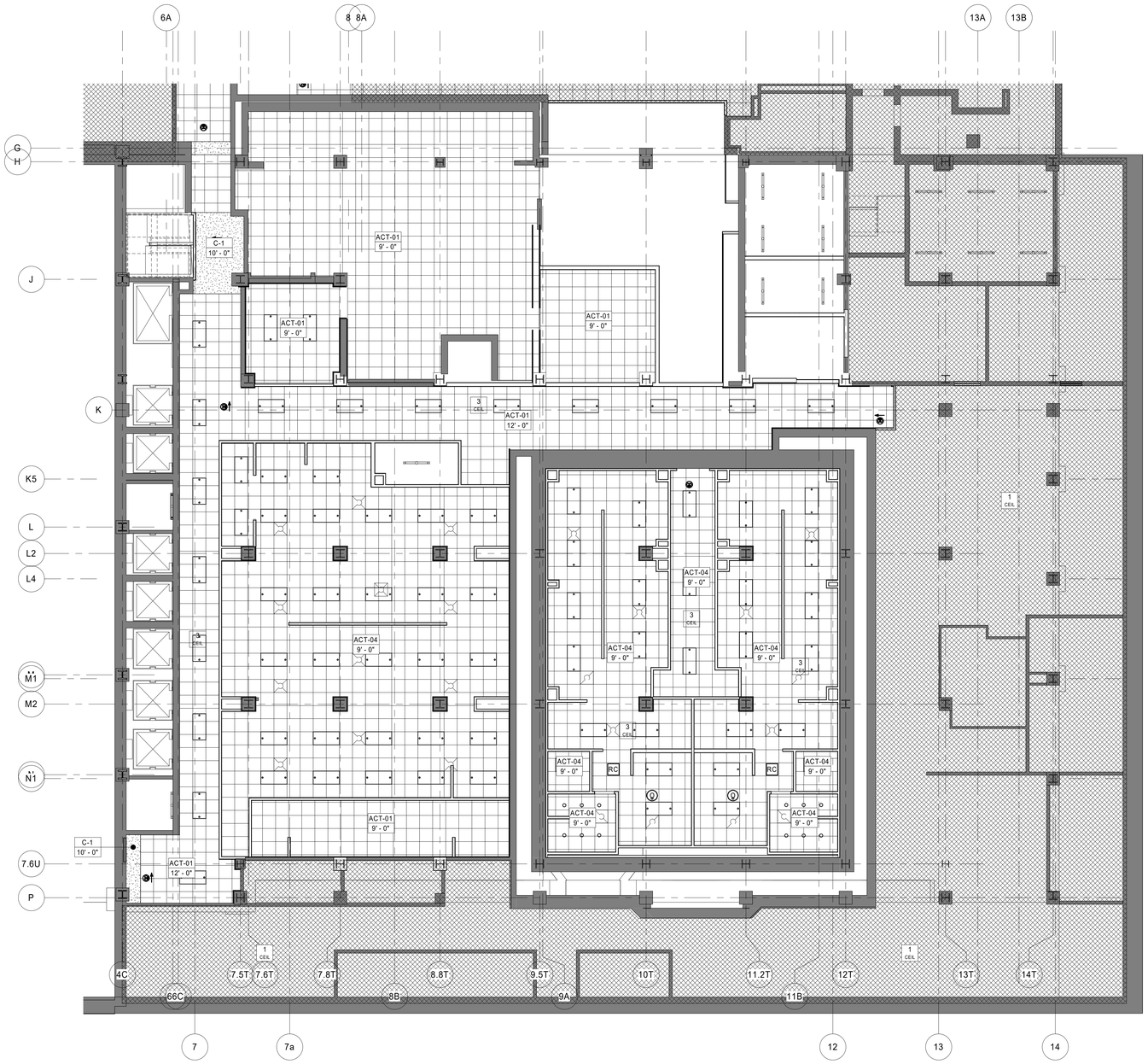

1 Basement RCP - Tower
A1.20-T0 1/8" = 1'-0"

NORTH

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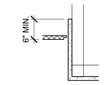

8. WHERE GYP. BD. CEILINGS ARE INDICATED TO BE LOWER THAN ADJACENT GYP. DB. CEILINGS THE CONTRACTOR IS TO PROVIDE A CONTINUOUS FINISHED VERTICAL GYP. BD. BULKHEAD RETURN TO THE ADJACENT FINISHED GYP. BD. CEILING.

9. REFER TO INDIVIDUAL GUESTROOM SHEETS RCP FOR LIGHT LOCATIONS IN THOSE ROOMS.
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SYMBOL LEGEND

C1 X'-X"	C1 - GYPSUM BOARD CEILING
ACT-01 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2X2 - BACK OF HOUSE/ADMIN
ACT-2 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - PUBLIC AREAS / BALLROOM
ACT-4 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - GUEST CORRIDOR
ACT-5 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - BACK OF HOUSE AT TOWER
ACT-6 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - SCRUBABLE/WIPEABLE

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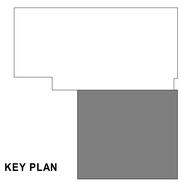

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - RCP - Basement

A1.20-T0

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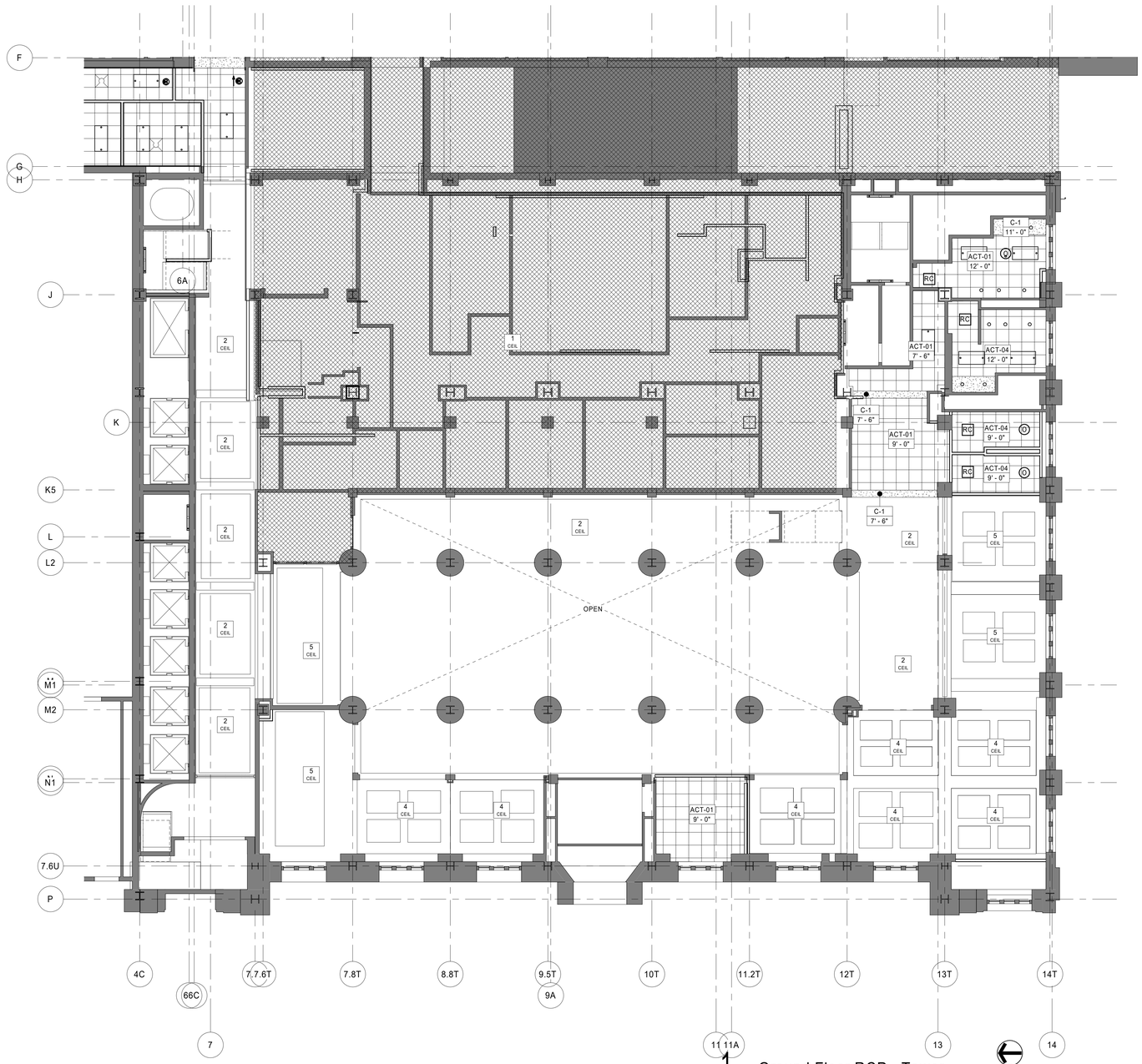

1 Ground Floor RCP - Tower
A1.20-T1 1/8" = 1'-0"

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9. REFER TO INDIVIDUAL GUESTROOM SHEETS RCP FOR LIGHT LOCATIONS IN THOSE ROOMS.
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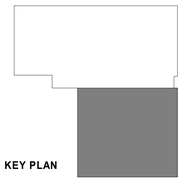
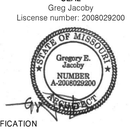


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE

Rev. #	Revision Description	Issue Date

Tower - RCP - 1st

A1.20-T1

CODED

1 ITEM	NO W IN T THE DRA
2 ITEM	EXIS CON HAR OPE REP
3 ITEM	NEW SLO TO
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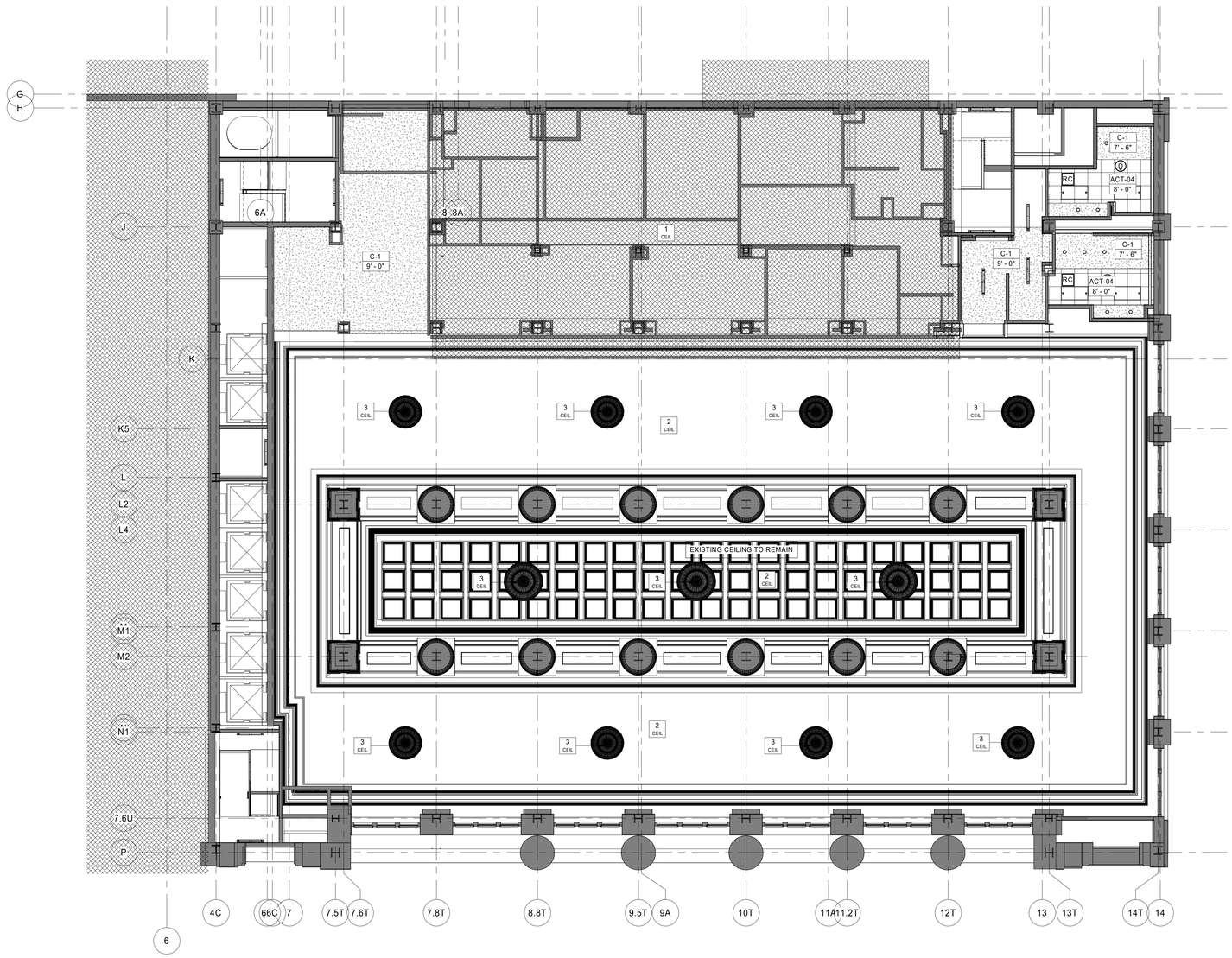
9 ITEM	PAT TO
10 ITEM	PRO HER ATT
11 ITEM	FUR
12 ITEM	42" NEV RAI
13 ITEM	EXIS REP
14 ITEM	REP
15 ITEM	EXIS DET
16 ITEM	REP BAS
17 ITEM	GAR THIS
18 ITEM	REP ARE



1 Mezzanine RCP - Tower
A1.20-T2 1/8" = 1'-0"

NORTH

GENERAL CEILING PLAN NOTES

1. DO NOT SCALE DRAWINGS.
2. UNLIKE FLOOR PLAN DIMENSIONS, DIMENSIONS SHOWN ON THE REFLECTED CEILING PLAN ARE FINISHED DIMENSIONS UNLESS NOTED OTHERWISE.
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5. REFER TO SPECIFICATIONS FOR EACH ITEM REPRESENTED WITHIN THE DRAWING SET.
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7. WHERE GYP. BD. CEILINGS ARE INDICATED TO BE LOWER THAN ADJACENT ACT CEILINGS THE CONTRACTOR IS TO PROVIDE A FINISHED VERTICAL GYP. BD. BULKHEAD RETURN FROM THE LOWER FINISHED GYP. BD. CEILING TO A MINIMIMUM OF 6" ABOVE THE ADJACENT ACT CEILING UNLESS NOTED OTHERWISE. SEE FLOOR PLANS AND LIFE SAFETY PLANS.

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SYMBOL LEGEND

C1 X'-X"	C1 - GYPSUM BOARD CEILING
ACT-01 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2X2 - BACK OF HOUSE/ADMIN
ACT-2 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - PUBLIC AREAS / BALLROOM
ACT-4 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - GUEST CORRIDOR
ACT-5 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - BACK OF HOUSE AT TOWER
ACT-6 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - SCRUBABLE/WIPEABLE

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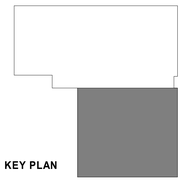

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
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Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - RCP - Mezzanine

A1.20-T2

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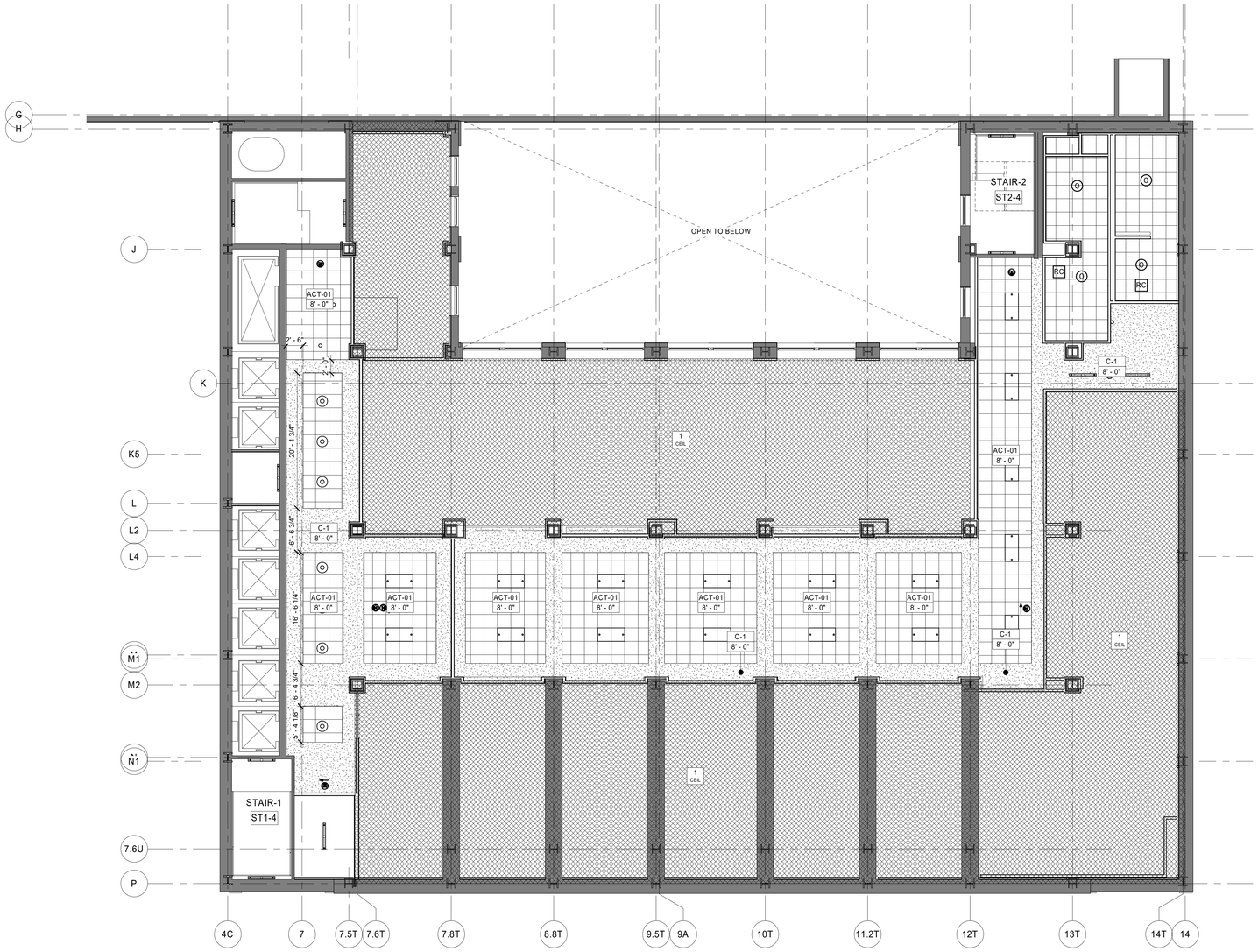

1 A1.20-T4 — T - 4TH FLR

1/8" = 1'-0"

NORTH

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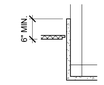

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ACT-5 X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - BACK OF HOUSE AT TOWER
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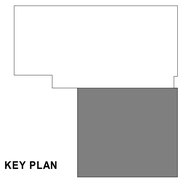

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
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Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - RCP - 4th

A1.20-T4

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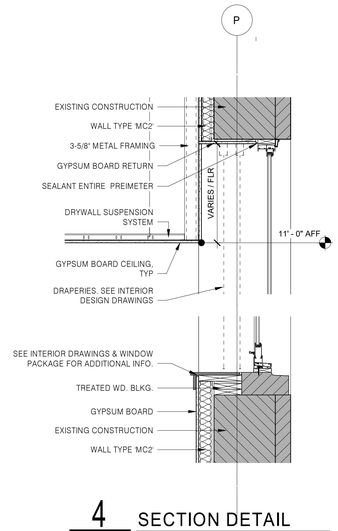
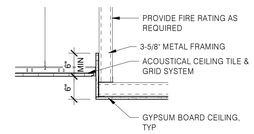
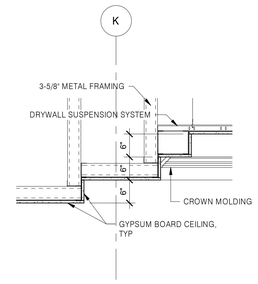


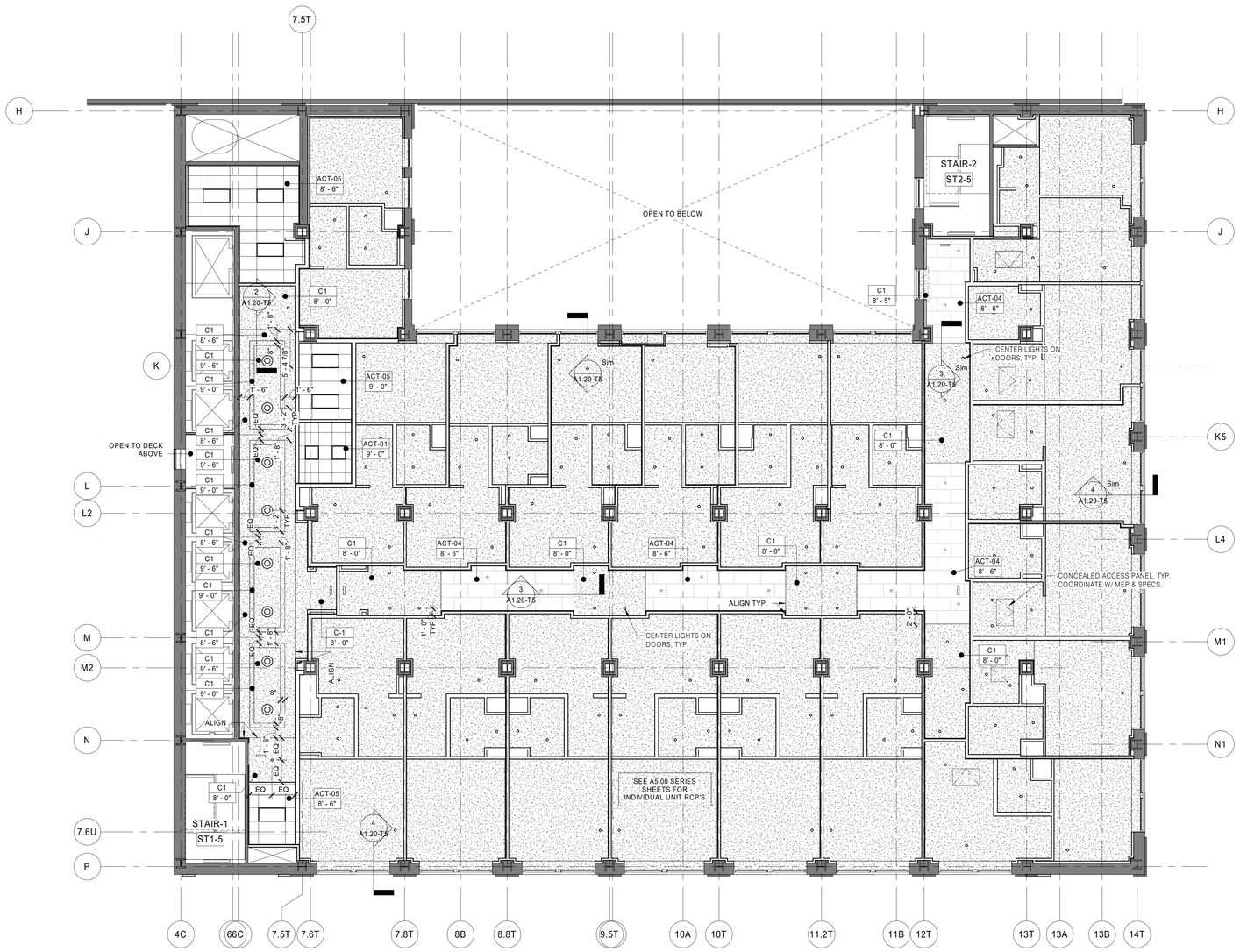
4 SECTION DETAIL
A1.20-T5 3/4" = 1'-0"



3 SECTION DETAIL
A1.20-T5 3/4" = 1'-0"



2 SECTION DETAIL
A1.20-T5 3/4" = 1'-0"



1 Reflected Ceiling Plan
A1.20-T5 1/8" = 1'-0"
5th, 7th Thru 10th, 12th Thru 19th Floors

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SYMBOL LEGEND

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ACT-01 / X'-X'	ACT - ACOUSTICAL CEILING TILE - 2X2 - BACK OF HOUSE/ADMIN
ACT-2 / X'-X'	ACT - ACOUSTICAL CEILING TILE - 2x2 - PUBLIC AREAS / BALLROOM
ACT-4 / X'-X'	ACT - ACOUSTICAL CEILING TILE - 2x4 - GUEST CORRIDOR
ACT-5 / X'-X'	ACT - ACOUSTICAL CEILING TILE - 2x4 - BACK OF HOUSE AT TOWER
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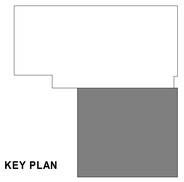

KEY PLAN

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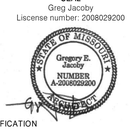
Liscense number: 2008029200



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Project No.: 18A023
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Checked By: Checker
Scale: See Drawing
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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - RCP - 5th

A1.20-T5

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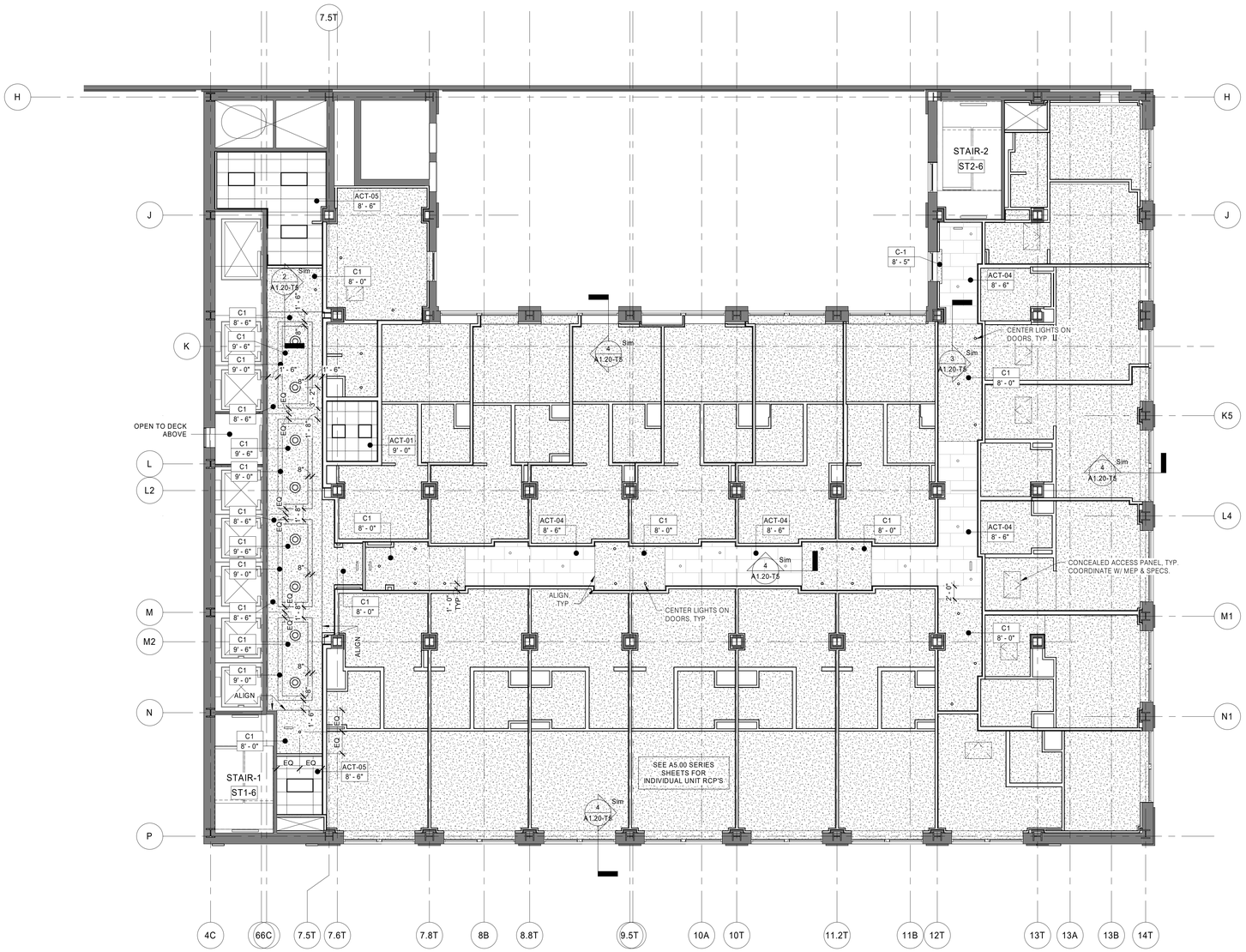

1 Reflected Ceiling Plan
A1.20-T6
Sixth Floor
1/8" = 1'-0"

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Indianapolis, Indiana 46204
Phone: (317) 635-5030
Website: www.bdmd.com
MO Certificate of Authority: W00923182

Delta Quad Holdings, LLC
Owner

Rau Construction Co.
Construction Manager

9101 West 110th Street, Suite 150
Overland Park, Kansas 66210
Phone: (913) 642-6000
Website: www.website.com

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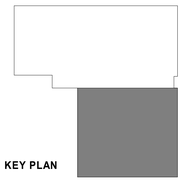

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - RCP - 6th

A1.20-T6

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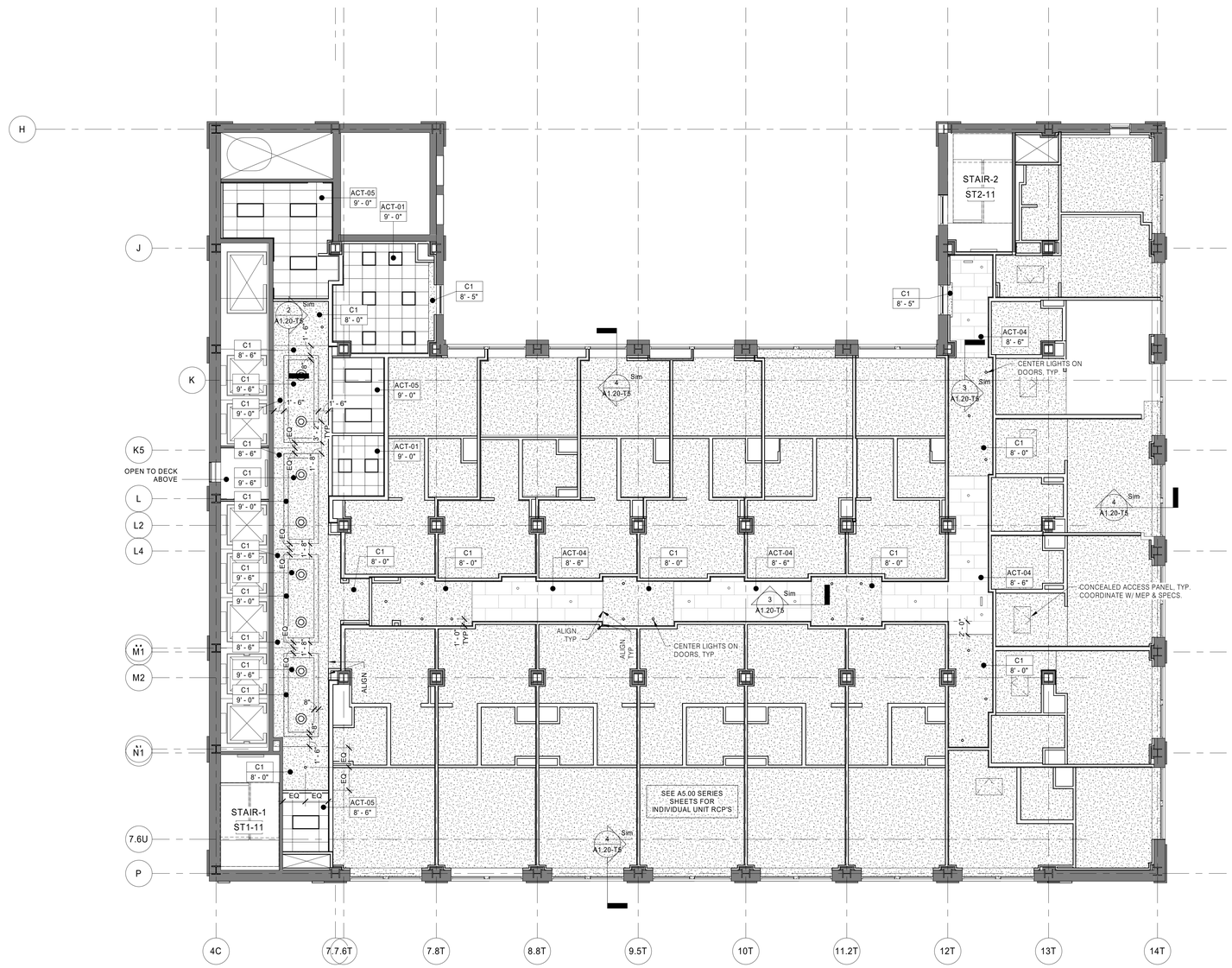

1 Reflected Ceiling Plan
11th Floor
A1.20-T11 1/8" = 1'-0"

GENERAL CEILING PLAN NOTES

1. DO NOT SCALE DRAWINGS.
2. UNLIKE FLOOR PLAN DIMENSIONS, DIMENSIONS SHOWN ON THE REFLECTED CEILING PLAN ARE FINISHED DIMENSIONS UNLESS NOTED OTHERWISE.
3. DIMENSIONS TO LIGHT FIXTURES ARE TO THE CENTERPOINT OF THE FIXTURE, TO THE FINISHED EDGE OF FIXTURE, OR TO THE CENTERLINE OF ASSOCIATED CEILING GRID SYSTEM.
4. ALL DESIGN TEAM DRAWINGS SHALL BE USED TO LOCATE BUILDING ELEMENTS. CONTACT THE ARCHITECT WITH CONFLICTS, DISCREPANCIES, AND OMISSIONS PRIOR TO COMMENCEMENT OF WORK.
5. REFER TO SPECIFICATIONS FOR EACH ITEM REPRESENTED WITHIN THE DRAWING SET.
6. NOT ALL LIGHT FIXTURES MAY BE REPRESENTED ON THE ARCHITECTURAL DRAWINGS. SEE ELECTRICAL & INTERIOR DESIGN DRAWINGS FOR ADDITIONAL LIGHT FIXTURE TYPES AND LOCATIONS. CONFIRM ANY DESCREPANCIES BETWEEN DRAWINGS WITH THE ARCHITECT PRIOR TO COMMENCEMENT OF WORK.
7. WHERE GYP. BD. CEILINGS ARE INDICATED TO BE LOWER THAN ADJACENT ACT CEILINGS THE CONTRACTOR IS TO PROVIDE A FINISHED VERTICAL GYP. BD. BULKHEAD RETURN FROM THE LOWER FINISHED GYP. BD. CEILING TO A MINIMMUM OF 6" ABOVE THE ADJACENT ACT CEILING UNLESS NOTED OTHERWISE. SEE FLOOR PLANS AND LIFE SAFETY PLANS.

8. WHERE GYP. BD. CEILINGS ARE INDICATED TO BE LOWER THAN ADJACENT GYP. DB. CEILINGS THE CONTRACTOR IS TO PROVIDE A CONTINUOUS FINISHED VERTICAL GYP. BD. BULKHEAD RETURN TO THE ADJACENT FINISHED GYP. BD. CEILING.

9. REFER TO INDIVIDUAL GUESTROOM SHEETS RCP FOR LIGHT LOCATIONS IN THOSE ROOMS.
10. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UNTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
11. RENOVATIONS TO STAIRWELLS ST-1, ST-2 & ALL ELEVATORS (IN GRAY POCHE) WILL BE ISSUED IN FUTURE DRAWING PACKAGE.

SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-01 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2X2 - BACK OF HOUSE/ADMIN
ACT-2 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - PUBLIC AREAS / BALLROOM
ACT-4 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - GUEST CORRIDOR
ACT-5 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x4 - BACK OF HOUSE AT TOWER
ACT-6 / X'-X"	ACT - ACOUSTICAL CEILING TILE - 2x2 - SCRUBABLE/WIPEABLE

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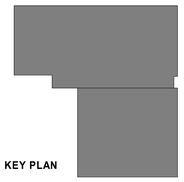

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Greg Jacoby
Liscense number: 2008029200

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A1.20-T11

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1 T - 20TH FLR
A1.20-T20 1/8" = 1'-0"

NORTH

GENERAL CEILING PLAN NOTES

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CODED CEILING NOTES

1 CEIL	NO WORK TO BE COMPLETED IN POCHE'D AREAS IN THIS PHASE. MEP MAY HAVE LIMITED WORK IN THESE AREAS. COORDINATE WITH MEP DRAWINGS.
2 CEIL	EXISTING CEILING TO REMAIN. PATCH AND REPAIR AS NECESSARY TO MAINTAIIN ORIGINAL INTENT AND HISTORIC FEATURES. BRING ANY CONCERNES OR QUESTIONS TO THE INTERIOR DESIGNER.SEE SPECIFICATIONS FOR HISTORIC MATERIALS.
3 CEIL	EXISTING LIGHT FIXTURE TO BE REFURBISHED. REFER TO SPECIFICATIONS.
4 CEIL	PATCH AND REPAINT EXISTING GYP. BD. COFFER CEILINGS IN THESE AREAS. COORDIANTE WITH MEP.
5 CEIL	MATCH EXISTING GYP. BD. COFFER CEILING IN THESE AREAS. COORDINATE WITH MEP.

SYMBOL LEGEND

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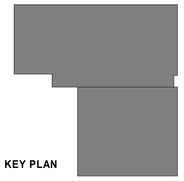

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

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A1.20-T20

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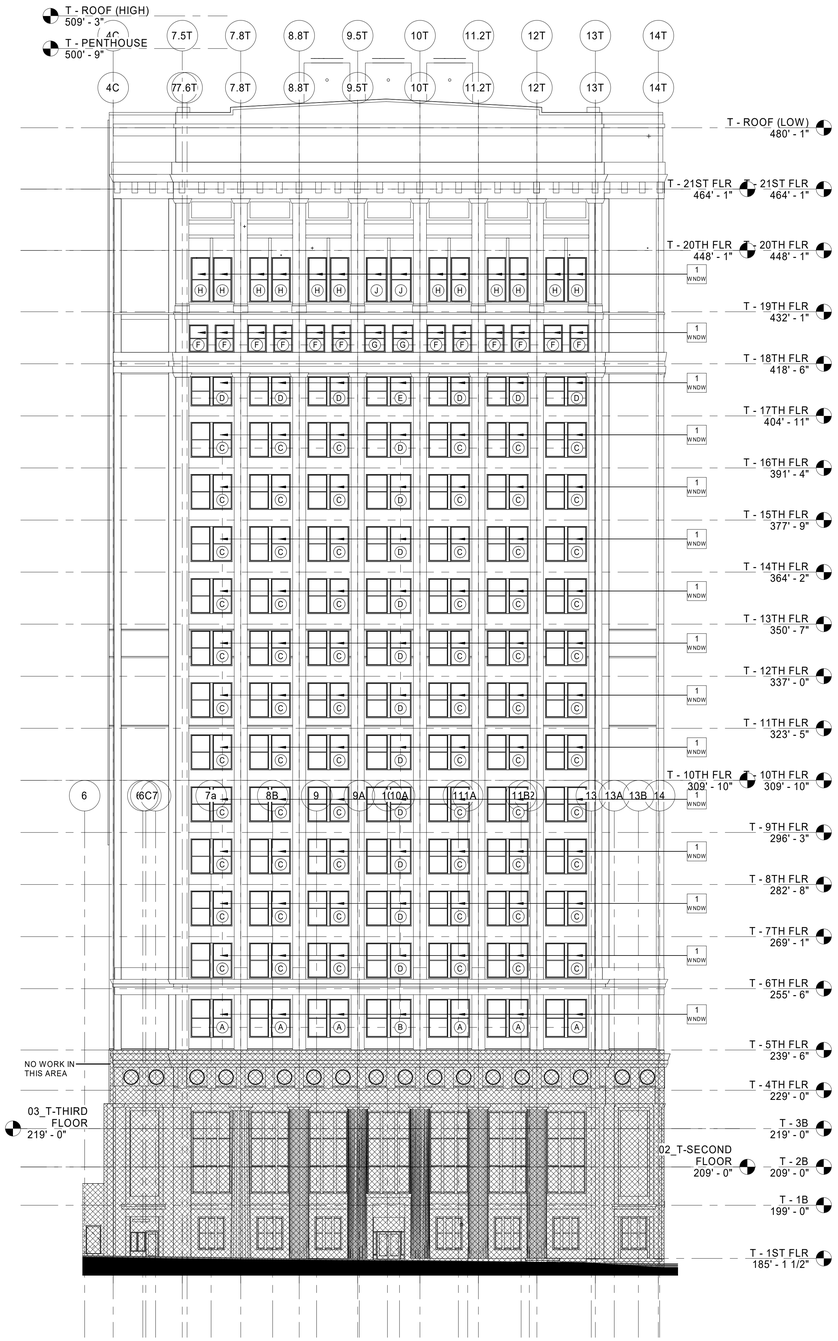
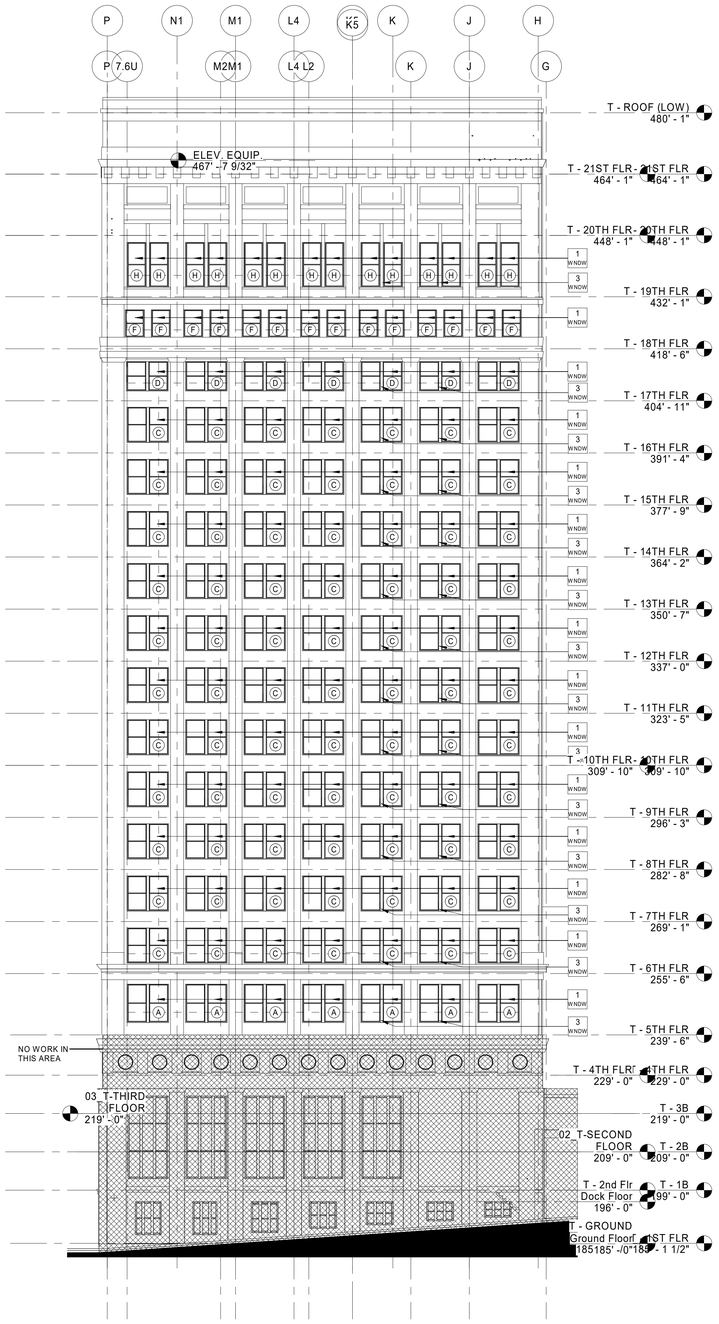


1 West Elevation - Windows

A2.10 1/16" = 1'-0"



2 South Elevation - Windows

A2.10 1/16" = 1'-0"

GENERAL WINDOW NOTES

1. WINDOW SYSTEMS ARE TO BE THERMALLY BROKEN.
2. ARCHITECT TO APPROVE GLASS SAMPLES PRIOR TO FABRICATION.
3. ARCHITECT TO APPROVE FINISH SAMPLES PRIOR TO FABRICATION.
4. CONTRACTOR TO FIELD VERIFY EACH R.O. DIMENSION PRIOR TO FABRICATION.

CODED WINDOW NOTES

1 WNDW — NEW ALUMINUM WINDOW SYSTEM. THIS INCLUDES GLAZING, ALUMINUM FRAME, FASTENERS, MULLIONS, AND ALL OTHER RELATED COMPONENTS. SEE WINDOW ELEVATIONS AND DETAILS.

2 WNDW — BASE BID: NEW ALUMINUM WINDOW SYSTEM. THIS INCLUDES GLAZING, ALUMINUM FRAME, FASTERNERS, MULLIONS, AND ALL OTHER RELATED COMPONENTS. SEE WINDOW ELEVATIONS AND DETAILS. ALTERNATE BID: REPAIR EXISTING WINDOW SYSTEM. THIS INCLUDES CLEANING ALL EXTERIOR AND INTERIOR. THIS WILL INCLUDE REMOVAL OF BIRD EXCREMENT. REMOVE EXISTING SEALANT AND REINSTALL NEW SEALANT. REMOVE ALL SPANDREL TRANSOMS WITH GRILLES OR HOLES AND REPLACE IN KIND. INSTALL NEW ALUMINUM INTERIOR STORM WINDOW WITH COLOR TO MATCH EXISTING.

3 WNDW — PROVIDE FOAM INSULATION AT VERTICAL SEPERATION FOR ACOUSTICAL ISOLATION

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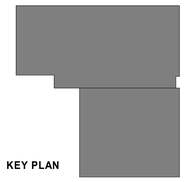

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Greg Jacoby
Liscense number: 2008029200

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Exterior Window Elevations

A2.10

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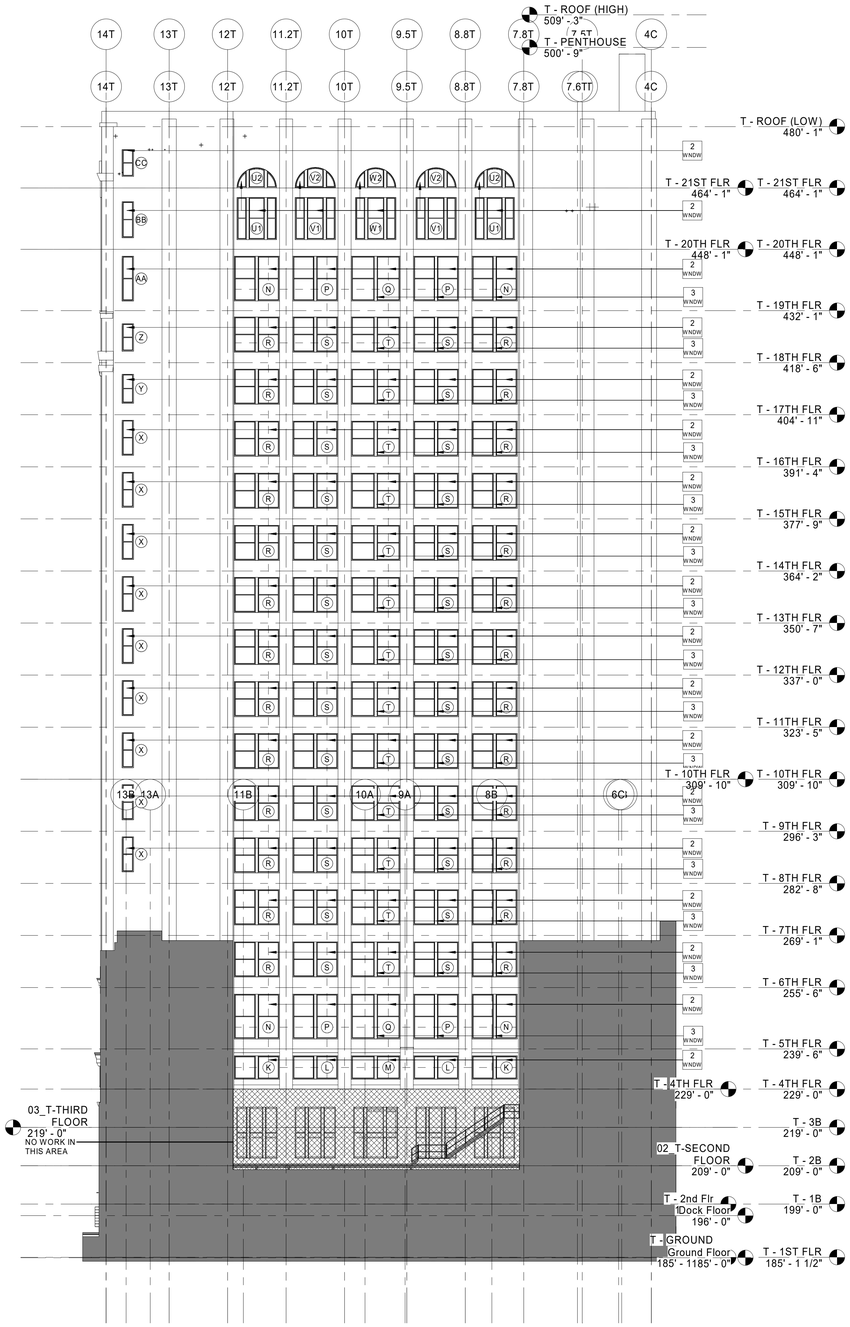
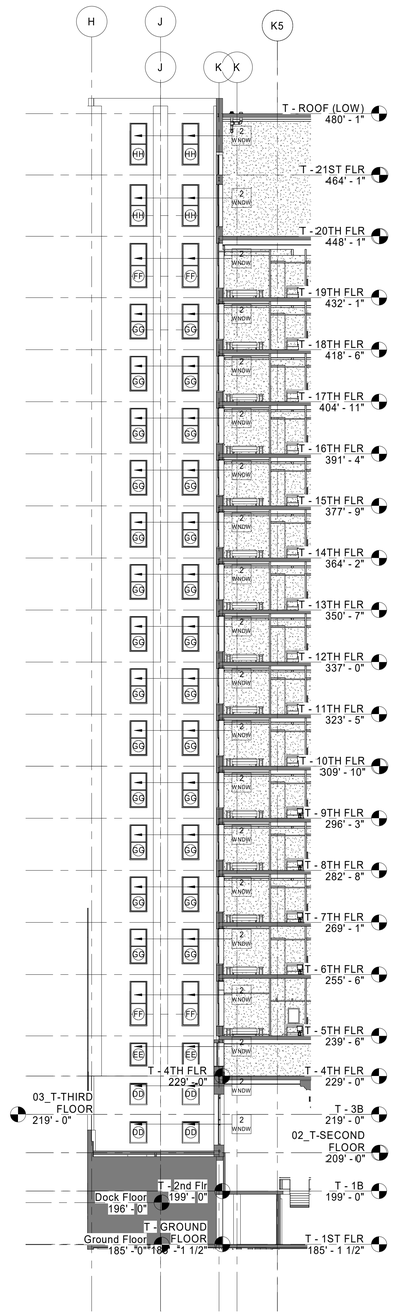
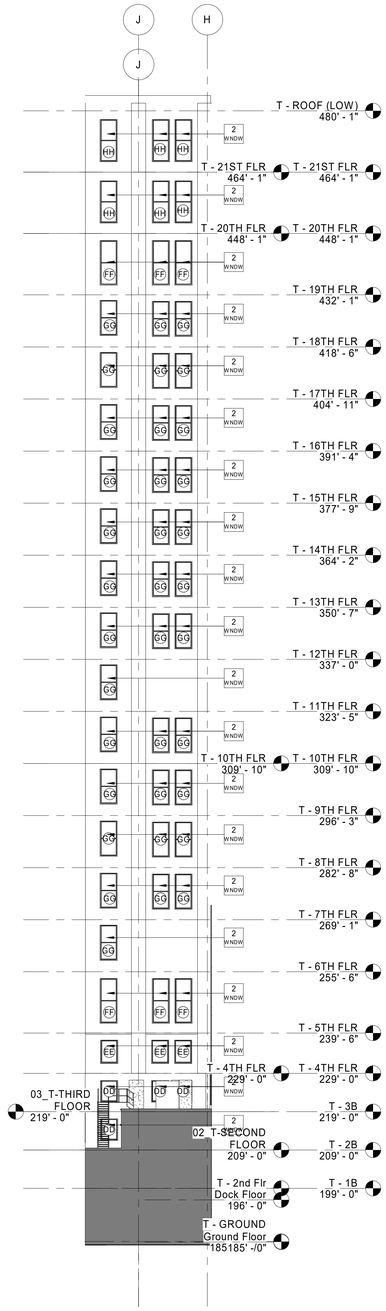


1 East Elevation - Windows
A2.11 1/16" = 1'-0"



2 E Elevation (N Face) - Windows
A2.11 1/16" = 1'-0"



3 E Elevation (S Face) - Windows
A2.11 1/16" = 1'-0"

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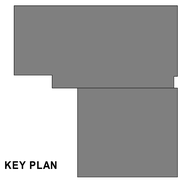

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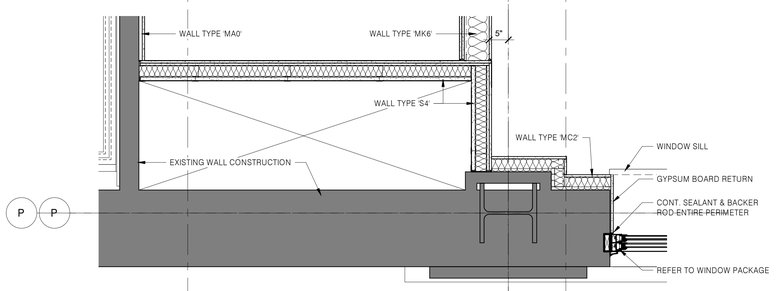
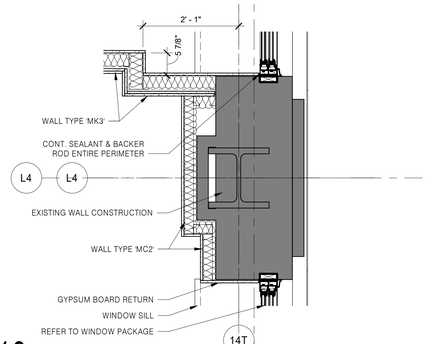
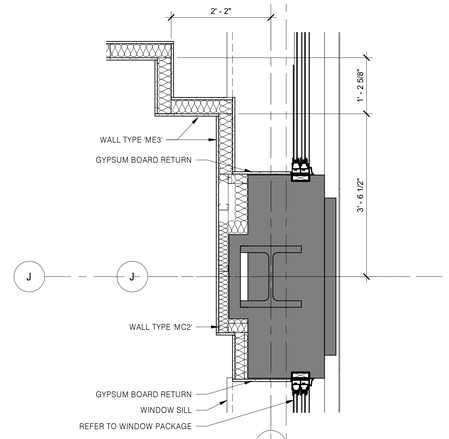


17 PLAN DETAIL
A3.01 3/4" = 1'-0"



13 PLAN DETAIL
A3.01 3/4" = 1'-0"



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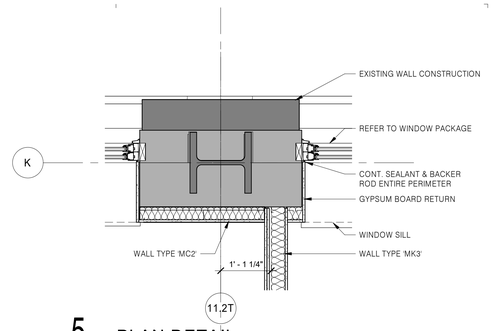
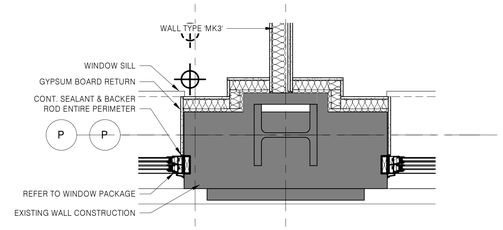
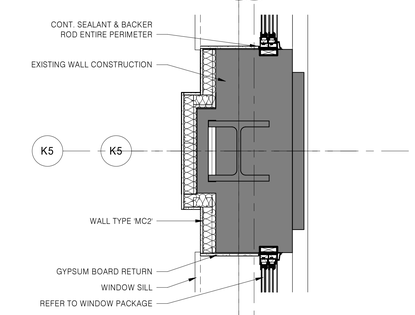


5 PLAN DETAIL
A3.01 3/4" = 1'-0"



16 PLAN DETAIL
A3.01 3/4" = 1'-0"



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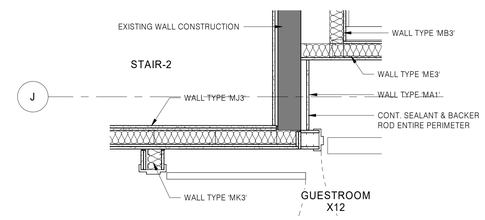

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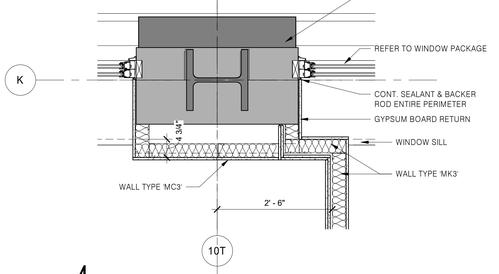

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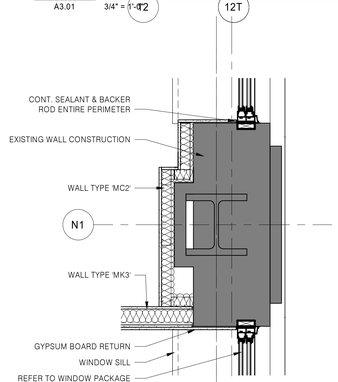

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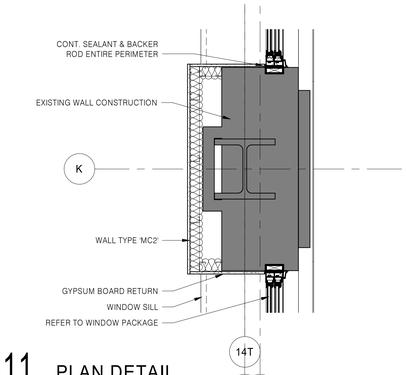

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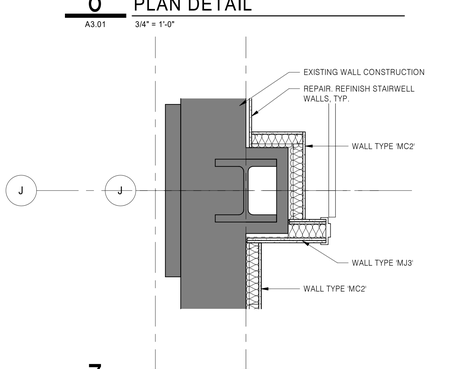

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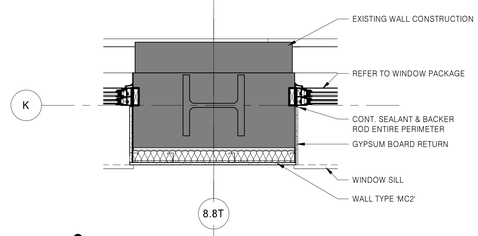

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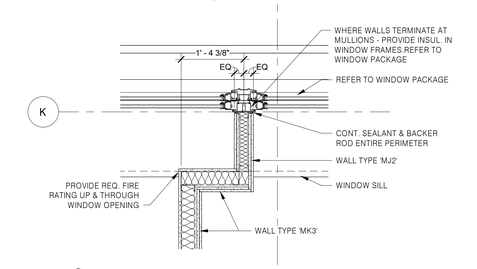

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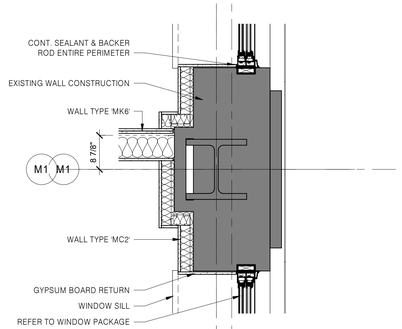

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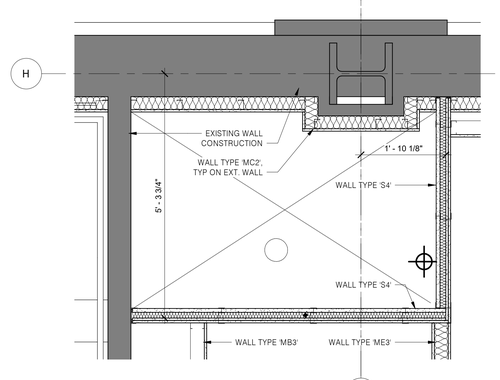

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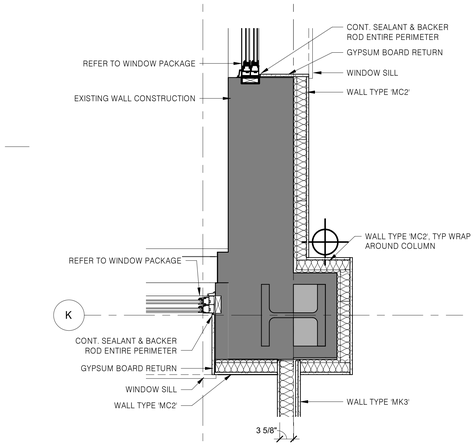

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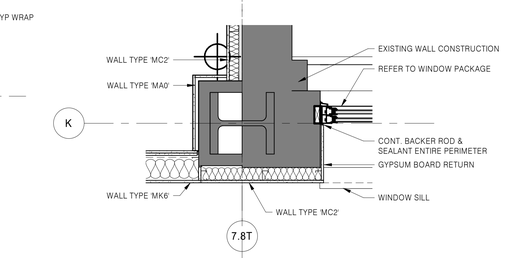

1 PLAN DETAIL
A3.01 3/4" = 1'-0"

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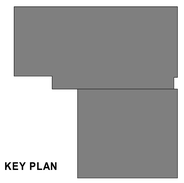

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Plan Details

A3.01

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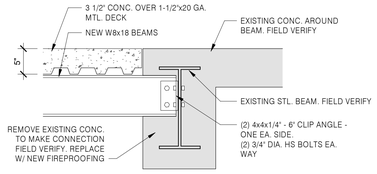
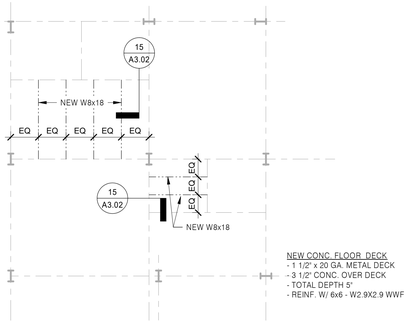


15 Structural Section - Floor Infill

A3.02 1" = 1'-0"



14 Structural Plan - Floor Infill

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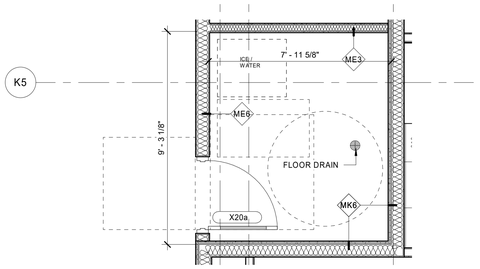
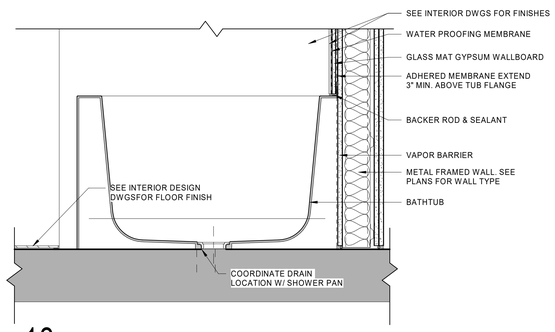


13 Plan Detail Ice Room

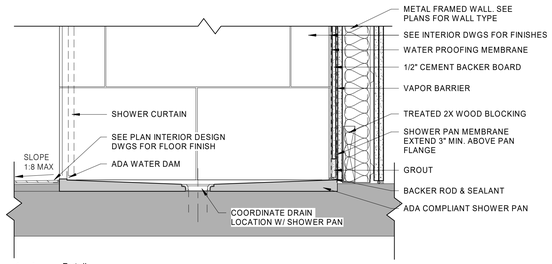
A3.02 3/8" = 1'-0"



12 Standard bath/shwr

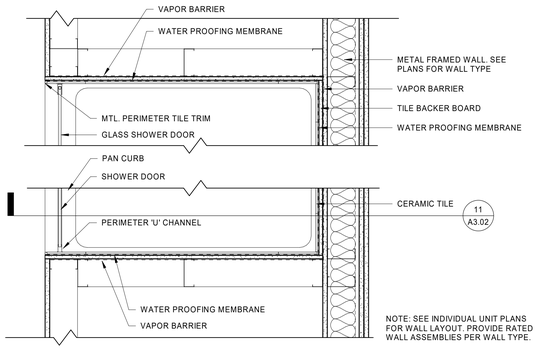
A3.02 1 1/2" = 1'-0"

3 /A2.111



11 Detail ADA Shower Pan

A3.02 1 1/2" = 1'-0"



10 Standard Shower Pan

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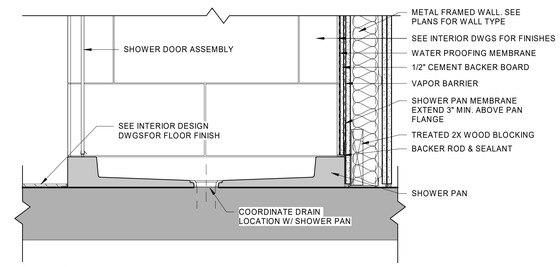
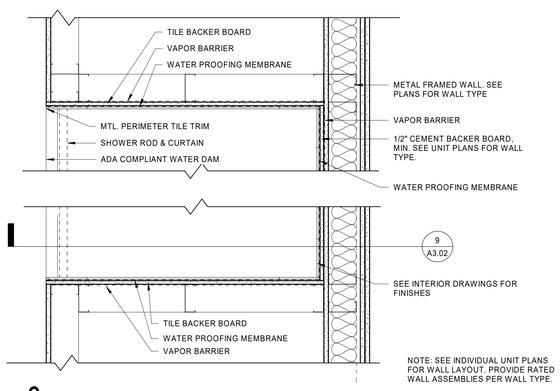


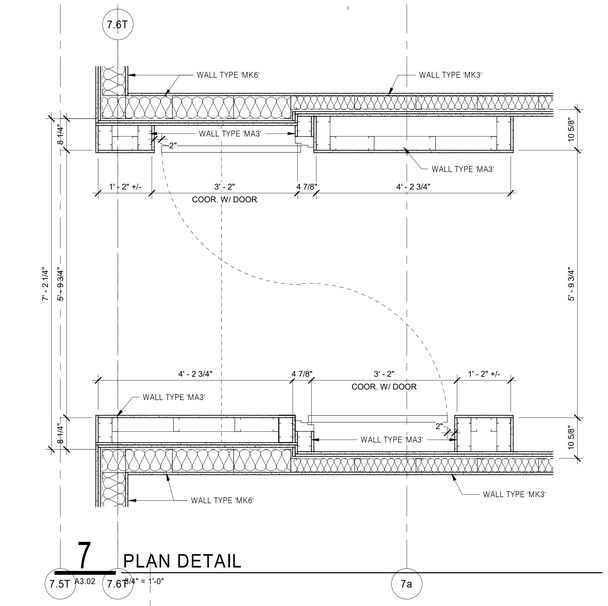
9 Detail Standard Shower Pan

A3.02 1 1/2" = 1'-0"



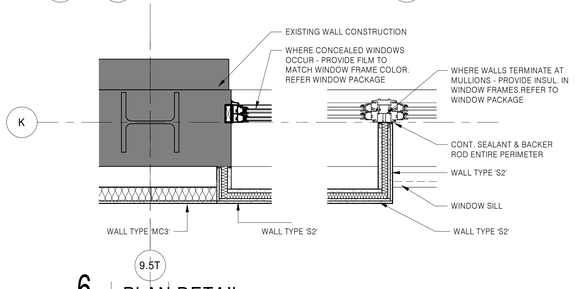
8 Standard Shower Pan

A3.02 1 1/2" = 1'-0"



7 PLAN DETAIL

A3.02 3/4" = 1'-0"



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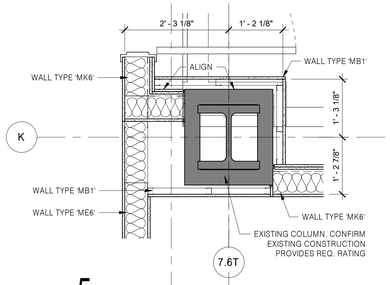

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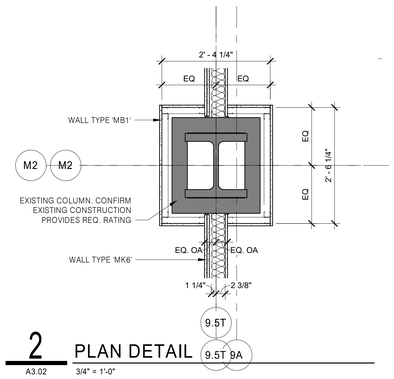

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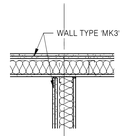
A3.02 3/4" = 1'-0"



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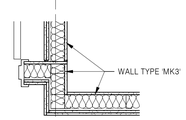

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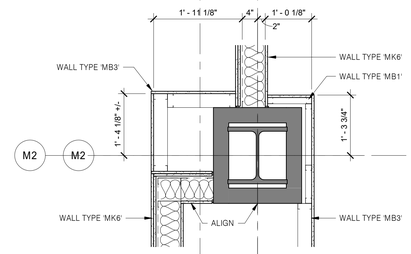

1 PLAN DETAIL

A3.02 3/4" = 1'-0"

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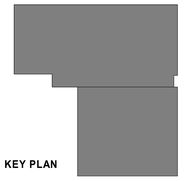

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Plan Details

A3.02

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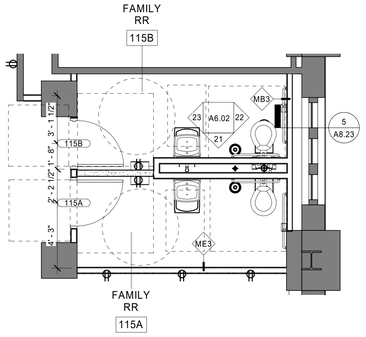
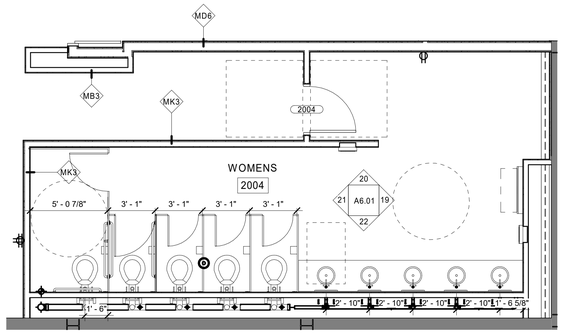
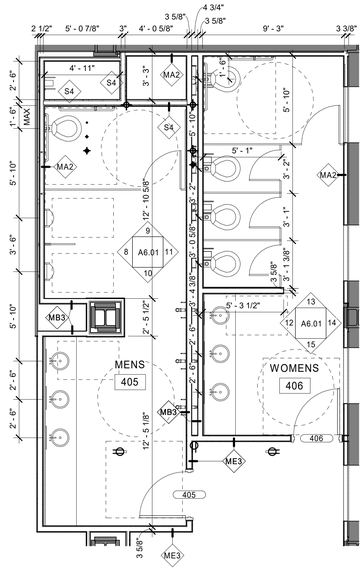


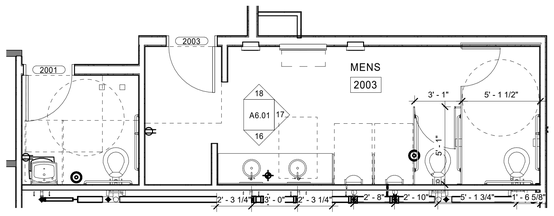
4 A3.03 Ground Flr Family Restroom Enlarged Plan
1/4" = 1'-0"



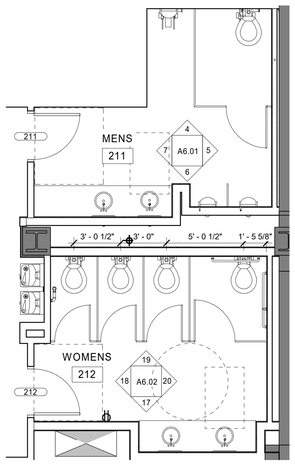
7 A3.03 20th Floor Women's RR
1/4" = 1'-0"



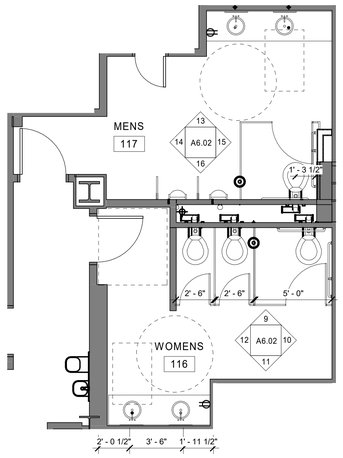
5 A3.03 4th Floor RR
1/4" = 1'-0"



6 A3.03 20th Floor Men's RR
1/4" = 1'-0"



3 A3.03 Mezzanine Level RR
1/4" = 1'-0"



2 A3.03 First Floor RR
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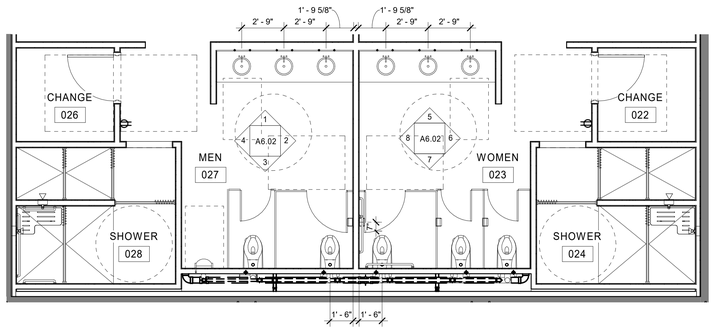

1 A3.03 Basement RR & Changing
1/4" = 1'-0"

TOILET ACCESSORY NOTES

EACH ITEM IS PROVIDED AND INSTALLED BY CONTRACTOR. STUD CONTRACTOR TO PROVIDE IN WALL BLOCKING FOR WALL MOUNTING EACH ITEM.

DH-1 T-ACC	[PUBLIC RESTROOMS] DOOR HOOK. MOUNT TO INSIDE FACE OF EACH TOILET COMPARTMENT DOOR.
DH-2 T-ACC	[APARTMENT UNITS] DOOR HOOK. MOUNT TO INSIDE FACE OF BATHROOM DOOR.
GB18 T-ACC	18" GRAB BAR, 1 1/2" DIA. BRUSHED STAINLESS.
GB36 T-ACC	36" GRAB BAR, 1 1/2" DIA. BRUSHED STAINLESS.
GB42 T-ACC	42" GRAB BAR, 1 1/2" DIA. BRUSHED STAINLESS.
M-1 T-ACC	[PUBLIC RESTROOMS] 18" x 36" MIRROR. CENTER ABOVE EACH SINK.
M-2 T-ACC	[PUBLIC RESTROOMS] 24" x 60" MIRROR WITH 1/2" BRUSHED STAINLESS METAL EDGE. MOUNT TO WALL FROM BEHIND WITH CONCEALED HANGERS.
M-3 T-ACC	[APARTMENT UNITS] FRAMED WALL MIRROR. SEE DETAIL 3/A4.07.
MB-1 T-ACC	[JANITOR CLOSET] WALL MOUNTED MOP/BROOM HOLDER
MC-1 T-ACC	[APARTMENT UNITS] RECESSED WALL MOUNTED MEDICINE CABINET WITH MIRROR. SEE DETAIL 4/A4.07.
PA-1 T-ACC	[PUBLIC RESTROOMS] FLOOR MOUNTED TOILET PARTITION. PROVIDE SCRANTON PRODUCTS 1" SOLID PLASTIC, TEXTURE STAINLESS EX.
SD-1 T-ACC	[PUBLIC RESTROOMS] LIQUID SOAP DISPENSER. WALL MOUNTED BETWEEN EACH MIRROR.
TB-1 T-ACC	[APARTMENT UNITS] 24" TOWEL BAR
TD-1 T-ACC	[PUBLIC RESTROOMS] SURFACE MOUNTED PAPER TOWEL DISPENSER
TP-1 T-ACC	[PUBLIC RESTROOMS] TOILET PAPER DISPENSER
TP-2 T-ACC	[APARTMENT UNITS] TOILET PAPER DISPENSER
US-1 T-ACC	[PUBLIC RESTROOMS] WALL MOUNTED URINAL SCREEN. SCRANTON PRODUCTS 1" SOLID PLASTIC, TEXTURE STAINLESS EX. (24" x 60")

ACCESSIBILITY NOTES

SEE ACCESSIBILITY STANDARDS SHEET ON A0.02 FOR ACCESSORY MOUNTING INFORMATION.

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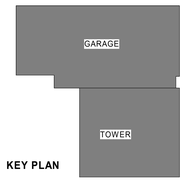

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Enlarged Plan - Restrooms

A3.03

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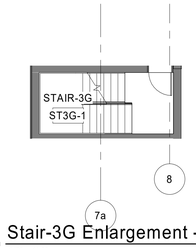
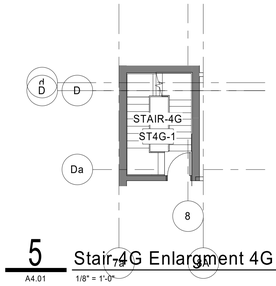
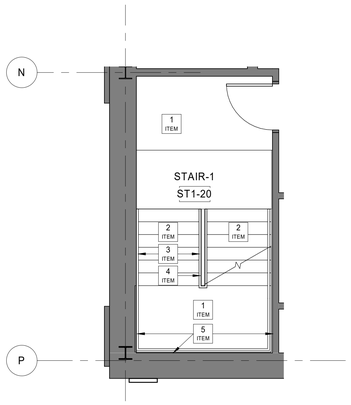


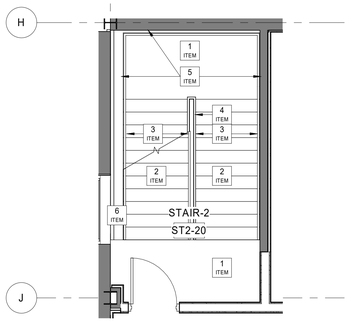
6 Stair-3G Enlargement - 3G ST3G-1
A4.01 1/8" = 1'-0"



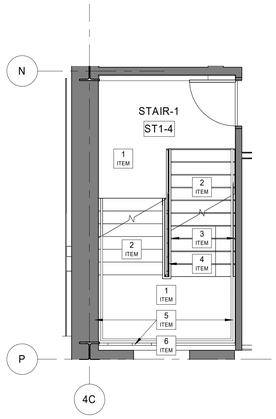
5 Stair-4G Enlargement 4G - ST4G-1
A4.01 1/8" = 1'-0"



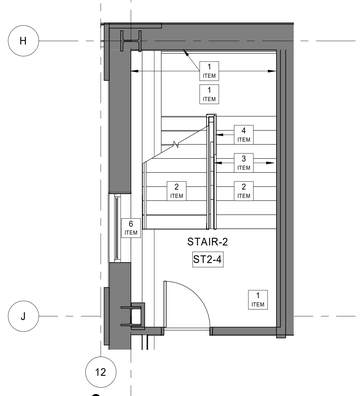
10 Stair 1 Twentieth Floor
A4.01 1/4" = 1'-0"



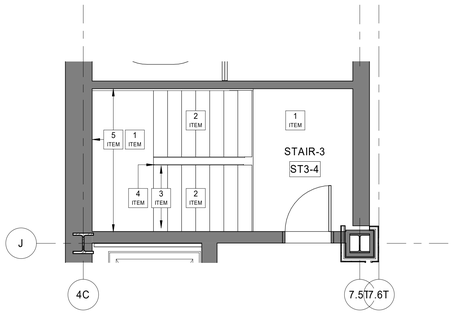
7 Stair 2 Enlargement Twentieth Floor
A4.01 1/4" = 1'-0"



4 Stair 1 Enlargement Typical
A4.01 1/4" = 1'-0"



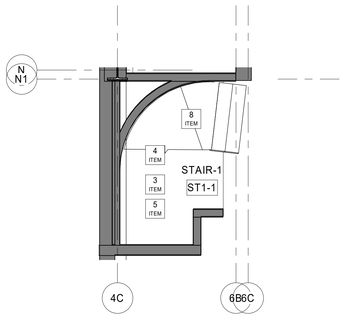
8 Stair 2 Enlargement Typical
A4.01 1/4" = 1'-0"



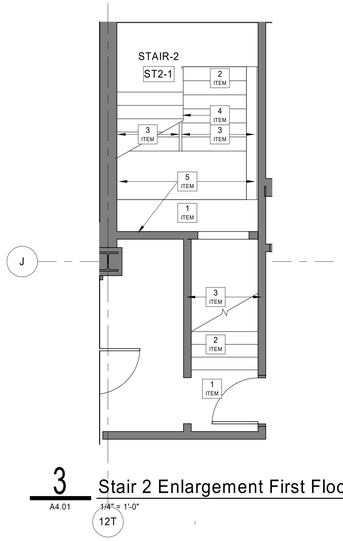
9 Stair 3 Enlargement Typical
A4.01 1/4" = 1'-0"

13 Stair 3
A4.01 1/8" = 1'-0"

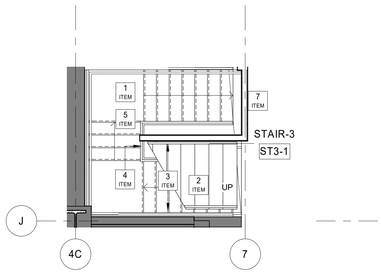
12 Stair 2
A4.01 1/8" = 1'-0"



1 Stair 1 Enlargement First Floor
A4.01 1/4" = 1'-0"



3 Stair 2 Enlargement First Floor
A4.01 1/4" = 1'-0"
12T



2 Stair 3 Enlargement First Floor
A4.01 1/4" = 1'-0"

11 Stair 1
A4.01 1/8" = 1'-0"

GENERAL STAIR NOTES

1. UNLESS NOTED OTHERWISE PROVIDE CONCRETE FILLED METAL PAN STAIR SYSTEM BETWEEN EACH FLOOR LEVEL.
2. PROVIDE 4'-0" MIN INTERMEDIATE LANDING(S) BETWEEN EACH FLOOR LEVEL AND 5'-0" MIN. LANDING AT EACH FLOOR LEVEL.
3. PROVIDE MAXIMUM 7" RISE TO MAXIMUM 11" RUN.
4. PROVIDE MAXIMUM 1" NOSING.
5. PROVIDE MANUFACTURER STANDARD HANDRAILS AND GUARDRAILS WHICH COMPLY WITH GOVERNING CODES. SEE SHEET A4.06.
6. PAINT EXPOSED STEEL COMPONENTS OF STAIR A COLOR TO BE SELECTED BY ARCHITECT.

MATERIAL FINISH LEGEND

PT-17	[WALL PAINT @ STAIRS. SHERWIN WILLIAMS 7017 DORIAN GRAY.FINIISH: SATIN
PT-21b	STAIR RAILING PAINT. SHERWIN WILLIAMS 9168 ELEPHANT EAR. FINISH: SEMI-GLOSS
RF-03	VINYL STAIR TREAD AND RISER. TARKETT. SAFE-T GRIP SQUARE NOSE WITH GRIT TAPE INSERT. #VIVG. COLOR TO BE SELECTED BY INTERIOR DESIGNER FROM MANUFACTURER'S FULL RANGE.

CODED STAIR FINISH NOTES

NOTE: ALL STAIRS AND RAILINGS ARE EXISTING. ONLY TO PROVIDE NEW FINISHES FOR EXISTING STAIRS AND RAILINGS.

1 ITEM	NEW VINYL FLOORING TO MATCH RISERS AND TREADS (RF-03)
2 ITEM	NEW VINYL RISERS AND TREADS (RF-03)
3 ITEM	PREP EXISTING RAILINGS AND HANDRAILS; REPAINT (PT-21b)
4 ITEM	REPAIR AND REFINISH EXISTING WOOD HANDRAIL.
5 ITEM	PATCH AND REPAIR ALL EXISTING WALLS AS NECESSARY. PAINT (PT-17)
6 ITEM	REPAIR AND REFINISH AREAS AROUND WINDOW SILLS. REFER TO SPECIFICATIONS FOR HISTORIC PLASTER WORK
7 ITEM	NEW WALL AT DOWN SIDE OF STAIRWELL TO PROHIBIT ENTRY TO LOWER LEVEL FROM THIS STAIR.
8 ITEM	EXISTING TERRAZZO FLOORING TO REMAIN. REPAIR AS NECESSARY. REFER TO SPECIFICATIONS.

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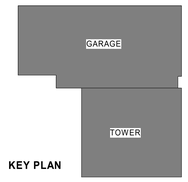

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

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Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
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REVISION SCHEDULE		
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Stair Enlarged Plans and Sections

A4.01

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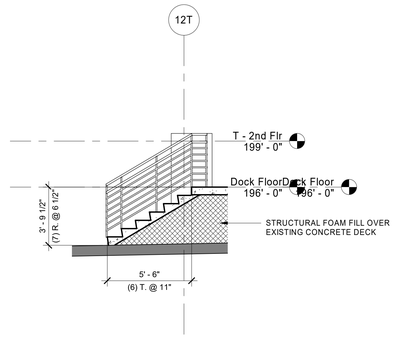
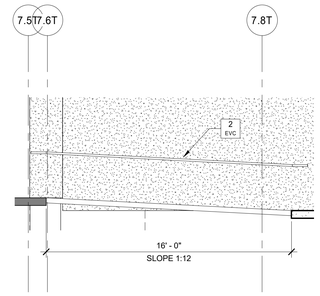
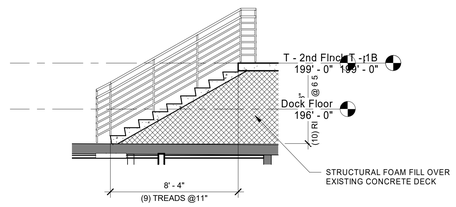


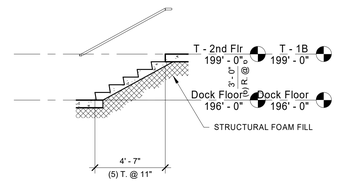
7 Stair 210G
A4.02 1/4" = 1'-0"



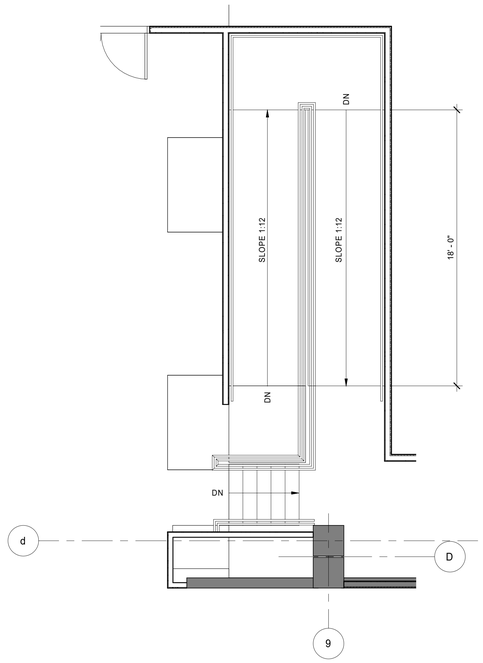
8 RAMP 002
A4.02 1/4" = 1'-0"



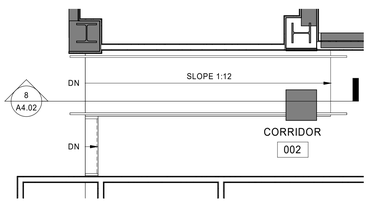
5 Stair Section - 224N
A4.02 1/4" = 1'-0"



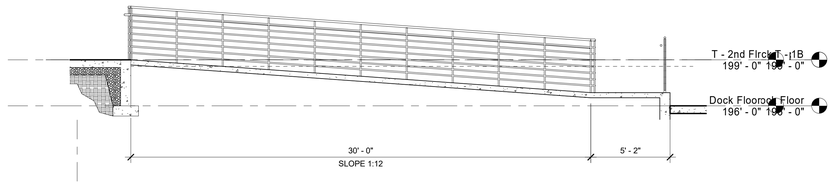
6 Stair Section - 224S
A4.02 1/4" = 1'-0"



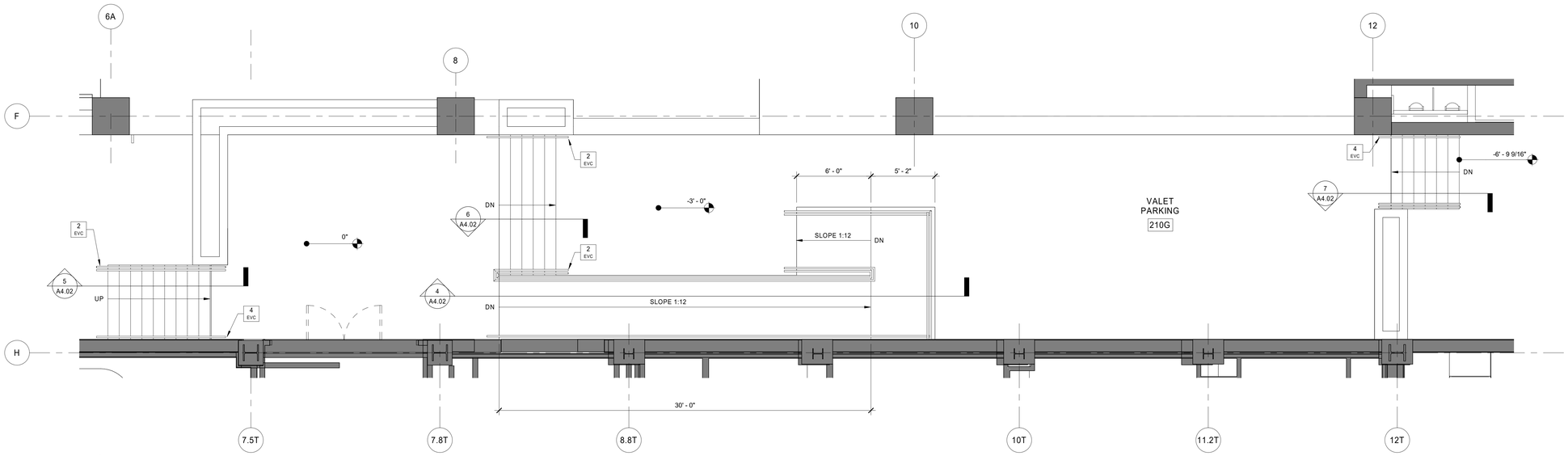
2 Plan Enlargement - Employee Entry
A4.02 1/4" = 1'-0"



3 Corridor 002 Ramp/Stair
A4.02 1/4" = 1'-0"



4 Ramp 224
A4.02 1/4" = 1'-0"



1 Plan Enlargement - Valet Stoop
A4.02 1/4" = 1'-0"

GENERAL EXTERIOR STAIR NOTES

1. PROVIDE MAXIMUM 7" RISE TO MAXIMUM 11" RUN.
2. PROVIDE MAXIMUM 1" NOSING.
3. PROVIDE MANUFACTURER STANDARD HANDRAILS AND GUARDRAILS WHICH COMPLY WITH GOVERNING CODES. SEE SHEET A4.06.
4. PAINT ALL EXPOSED STEEL STAIR COMPONENTS - COLOR TO BE SELECTED BY ARCHITECT.

CODED EXT. VERTICAL CIRCULATION NOTES

1 EVC	CAST-IN-PLACE CONCRETE STAIR
2 EVC	WALL MOUNTED HANDRAIL - REFER TO DETAIL 4/A4.03
3 EVC	FLOOR MOUNTED HANDRAIL - REFER TO DETAIL 1/A4.03
4 EVC	GUARDRAIL WITH HANDRAIL - REFER TO DETAIL 2/A4.03
5 EVC	GUARDRAIL - REFER TO DETAIL 3/A4.03

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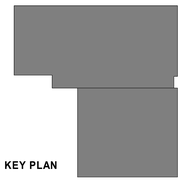
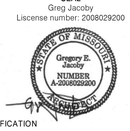


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



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The Grand Reserve

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Project No.: 18A023
Drawn By: JPS
Checked By: Checker
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REVISION SCHEDULE		
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Stair and Ramp Enlarged Plans and Sections

A4.02

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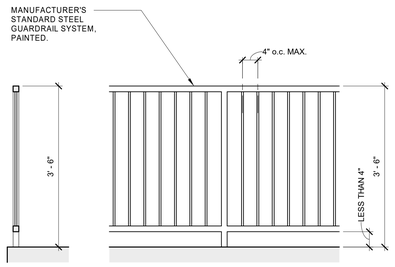
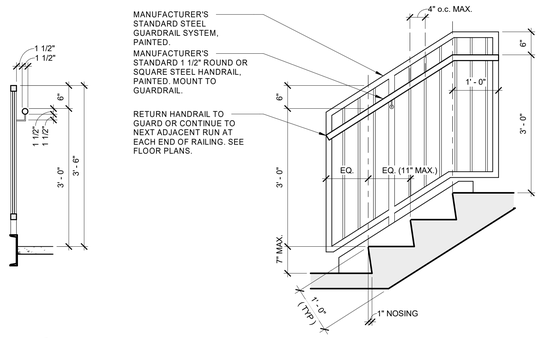


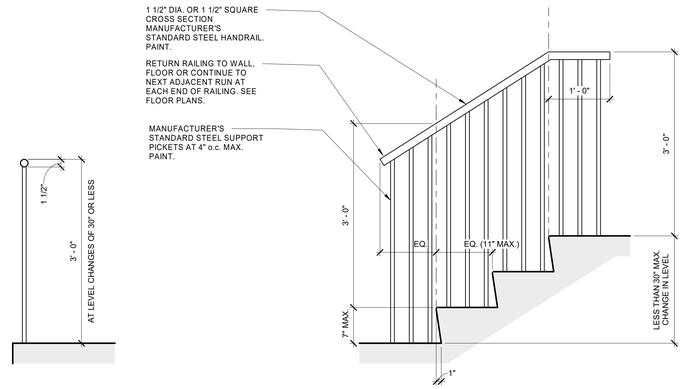
3 Typical Guardrail

A4.03 3/4" = 1'-0"



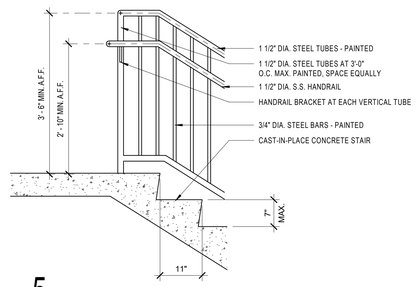
2 Typical Guardrail with Handrail

A4.03 3/4" = 1'-0"



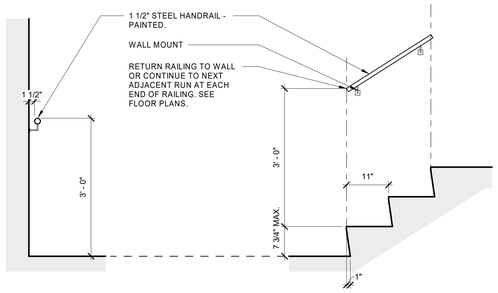
1 TypicalFloor Mounted Handrail

A4.03 1" = 1'-0"



5 Typical Stair Transition

A4.03 3/4" = 1'-0"



4 Wall Mounted Handrail

A4.03 3/4" = 1'-0"

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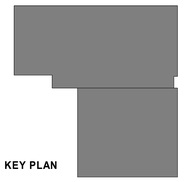

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Stair and Ramp Details

A4.03

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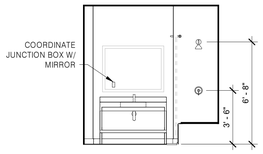
GENERAL GUESTROOM NOTES

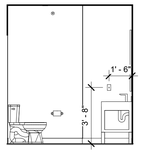
1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
2. THE FRAMING CONTRACTOR IS TO PROVIDE IN-WALL BLOCKING / REINFORCING FOR WALL MOUNTED AND CEILING MOUNTED ITEMS, INCLUDING BLOCKING FOR EACH TOILET, TUB, AND SHOWER REQUIRED FOR GRAB BARS.
3. IF THE CONTRACTOR DOES NOT HAVE DOCUMENTED CONFIRMATION OF THE HEIGHT AT WHICH AN OBJECT IS TO BE MOUNTED THE CONTRACTOR IS TO CONSULT THE ARCHITECT PRIOR TO THE PLACEMENT OF BLOCKING AND THE INSTALLATION OF THE ITEM.
4. FURNITURE IS SHOWN FOR REFERENCE. REFER TO INTERIOR DESIGN DRAWINGS.
5. REFER TO INTERIOR DESIGN SHEETS FOR FINISHES. ANY FINISHES SHOWN ON ARCHITECTURAL SHEETS ARE FOR REFERENCE ONLY.
6. COORDINATE OUTLETS, SWITCHES, LOW VOLTAGE, DATA, ETC. WITH RESPECTIVE DESIPLINES DRAWINGS & FURNITURE SELECTION.
7. WET BAR & VANITIES ARE SHOWN FOR REFERENCE. COORDINATE WITH MEP & INTERIOR DESIGN DRAWINGS.
8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UINTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

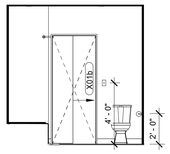
C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE



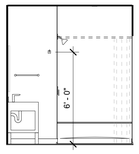
19 Interior Elevation
BATH NORTH
A5.01 1/4" = 1'-0"



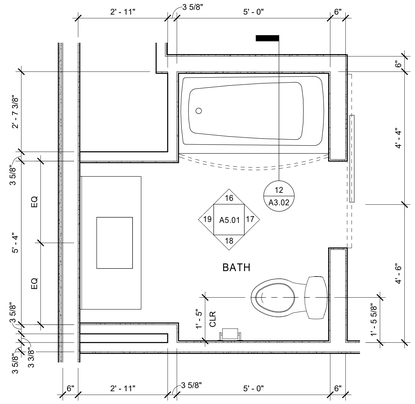
18 Interior Elevation
BATH WEST
A5.01 1/4" = 1'-0"



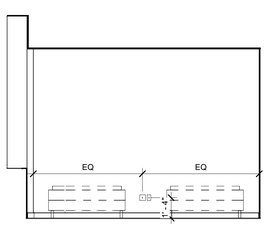
17 Interior Elevation
BATH SOUTH
A5.01 1/4" = 1'-0"



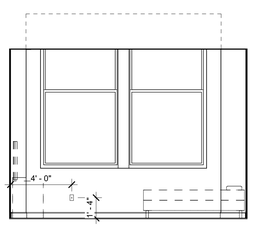
16 Interior Elevation
BATH EAST
A5.01 1/4" = 1'-0"



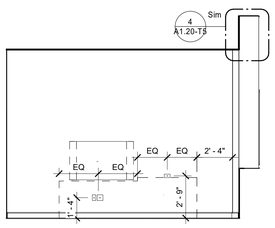
15 Floor Plan
ENLARGED BATH
A5.01 1/2" = 1'-0"



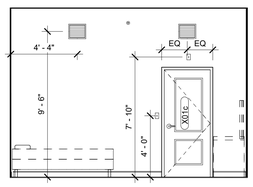
14 Interior Elevation
BEDROOM NORTH
A5.01 1/4" = 1'-0"



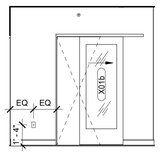
13 Interior Elevation
BEDROOM WEST
A5.01 1/4" = 1'-0"



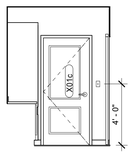
12 Interior Elevation
BEDROOM SOUTH
A5.01 1/4" = 1'-0"



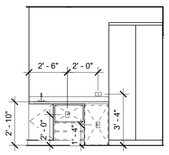
11 Interior Elevation
BEDROOM EAST
A5.01 1/4" = 1'-0"



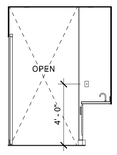
10 Interior Elevation
WET BAR EAST
A5.01 1/4" = 1'-0"



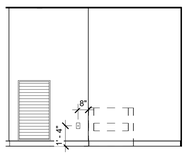
9 Interior Elevation
WET BAR NORTH
A5.01 1/4" = 1'-0"



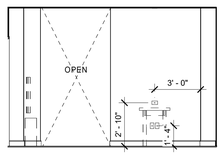
8 Interior Elevation
WET BAR WEST
A5.01 1/4" = 1'-0"



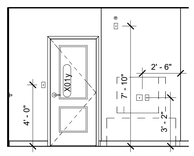
7 Interior Elevation
WET BAR SOUTH
A5.01 1/4" = 1'-0"



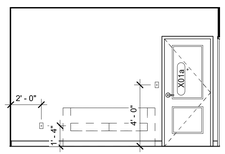
6 Interior Elevation
LIVING SOUTH
A5.01 1/4" = 1'-0"



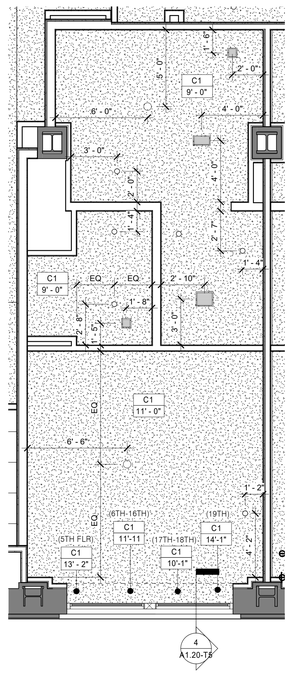
5 Interior Elevation
LIVING NORTH
A5.01 1/4" = 1'-0"



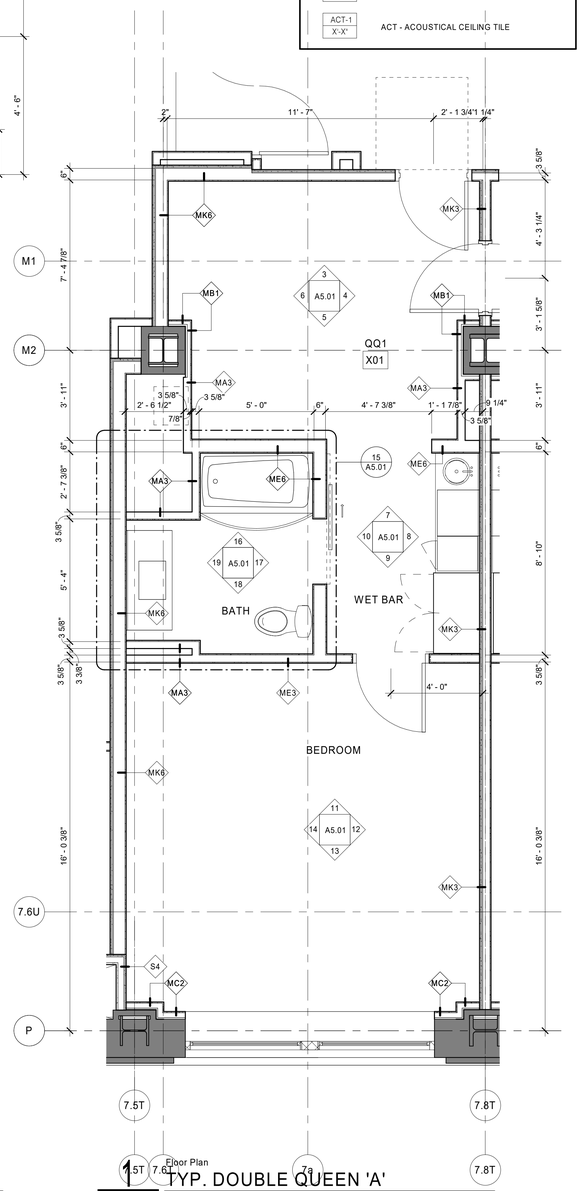
4 Interior Elevation
LIVING WEST
A5.01 1/4" = 1'-0"



3 Interior Elevation
LIVING EAST
A5.01 1/4" = 1'-0"



2 Reflected Ceiling Plan
TYP. DOUBLE QUEEN 'A'
A5.01 1/4" = 1'-0"



1 Floor Plan
TYP. DOUBLE QUEEN 'A'
A5.01 3/8" = 1'-0"

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LEADERSHIP + DESIGN®

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Planning
Interior Design

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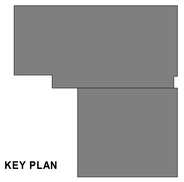
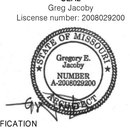
Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Dbl Queen - 'A'

A5.01

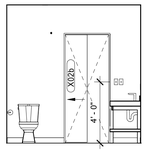
\\bdmd.local\UEM\UserShare\cmendoza\Documents\18A023 KCES R20_cmendoza.rvt
9/10/2020 4:36:43 PM

GENERAL GUESTROOM NOTES

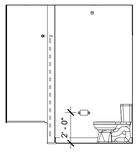
1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
2. THE FRAMING CONTRACTOR IS TO PROVIDE IN-WALL BLOCKING / REINFORCING FOR WALL MOUNTED AND CEILING MOUNTED ITEMS, INCLUDING BLOCKING FOR EACH TOILET, TUB, AND SHOWER REQUIRED FOR GRAB BARS.
3. IF THE CONTRACTOR DOES NOT HAVE DOCUMENTED CONFIRMATION OF THE HEIGHT AT WHICH AN OBJECT IS TO BE MOUNTED THE CONTRACTOR IS TO CONSULT THE ARCHITECT PRIOR TO THE PLACEMENT OF BLOCKING AND THE INSTALLATION OF THE ITEM.
4. FURNITURE IS SHOWN FOR REFERENCE. REFER TO INTERIOR DESIGN DRAWINGS.
5. REFER TO INTERIOR DESIGN SHEETS FOR FINISHES. ANY FINISHES SHOWN ON ARCHITECTURAL SHEETS ARE FOR REFERENCE ONLY.
6. COORDINATE OUTLETS, SWITCHES, LOW VOLTAGE, DATA, ETC. WITH RESPECTIVE DESIPLINES DRAWINGS & FURNITURE SELECTION.
7. WET BAR & VANITIES ARE SHOWN FOR REFERENCE. COORDINATE WITH MEP & INTERIOR DESIGN DRAWINGS.
8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UINTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

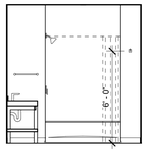
C1 X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 X'-X"	ACT - ACOUSTICAL CEILING TILE



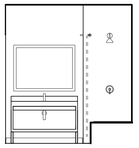
19 BATH NORTH
A5.02 1/4" = 1'-0"



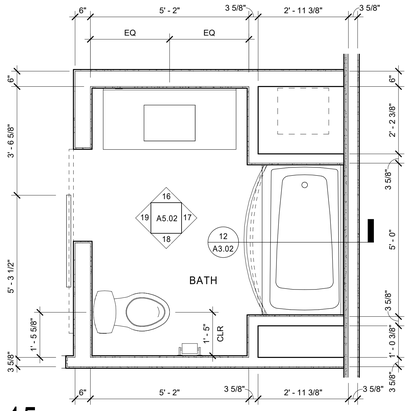
18 BATH WEST
A5.02 1/4" = 1'-0"



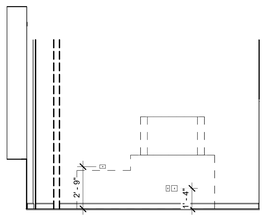
17 BATH SOUTH
A5.02 1/4" = 1'-0"



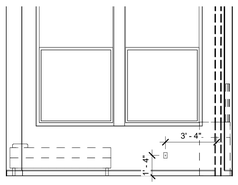
16 BATH EAST
A5.02 1/4" = 1'-0"



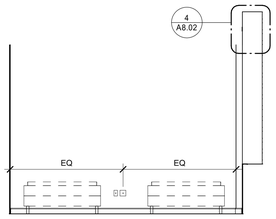
15 BATH - STANDARD
A5.02 1/2" = 1'-0"



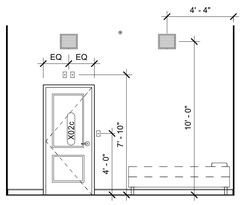
14 BEDROOM NORTH
A5.02 1/4" = 1'-0"



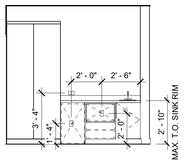
13 BEDROOM WEST
A5.02 1/4" = 1'-0"



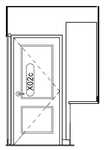
12 BEDROOM SOUTH
A5.02 1/4" = 1'-0"



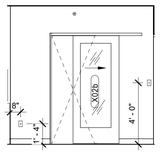
11 BEDROOM EAST
A5.02 1/4" = 1'-0"



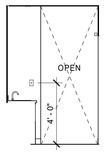
10 WET BAR NORTH
A5.02 1/4" = 1'-0"



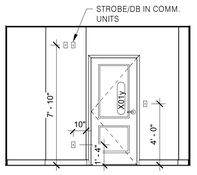
9 WET BAR WEST
A5.02 1/4" = 1'-0"



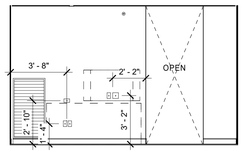
8 WET BAR SOUTH
A5.02 1/4" = 1'-0"



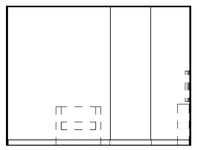
7 WET BAR EAST
A5.02 1/4" = 1'-0"



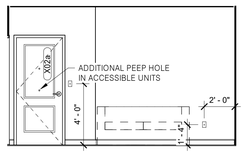
6 LIVING NORTH
A5.02 1/4" = 1'-0"



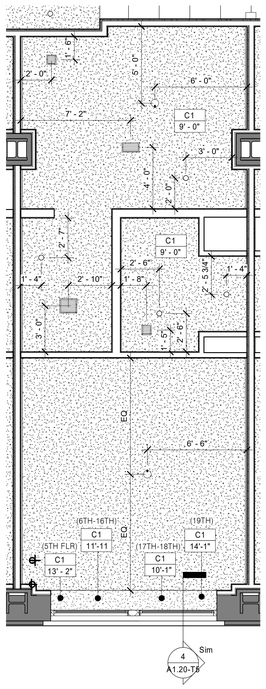
5 LIVING WEST
A5.02 1/4" = 1'-0"



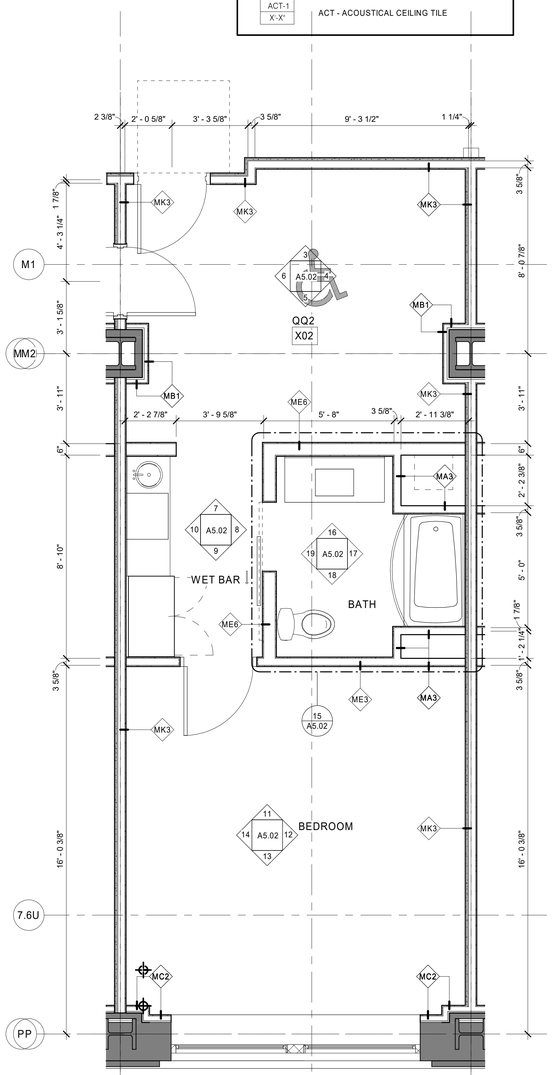
4 LIVING SOUTH
A5.02 1/4" = 1'-0"



3 LIVING EAST
A5.02 1/4" = 1'-0"



2 TYP. DOUBLE QUEEN 'B'
A5.02 1/4" = 1'-0"



1 TYP. DOUBLE QUEEN 'B'
A5.02 3/8" = 1'-0"

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Planning
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SK Design Group, Inc.
Civil Engineer

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Matchline Design Group, LLC
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Dallas, TX 75231
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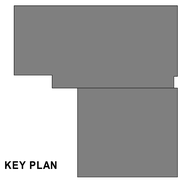
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Dbl Queen - 'B'

A5.02

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GENERAL GUESTROOM NOTES

1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
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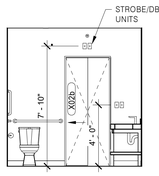
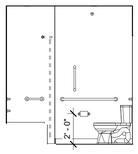
6. COORDINATE OUTLETS, SWITCHES, LOW VOLTAGE, DATA, ETC. WITH RESPECTIVE DESIPLINES DRAWINGS & FURNITURE SELECTION.
7. WET BAR & VANITIES ARE SHOWN FOR REFERENCE. COORDINATE WITH MEP & INTERIOR DESIGN DRAWINGS.
8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UINTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

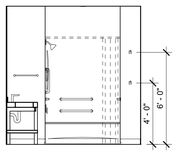
C1 / X'-X'	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X'	ACT - ACOUSTICAL CEILING TILE



19 BATH NORTH-ADA
A5.02a 1/4" = 1'-0"



18 BATH WEST-ADA
A5.02a 1/4" = 1'-0"



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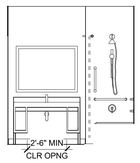

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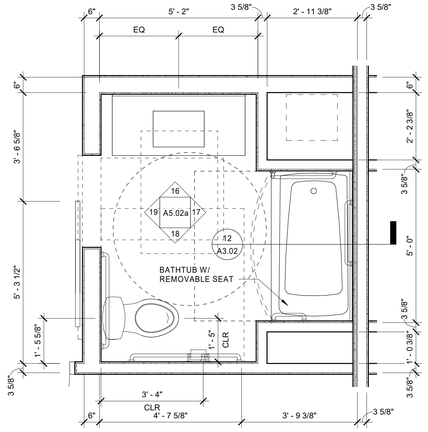
A5.02a 1/4" = 1'-0"



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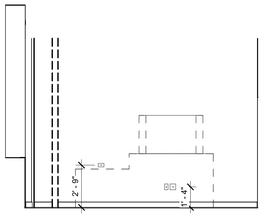

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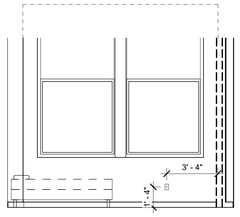
A5.02a 1/4" = 1'-0"



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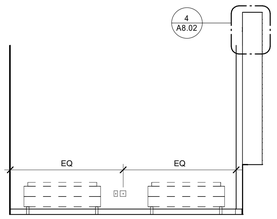

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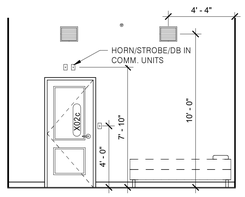

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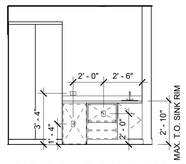

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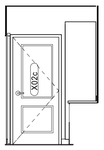
A5.02a 1/4" = 1'-0"



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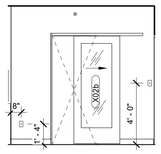

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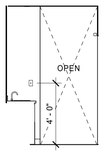

7 WET BAR EAST
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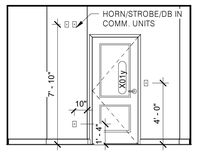
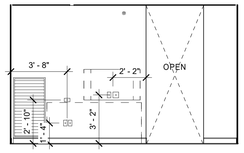


6 LIVING NORTH
A5.02a 1/4" = 1'-0"



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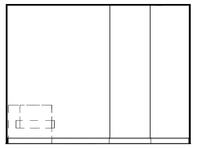

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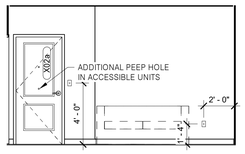

3 LIVING EAST
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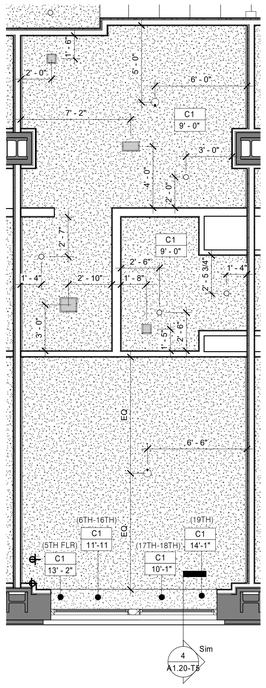
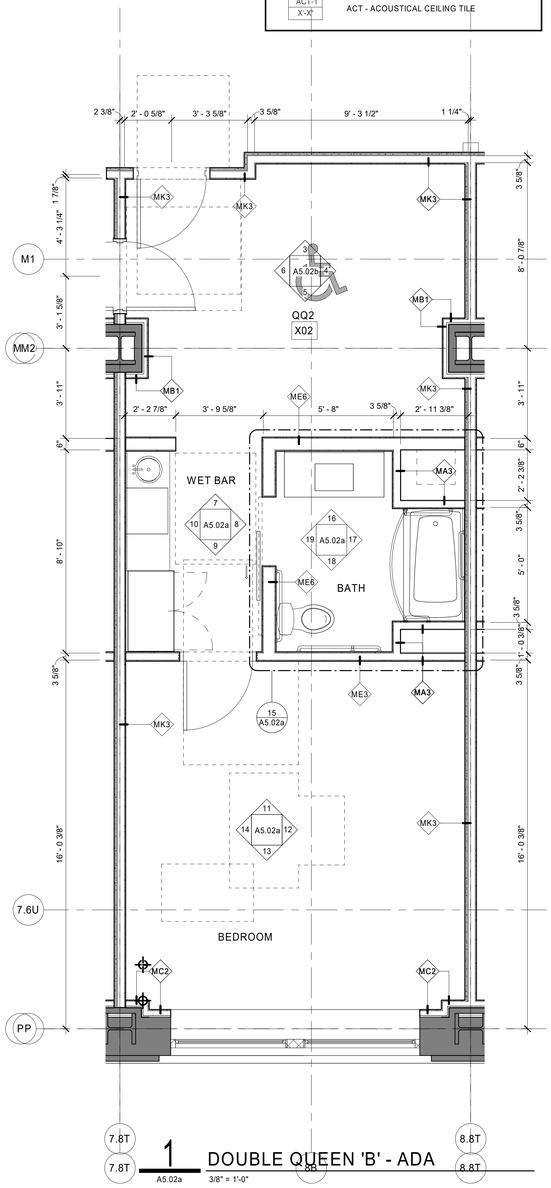


2 Reflected Ceiling Plan DOUBLE QUEEN 'B'
A5.02a 1/4" = 1'-0"



1 DOUBLE QUEEN 'B' - ADA
A5.02a 3/8" = 1'-0"

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Browning Day Mullins Dierdorf Architects
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MEP Engineer

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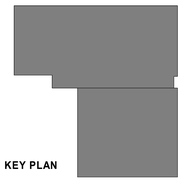
Matchline Design Group, LLC
Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

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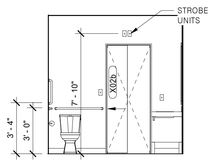
NOTE: ROLL-IN SHOWERS TO RECEIVE GRAB BARS & FOLDING SEAT. SEE SHEET A0.20 FOR ROOM MATRIX.



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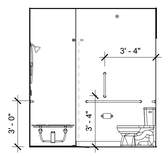

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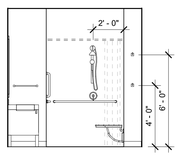

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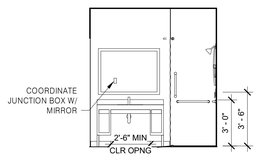

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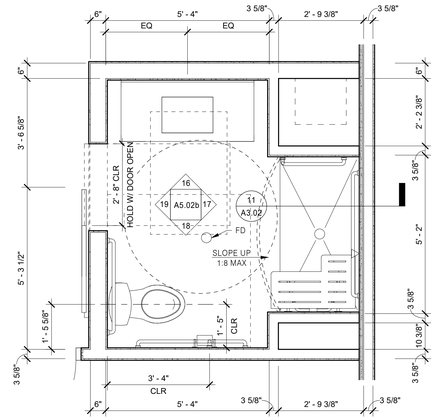
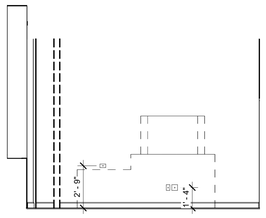


15 A5.02b BATH - ACCESSIBLE - ROLL-IN SHWR 1/2" = 1'-0"



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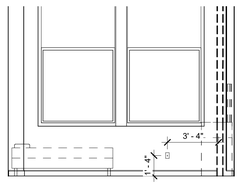

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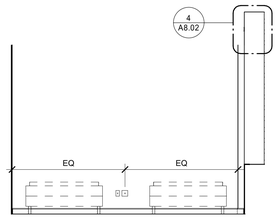
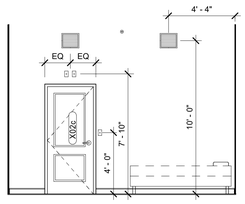
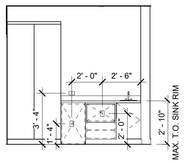


12 A5.02b BEDROOM SOUTH 1/4" = 1'-0"



11 A5.02b BEDROOM EAST 1/4" = 1'-0"



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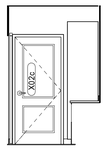
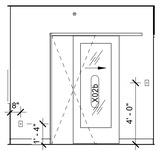


9 A5.02b WET BAR WEST 1/4" = 1'-0"



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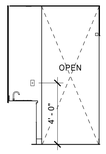

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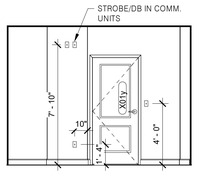
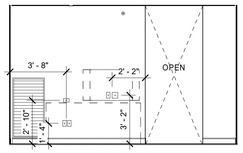


6 A5.02b LIVING NORTH 1/4" = 1'-0"



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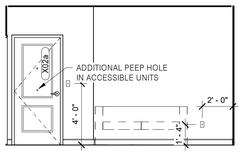

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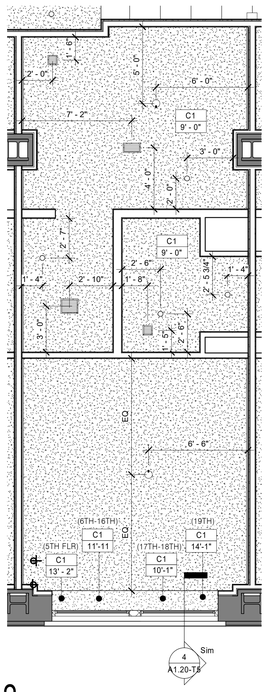
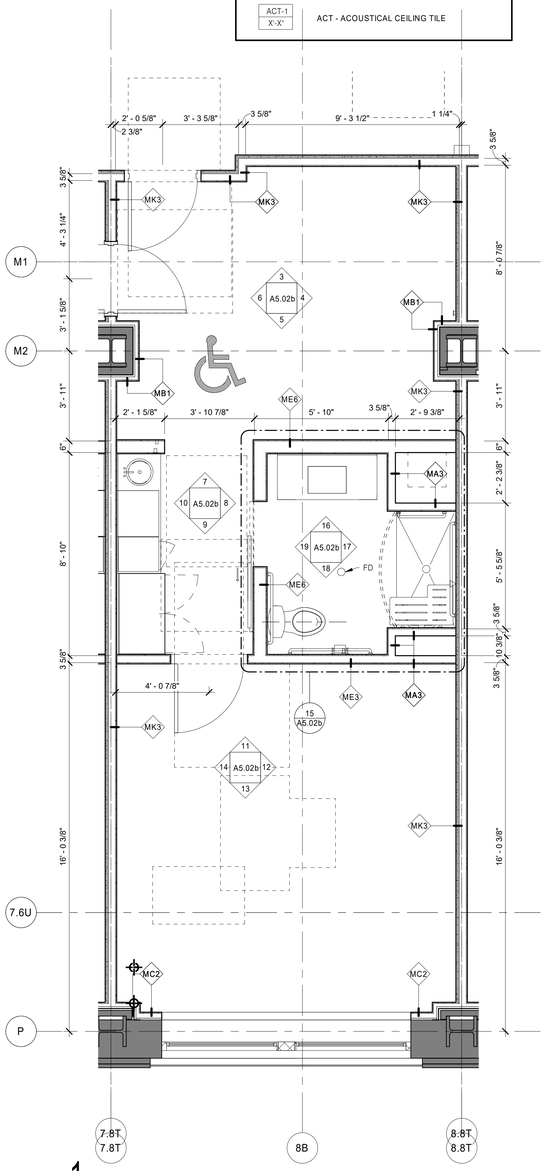


2 A5.02b DOUBLE QUEEN 'B' 1/4" = 1'-0"



1 A5.02b BATH - ACCESSIBLE - ROLL-IN SHWR 3/8" = 1'-0"

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Delta Quad Holdings, LLC
Owner

Rau Construction Co.
Construction Manager

9101 West 110th Street, Suite 150
Overland Park, Kansas 66210
Phone: (913) 642-6000
Website: www.website.com

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Structural Engineer

650 East Carmel Drive, Suite 150
Carmel, Indiana 46032
Phone: (317) 574-5409
Website: www.lawsonelser.com

Hoss & Brown Engineers, Inc.
MEP Engineer

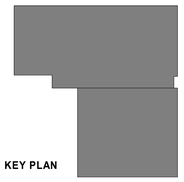
11205 West 79th Street, Suite 102
Lenexa, Kansas 66214
Phone: (913) 362-9090
Website: www.h-be.com

SK Design Group, Inc.
Civil Engineer

4600 College Boulevard, Suite 100
Overland Park, KS 66211
Phone: (913) 451-1818
Website: www.skdesigngroup.net

Matchline Design Group, LLC
Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Dbl Queen - 'B' - ADA

A5.02b

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GENERAL GUESTROOM NOTES

1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
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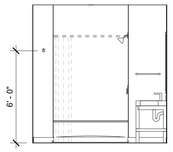
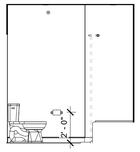
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE

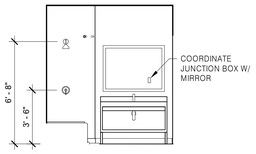


19 BATH NORTH
A5.03 1/4" = 1'-0"

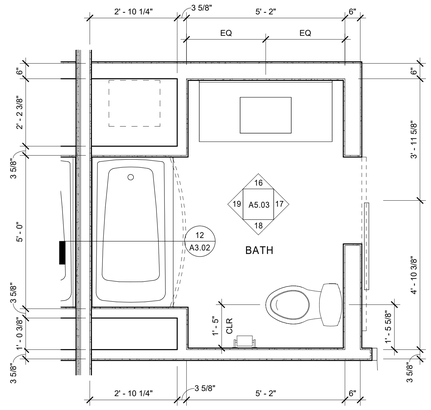


18 BATH WEST
A5.03 1/4" = 1'-0"

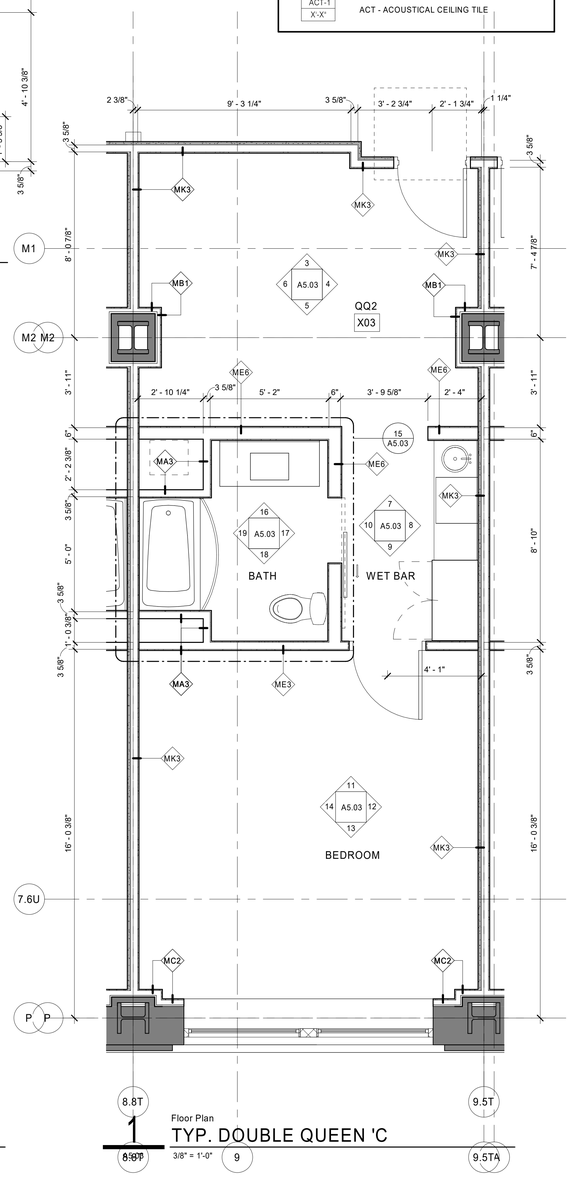
17 BATH SOUTH
A5.03 1/4" = 1'-0"



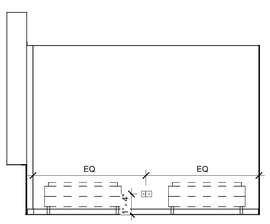
16 BATH EAST
A5.03 1/4" = 1'-0"



Floor Plan
15 ENLARGED BATH
A5.03 1/2" = 1'-0"



Floor Plan
1 TYP. DOUBLE QUEEN 'C
A5.03 3/8" = 1'-0"



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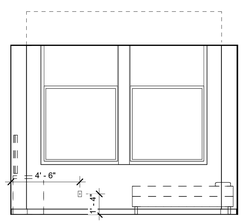

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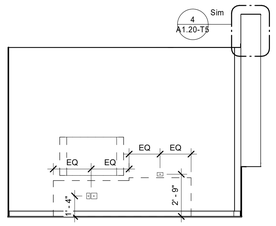
A5.03 1/4" = 1'-0"



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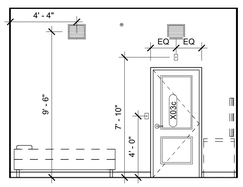
A5.03 1/4" = 1'-0"



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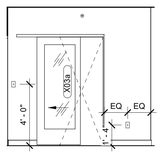

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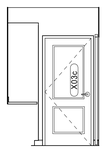

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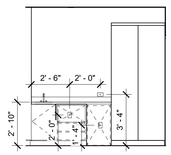
A5.03 1/4" = 1'-0"



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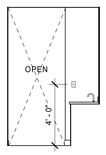
A5.03 1/4" = 1'-0"



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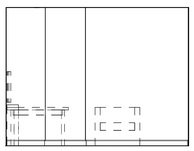
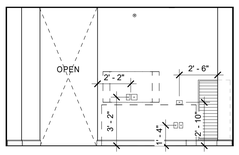
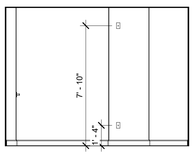
A5.03 1/4" = 1'-0"



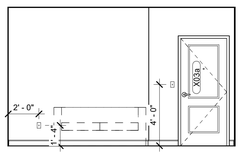
6 LIVING NORTH
A5.03 1/4" = 1'-0"



5 LIVING WEST
A5.03 1/4" = 1'-0"



4 LIVING SOUTH
A5.03 1/4" = 1'-0"



3 LIVING EAST
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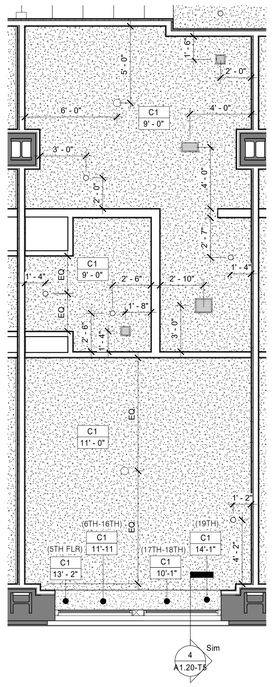

Reflected Ceiling Plan
2 TYP. DOUBLE QUEEN 'C'
A5.03 1/4" = 1'-0"

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

Browning Day Mullins Dierdorf Architects
Architecture
Landscape Architecture
Planning
Interior Design

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Website: www.bdmd.com
MO Certificate of Authority: W00923182

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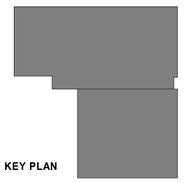

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

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Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Dbl Queen - 'C'

A5.03

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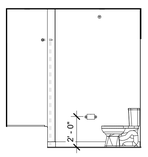

18 Interior Elevation
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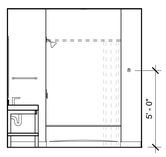

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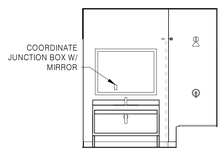
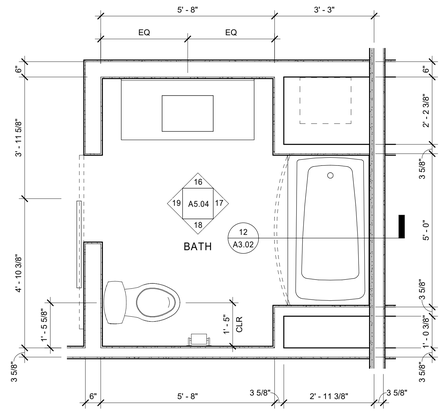
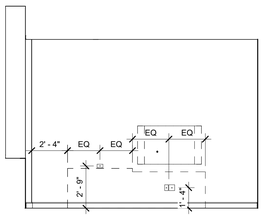


16 Interior Elevation
BATH EAST
A5.04 1/4" = 1'-0"



15 Floor Plan
ENLARGED BATH
A5.04 1/2" = 1'-0"



14 Interior Elevation
BEDROOM NORTH
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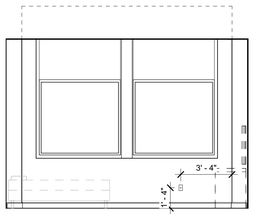

13 Interior Elevation
BEDROOM WEST
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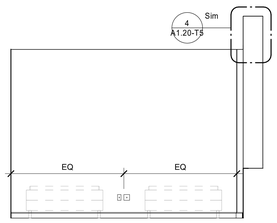
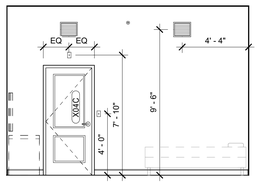
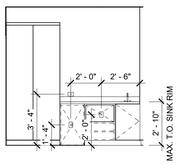


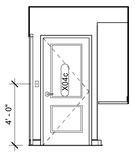
12 Interior Elevation
BEDROOM SOUTH
A5.04 1/4" = 1'-0"



11 Interior Elevation
BEDROOM EAST
A5.04 1/4" = 1'-0"



10 Interior Elevation
WET BAR NORTH
A5.04 1/4" = 1'-0"



9 Interior Elevation
WET BAR WEST
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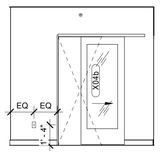

8 Interior Elevation
WET BAR SOUTH
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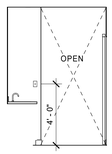

7 Interior Elevation
WET BAR EAST
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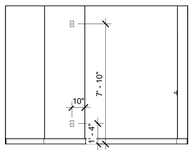

6 Interior Elevation
LIVING NORTH
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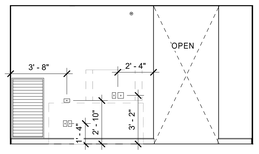

5 Interior Elevation
LIVING WEST
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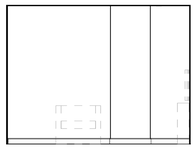

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LIVING SOUTH
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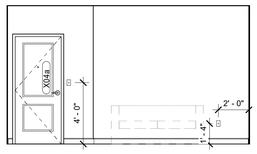
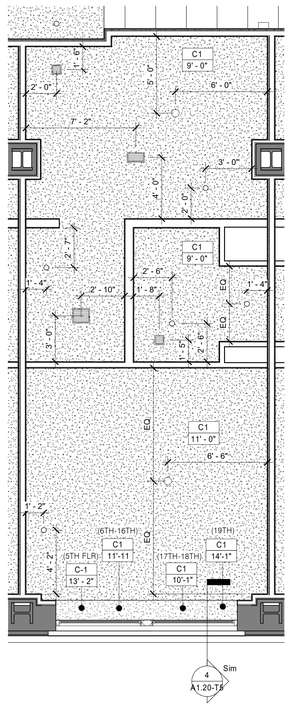
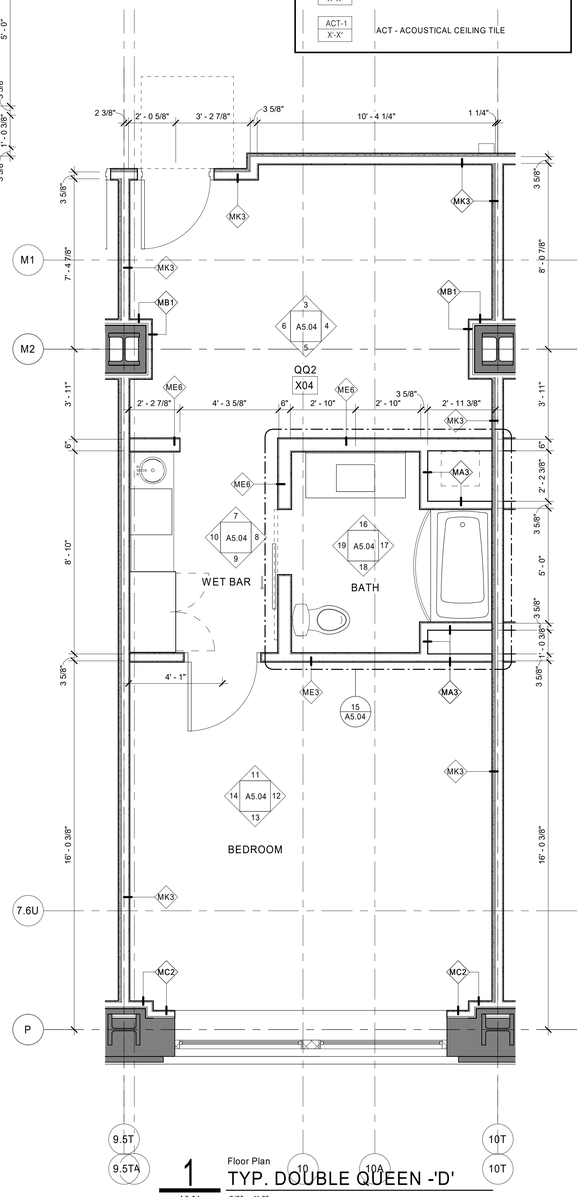


3 Interior Elevation
LIVING EAST
A5.04 1/4" = 1'-0"



2 Reflected Ceiling Plan
TYP. DOUBLE QUEEN - 'D'
A5.04 1/4" = 1'-0"



1 Floor Plan
TYP. DOUBLE QUEEN -'D'
A5.04 3/8" = 1'-0"

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

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Architecture
Landscape Architecture
Planning
Interior Design

626 North Illinois Street
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Phone: (317) 635-5030
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MO Certificate of Authority: W00923182

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Dallas, TX 75231
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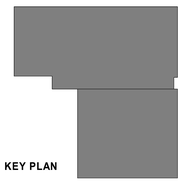
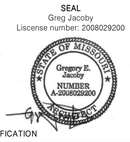
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Dbl Queen - 'D'

A5.04

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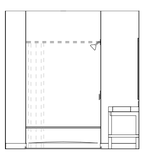
GENERAL GUESTROOM NOTES

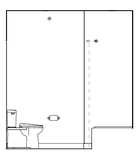
1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
2. THE FRAMING CONTRACTOR IS TO PROVIDE IN-WALL BLOCKING / REINFORCING FOR WALL MOUNTED AND CEILING MOUNTED ITEMS, INCLUDING BLOCKING FOR EACH TOILET, TUB, AND SHOWER REQUIRED FOR GRAB BARS.
3. IF THE CONTRACTOR DOES NOT HAVE DOCUMENTED CONFIRMATION OF THE HEIGHT AT WHICH AN OBJECT IS TO BE MOUNTED THE CONTRACTOR IS TO CONSULT THE ARCHITECT PRIOR TO THE PLACEMENT OF BLOCKING AND THE INSTALLATION OF THE ITEM.
4. FURNITURE IS SHOWN FOR REFERENCE. REFER TO INTERIOR DESIGN DRAWINGS.
5. REFER TO INTERIOR DESIGN SHEETS FOR FINISHES. ANY FINISHES SHOWN ON ARCHITECTURAL SHEETS ARE FOR REFERENCE ONLY.
6. COORDINATE OUTLETS, SWITCHES, LOW VOLTAGE, DATA, ETC. WITH RESPECTIVE DESIPLINES DRAWINGS & FURNITURE SELECTION.
7. WET BAR & VANITIES ARE SHOWN FOR REFERENCE. COORDINATE WITH MEP & INTERIOR DESIGN DRAWINGS.
8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UINTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

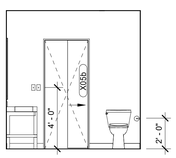
C1 X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 X'-X"	ACT - ACOUSTICAL CEILING TILE



19 BATH NORTH
A5.05 1/4" = 1'-0"



18 BATH WEST
A5.05 1/4" = 1'-0"



17 BATH SOUTH
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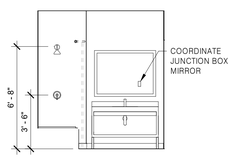

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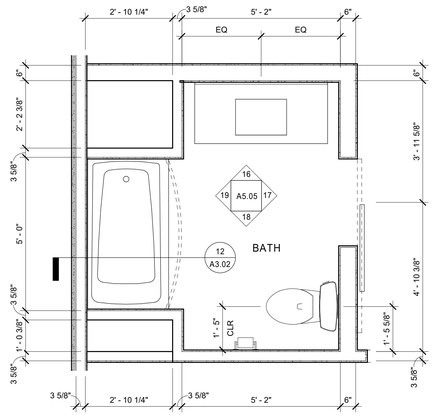
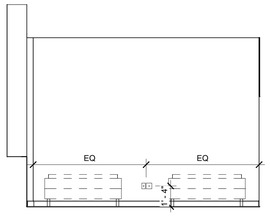


15 Floor Plan
ENLARGED BATH
A5.05 1/2" = 1'-0"



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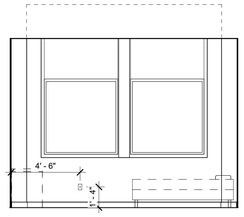

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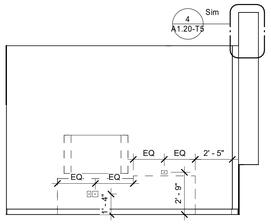
A5.05 1/4" = 1'-0"



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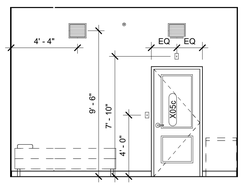
A5.05 1/4" = 1'-0"



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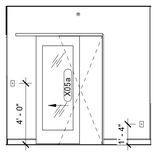
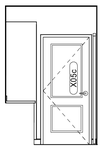
A5.05 1/4" = 1'-0"



10 WET BAR NORTH
A5.05 1/4" = 1'-0"



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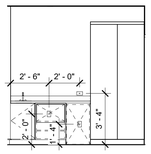

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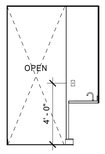
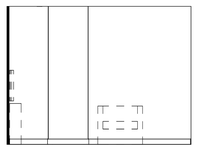
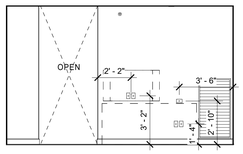
A5.05 1/4" = 1'-0"



7 WET BAR EAST
A5.05 1/4" = 1'-0"



6 LIVING NORTH
A5.05 1/4" = 1'-0"



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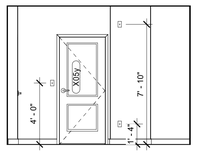
A5.05 1/4" = 1'-0"



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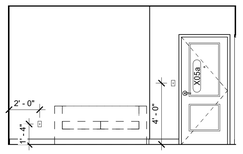
A5.05 1/4" = 1'-0"



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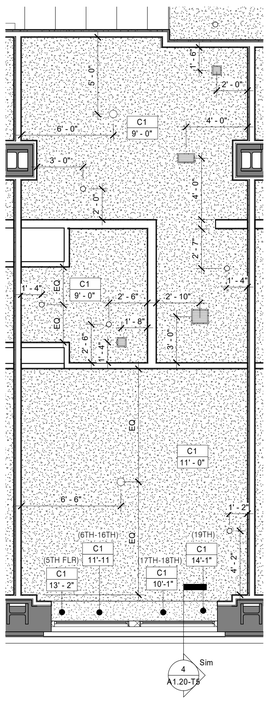
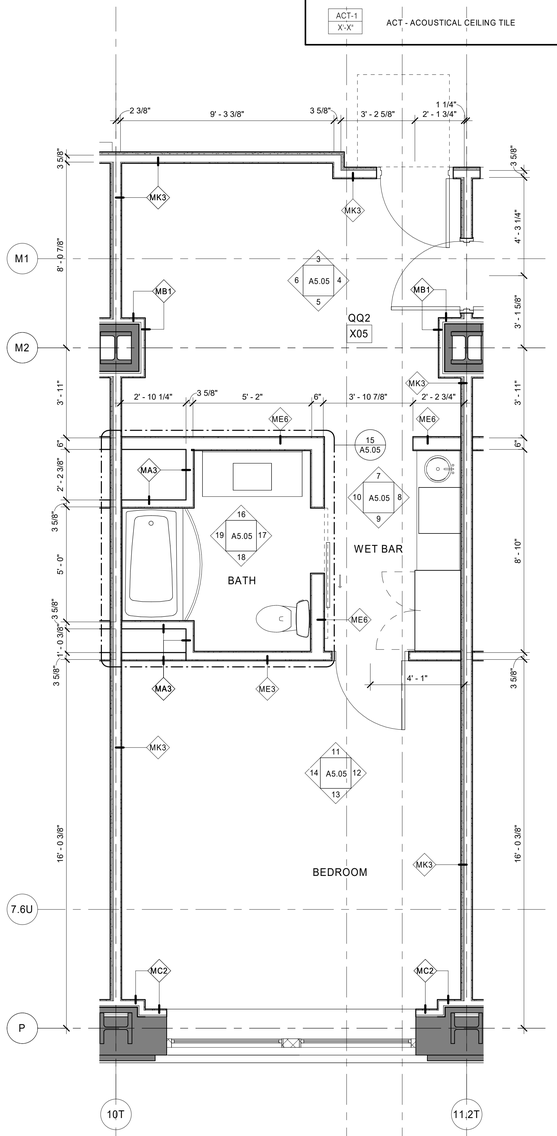


2 Reflected Ceiling Plan
TYP. DOUBLE QUEEN - 'E'
A5.05 1/4" = 1'-0"



1 Floor Plan
TYP. DOUBLE QUEEN - 'E'
A5.05 3/8" = 1'-0"

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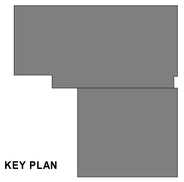

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Dbl Queen - 'E'

A5.05

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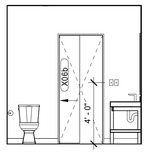
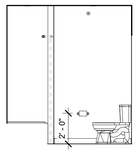
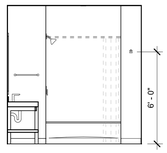


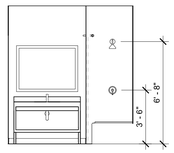
19 Interior Elevation
BATH NORTH
A5.06 1/4" = 1'-0"



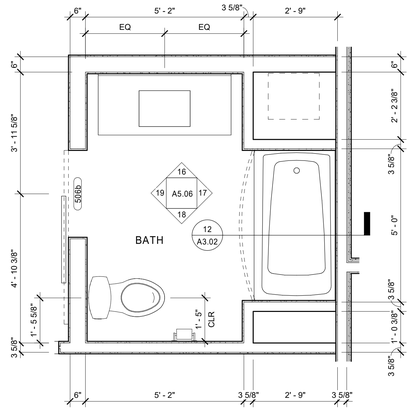
18 Interior Elevation
BATH WEST
A5.06 1/4" = 1'-0"



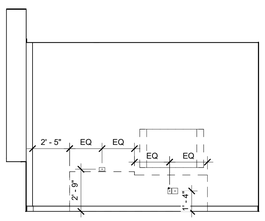
17 Interior Elevation
BATH SOUTH
A5.06 1/4" = 1'-0"



16 Interior Elevation
BATH EAST
A5.06 1/4" = 1'-0"



15 Floor Plan
ENLARGED BATH
A5.06 1/2" = 1'-0"



14 Interior Elevation
BEDROOM NORTH
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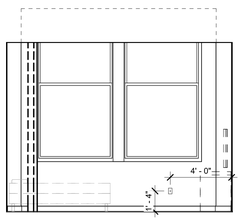

13 Interior Elevation
BEDROOM WEST
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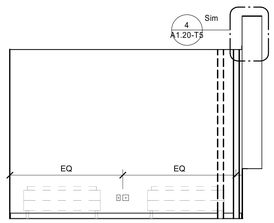
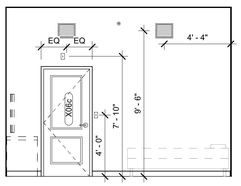


12 Interior Elevation
BEDROOM SOUTH
A5.06 1/4" = 1'-0"



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BEDROOM EAST
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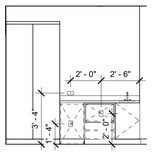

10 Interior Elevation
WET BAR NORTH
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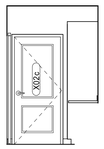

9 Interior Elevation
WET BAR WEST
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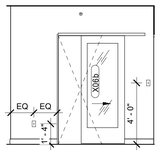

8 Interior Elevation
WET BAR SOUTH
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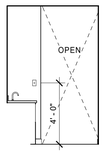

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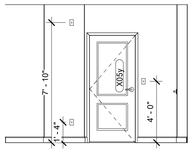
WET BAR EAST
A5.06 1/4" = 1'-0"



6 Interior Elevation
LIVING NORTH
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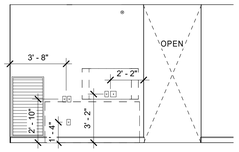
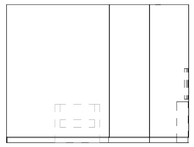
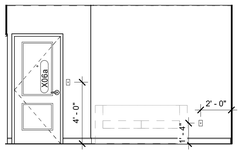


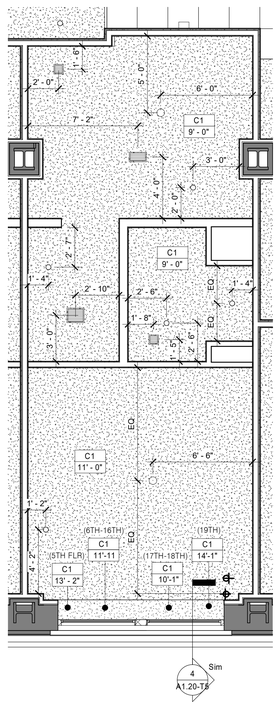
5 Interior Elevation
LIVING WEST
A5.06 1/4" = 1'-0"



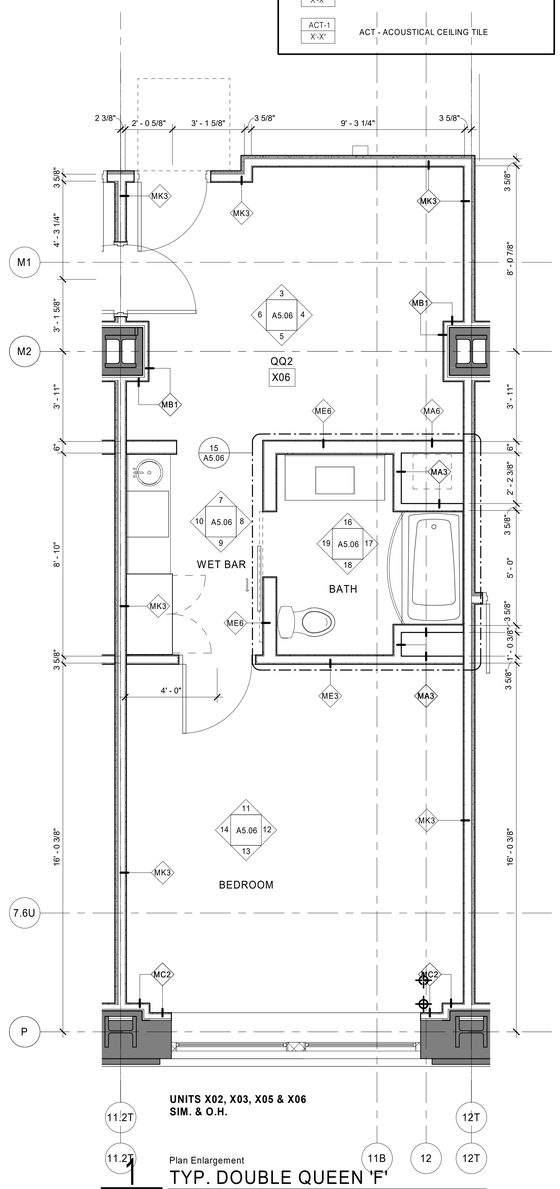
4 Interior Elevation
LIVING SOUTH
A5.06 1/4" = 1'-0"



3 Interior Elevation
LIVING EAST
A5.06 1/4" = 1'-0"



2 Reflected Ceiling Plan
TYP. DOUBLE QUEEN 'F'
A5.06 1/4" = 1'-0"



1 Plan Enlargement
TYP. DOUBLE QUEEN 'F'
A5.06 3/8" = 1'-0"

GENERAL GUESTROOM NOTES

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7. WET BAR & VANITIES ARE SHOWN FOR REFERENCE. COORDINATE WITH MEP & INTERIOR DESIGN DRAWINGS.
8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UNITS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

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Architecture
Landscape Architecture
Planning
Interior Design

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MO Certificate of Authority: W00923182

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Owner

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Construction Manager

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Overland Park, Kansas 66210
Phone: (913) 642-6000
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Structural Engineer

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Carmel, Indiana 46032
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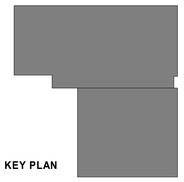
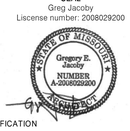
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Dbl Queen - 'F'

A5.06

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GENERAL GUESTROOM NOTES

1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
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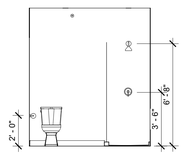
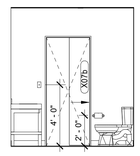
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

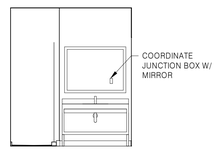
C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE



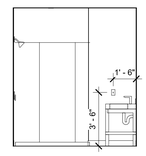
15 Interior Elevation
BATH NORTH
A5.07 1/4" = 1'-0"



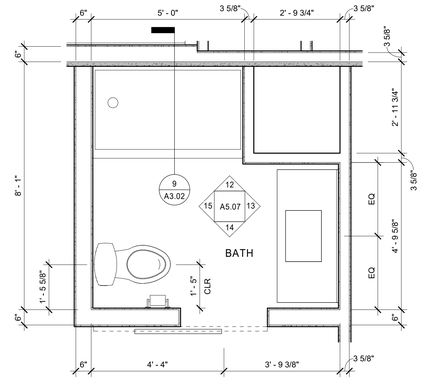
14 Interior Elevation
BATH WEST
A5.07 1/4" = 1'-0"



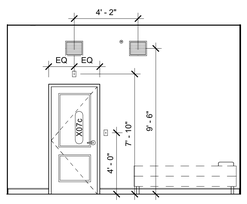
13 Interior Elevation
BATH SOUTH
A5.07 1/4" = 1'-0"



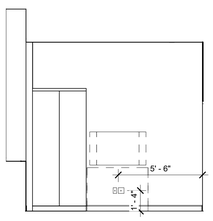
12 Interior Elevation
BATH EAST
A5.07 1/4" = 1'-0"



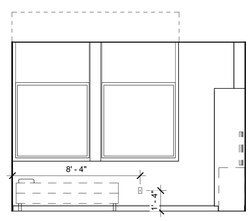
11 ENLARGED BATH
A5.07 1/2" = 1'-0"



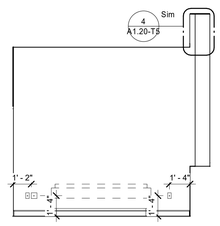
10 Interior Elevation
BEDROOM NORTH
A5.07 1/4" = 1'-0"



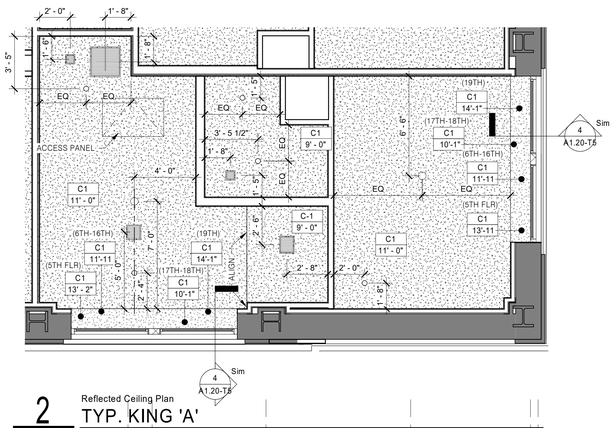
9 Interior Elevation
BEDROOM WEST
A5.07 1/4" = 1'-0"



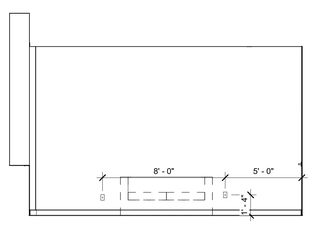
8 Interior Elevation
BEDROOM SOUTH
A5.07 1/4" = 1'-0"



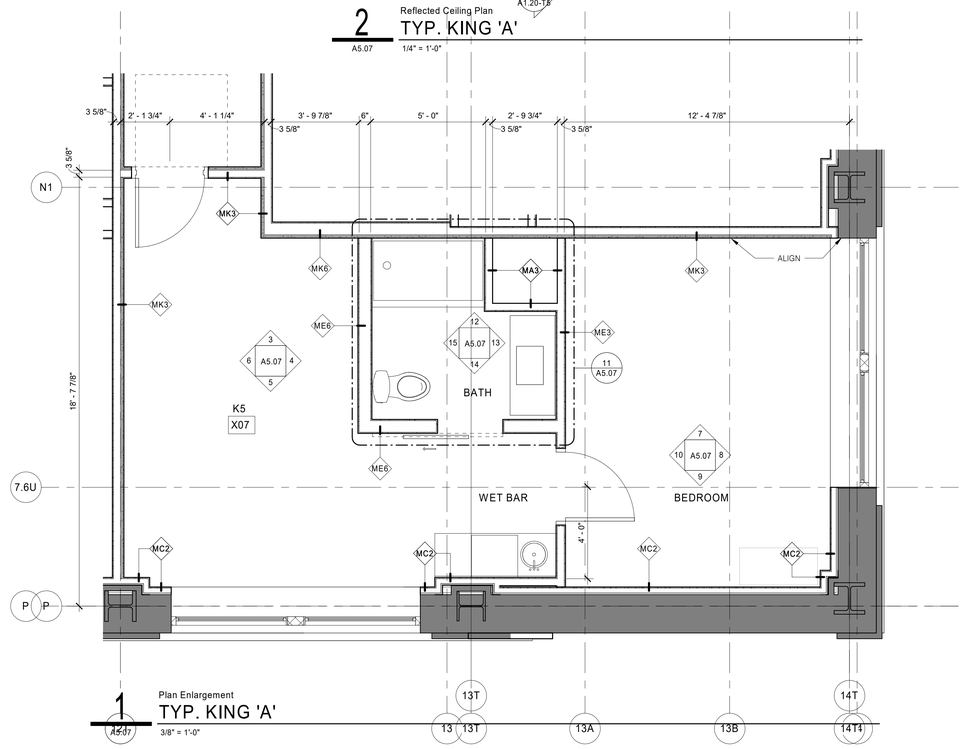
7 Interior Elevation
BEDROOM EAST
A5.07 1/4" = 1'-0"



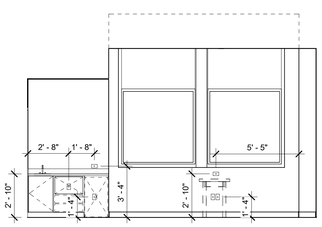
2 Reflected Ceiling Plan
TYP. KING 'A'
A5.07 1/4" = 1'-0"



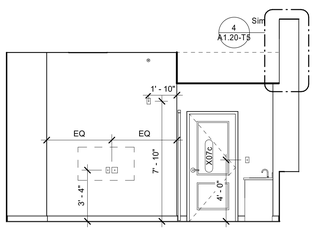
6 Interior Elevation
LIVING NORTH
A5.07 1/4" = 1'-0"



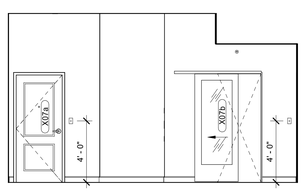
1 Plan Enlargement
TYP. KING 'A'
A5.07 3/8" = 1'-0"



5 Interior Elevation
LIVING WEST
A5.07 1/4" = 1'-0"



4 Interior Elevation
LIVING SOUTH
A5.07 1/4" = 1'-0"



3 Interior Elevation
LIVING EAST
A5.07 1/4" = 1'-0"

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Architecture
Landscape Architecture
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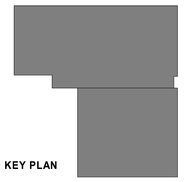

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'A'

A5.07

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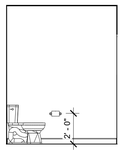
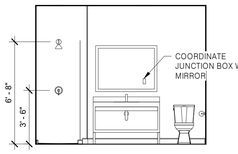
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE



14 Interior Elevation
BATH NORTH
A5.08 1/4" = 1'-0"



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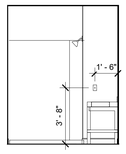
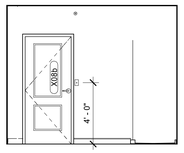


12 Interior Elevation
BATH SOUTH
A5.08 1/4" = 1'-0"



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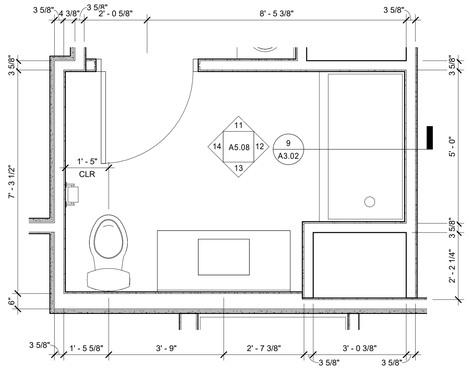
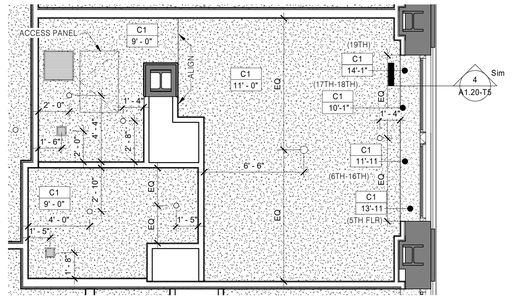
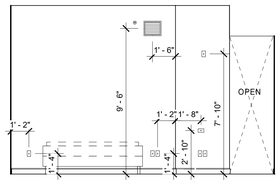
A5.08 1/4" = 1'-0"



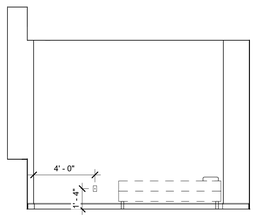
10 Floor Plan
ENLARGED BATH
A5.08 1/2" = 1'-0"



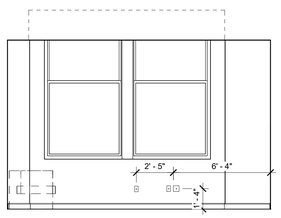
2 Reflected Ceiling Plan
TYP. KING 'B'
A5.08 1/4" = 1'-0"



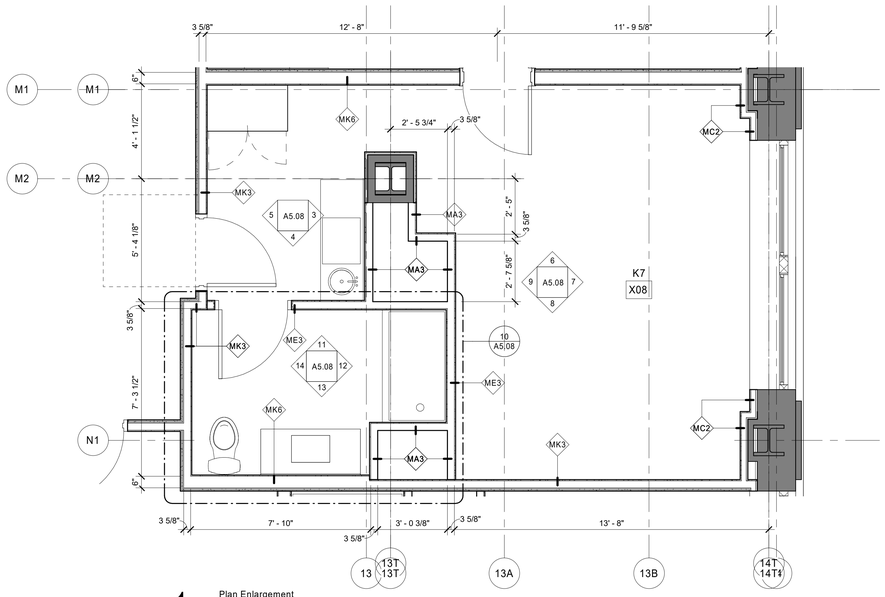
9 Interior Elevation
BEDROOM NORTH
A5.08 1/4" = 1'-0"



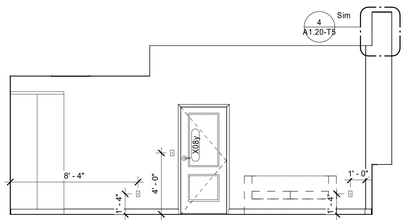
8 Interior Elevation
BEDROOM WEST
A5.08 1/4" = 1'-0"



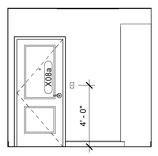
7 Interior Elevation
BEDROOM SOUTH
A5.08 1/4" = 1'-0"



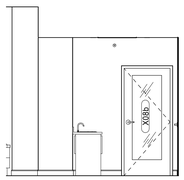
1 Plan Enlargement
TYP. KING 'B'
A5.08 3/8" = 1'-0"



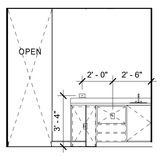
6 Interior Elevation
BEDROOM EAST
A5.08 1/4" = 1'-0"



5 Interior Elevation
WET BAR NORTH
A5.08 1/4" = 1'-0"



4 Interior Elevation
WET BAR WEST
A5.08 1/4" = 1'-0"



3 Interior Elevation
WET BAR SOUTH
A5.08 1/4" = 1'-0"

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

Browning Day Mullins Dierdorf Architects
Architecture
Landscape Architecture
Planning
Interior Design

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MO Certificate of Authority: W00923182

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Construction Manager

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Dallas, TX 75231
Phone: (972) 707-0568
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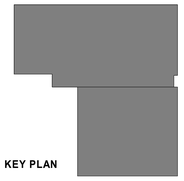

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'B'

A5.08

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GENERAL GUESTROOM NOTES

1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
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7. WET BAR & VANITIES ARE SHOWN FOR REFERENCE. COORDINATE WITH MEP & INTERIOR DESIGN DRAWINGS.
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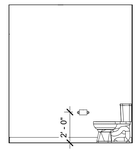
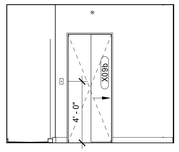
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

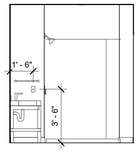
C1 X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 X'-X"	ACT - ACOUSTICAL CEILING TILE



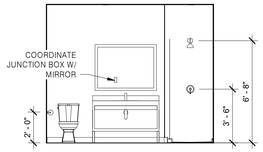
15 Interior Elevation
BATH NORTH
A5.09 1/4" = 1'-0"



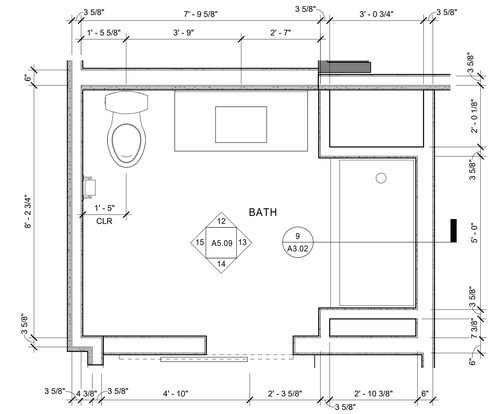
14 Interior Elevation
BATH WEST
A5.09 1/4" = 1'-0"



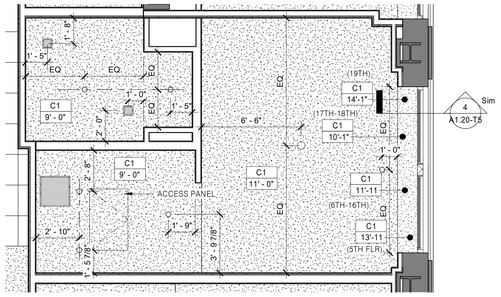
13 Interior Elevation
BATH SOUTH
A5.09 1/4" = 1'-0"



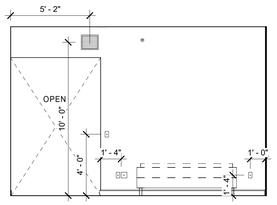
12 Interior Elevation
BATH EAST
A5.09 1/4" = 1'-0"



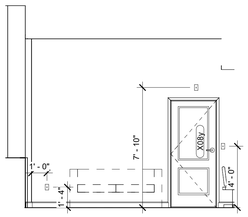
11 Floor Plan
ENLARGED BATH
A5.09 1/2" = 1'-0"



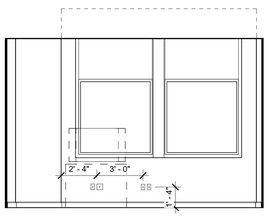
2 Reflected Ceiling Plan
TYP. KING 'C'
A5.09 1/4" = 1'-0"



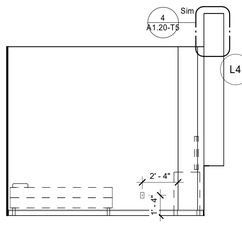
10 Interior Elevation
BEDROOM NORTH
A5.09 1/4" = 1'-0"



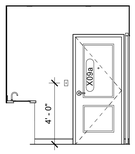
9 Interior Elevation
BEDROOM WEST
A5.09 1/4" = 1'-0"



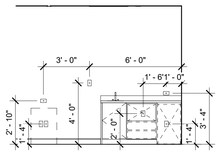
8 Interior Elevation
BEDROOM SOUTH
A5.09 1/4" = 1'-0"



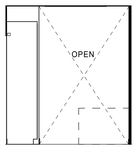
7 Interior Elevation
BEDROOM EAST
A5.09 1/4" = 1'-0"



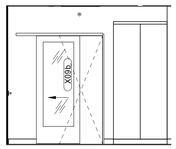
6 Interior Elevation
WET BAR NORTH
A5.09 1/4" = 1'-0"



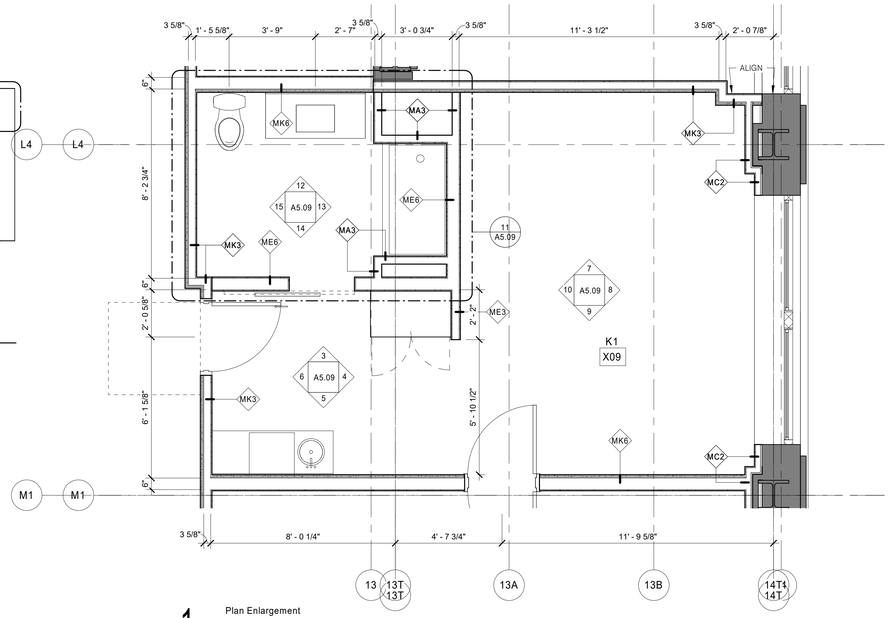
5 Interior Elevation
WET BAR WEST
A5.09 1/4" = 1'-0"



4 Interior Elevation
WET BAR SOUTH
A5.09 1/4" = 1'-0"



3 Interior Elevation
WET BAR EAST
A5.09 1/4" = 1'-0"



1 Plan Enlargement
TYP. KING 'C'
A5.09 3/8" = 1'-0"

BROWNING DAY MULLINS DIERDORF
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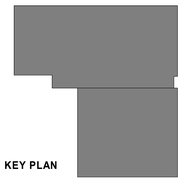
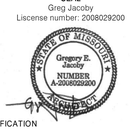


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'C'

A5.09

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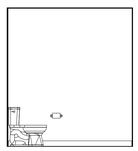

14 Interior Elevation
BATH NORTH
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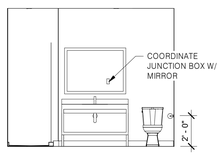

13 BATH WEST
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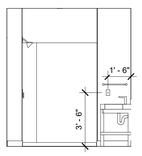
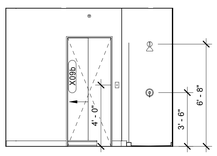


12 Interior Elevation
BATH SOUTH
A5.10 1/4" = 1'-0"



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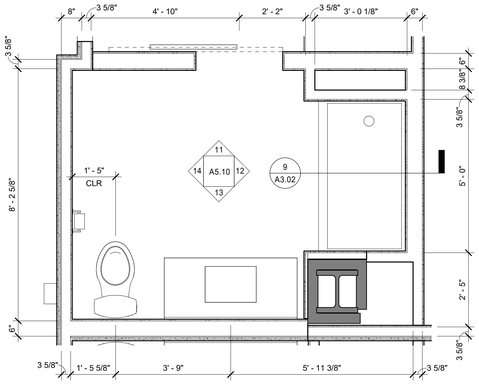
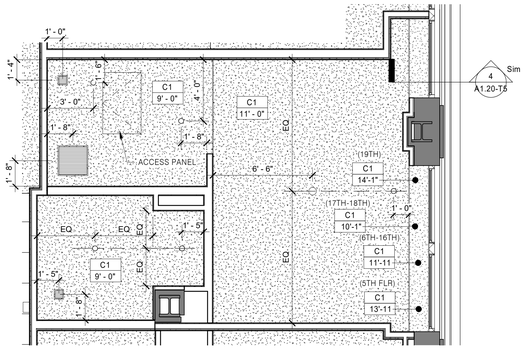


10 Floor Plan
ENLARGED BATH
A5.10 1/2" = 1'-0"



2 Reflected Ceiling Plan
TYP. KING 'D'
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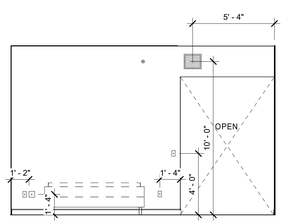
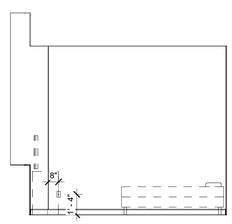
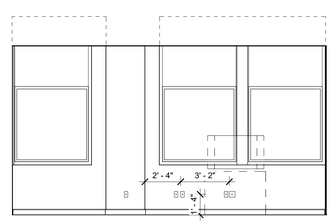


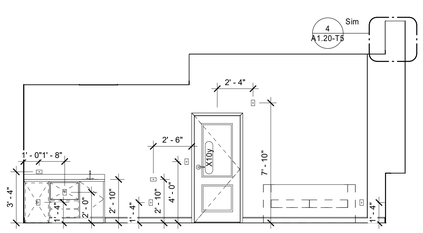
9 BEDROOM NORTH
A5.10 1/4" = 1'-0"



8 Interior Elevation
BEDROOM WEST
A5.10 1/4" = 1'-0"



7 Interior Elevation
BEDROOM SOUTH
A5.10 1/4" = 1'-0"



6 Interior Elevation
BEDROOM EAST
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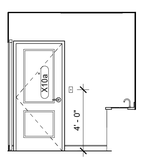
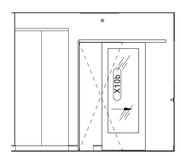
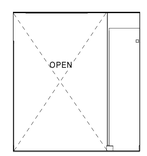


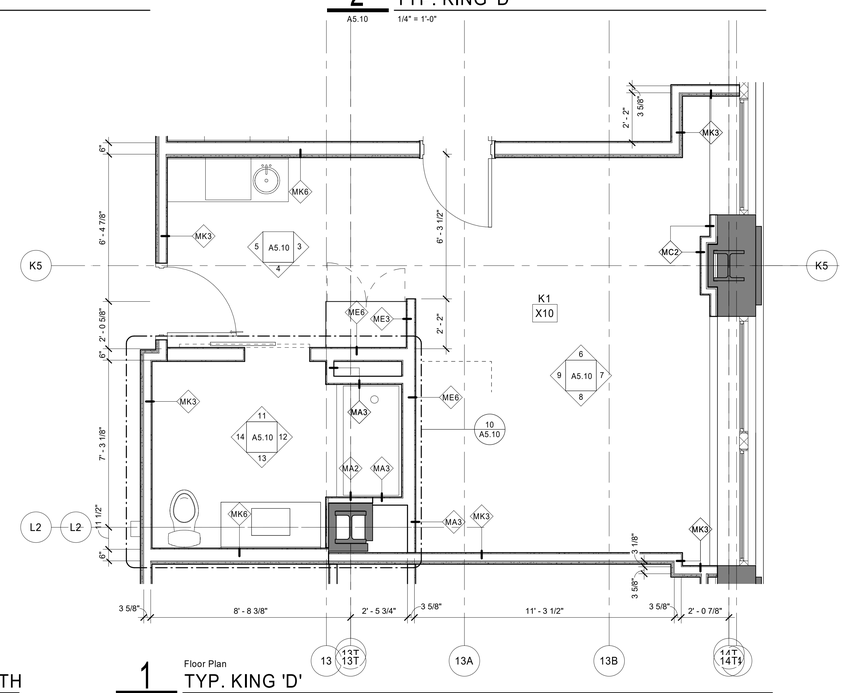
5 Interior Elevation
WET BAR NORTH
A5.10 1/4" = 1'-0"



4 Interior Elevation
WET BAR/LIVING WEST
A5.10 1/4" = 1'-0"



3 Interior Elevation
WET BAR SOUTH
A5.10 1/4" = 1'-0"



1 Floor Plan
TYP. KING 'D'
A5.10 3/8" = 1'-0"

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

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Architecture
Landscape Architecture
Planning
Interior Design

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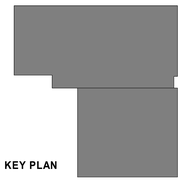

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'D'

A5.10

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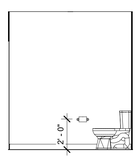
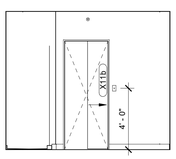
SYMBOL LEGEND

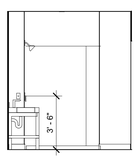
C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE



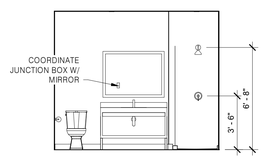
13 Interior Elevation
BATH NORTH
A5.11 1/4" = 1'-0"



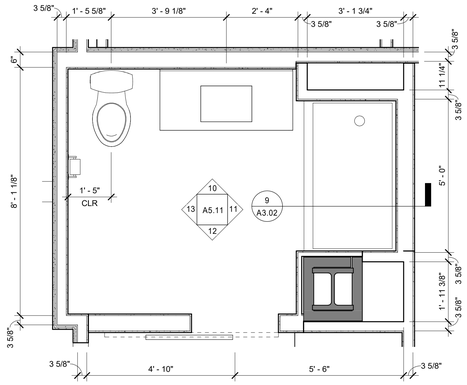
12 Interior Elevation
BATH WEST
A5.11 1/4" = 1'-0"



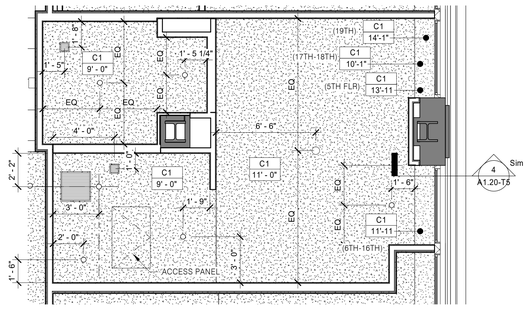
11 Interior Elevation
BATH SOUTH
A5.11 1/4" = 1'-0"



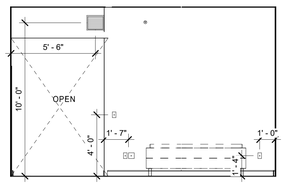
10 Interior Elevation
BATH EAST
A5.11 1/4" = 1'-0"



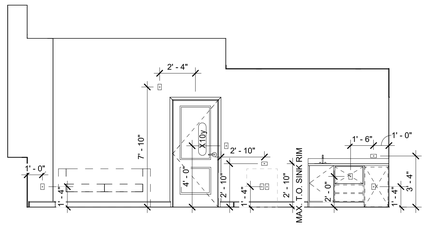
9 Floor Plan
BATH - STANDARD
A5.11 1/2" = 1'-0"



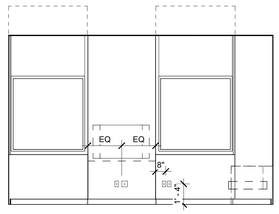
2 Reflected Ceiling Plan
TYP. KING 'E'
A5.11 1/4" = 1'-0"



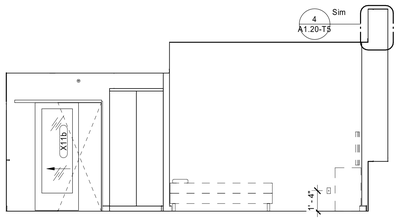
8 Interior Elevation
BEDROOM NORTH
A5.11 1/4" = 1'-0"



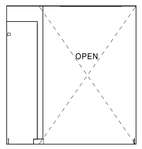
7 Interior Elevation
BEDROOM WEST
A5.11 1/4" = 1'-0"



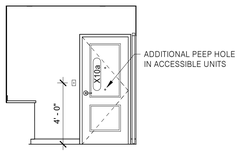
6 Interior Elevation
BEDROOM SOUTH
A5.11 1/4" = 1'-0"



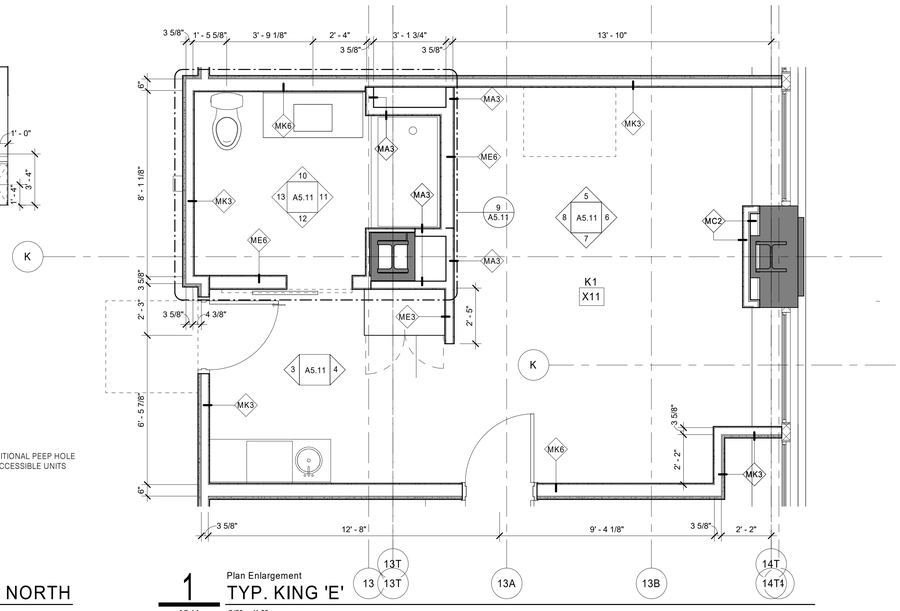
5 Interior Elevation
BEDROOM EAST
A5.11 1/4" = 1'-0"



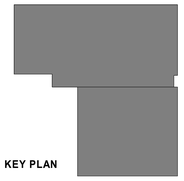
4 Interior Elevation
WET BAR SOUTH
A5.11 1/4" = 1'-0"



3 WET BAR NORTH
A5.11 1/4" = 1'-0"



1 Plan Enlargement
TYP. KING 'E'
A5.11 3/8" = 1'-0"



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A5.11

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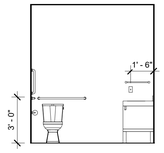
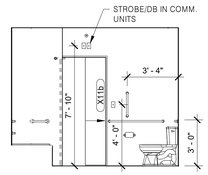


13 BATH NORTH-ADA
A5.11a 1/4" = 1'-0"



12 BATH NORTH-ADA
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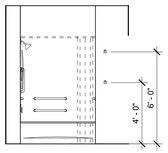
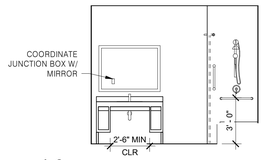


11 BATH SOUTH-ADA
A5.11a 1/4" = 1'-0"



10 BATH EAST-ADA
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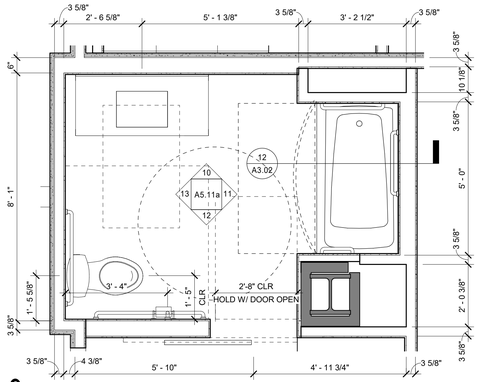
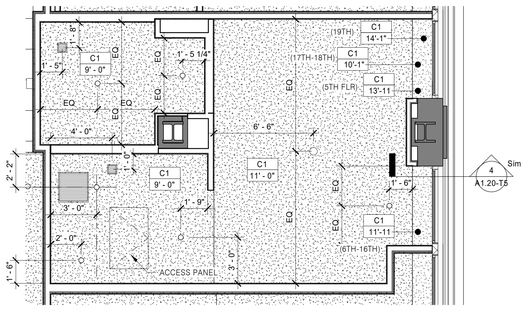


9 BATH - ACCESSIBLE - TUB
A5.11a 1/2" = 1'-0"



2 TYP. KING 'E'
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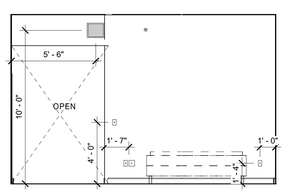

8 BEDROOM NORTH
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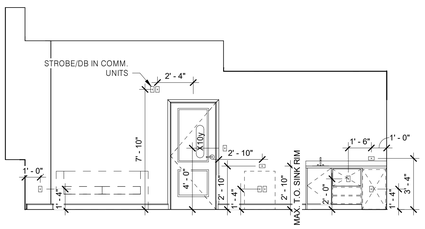

7 BEDROOM WEST
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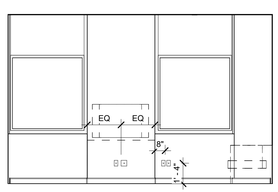

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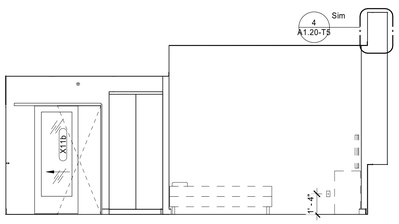

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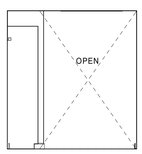

4 WET BAR SOUTH
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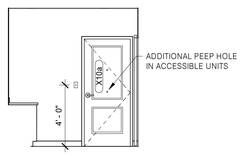

3 WET BAR NORTH
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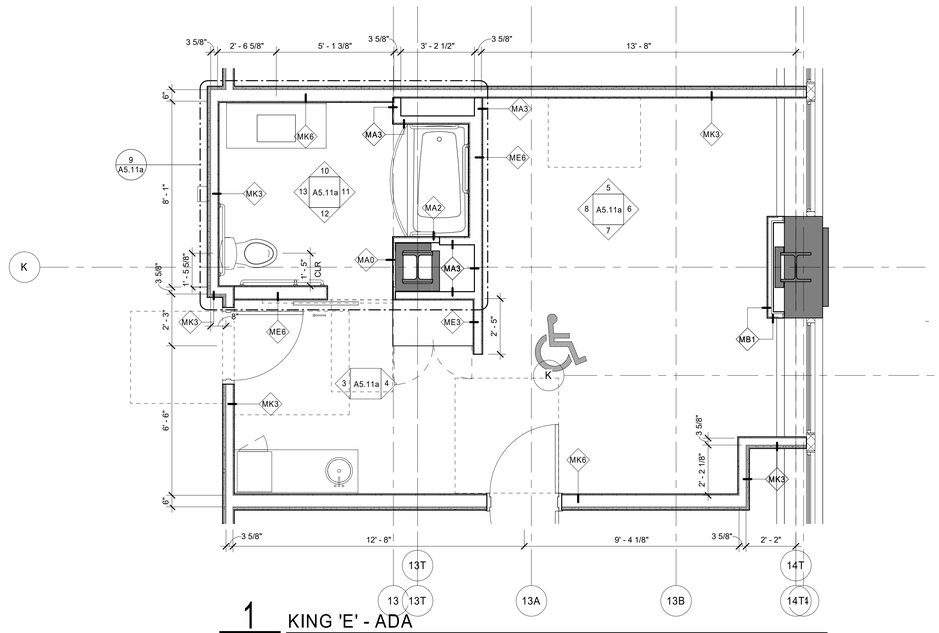

1 KING 'E' - ADA
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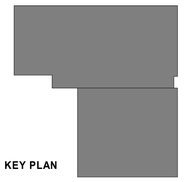

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Greg Jacoby
Liscense number: 2008029200

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King - 'E' ADA

A5.11a

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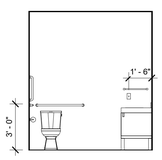
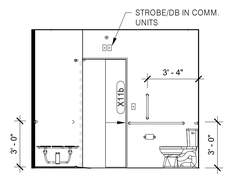
SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE

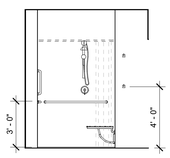
NOTE: ROLL-IN SHOWERS TO RECEIVE GRAB BARS & FOLDING SEAT. SEE SHEET A0.20 FOR ROOM MATRIX.



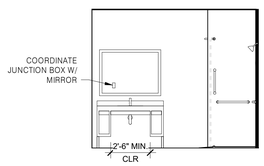
13 BATH NORTH-ADA
A5.11b 1/4" = 1'-0"



12 BATH WEST-ADA
A5.11b 1/4" = 1'-0"



11 BATH SOUTH-ADA
A5.11b 1/4" = 1'-0"



10 BATH EAST-ADA
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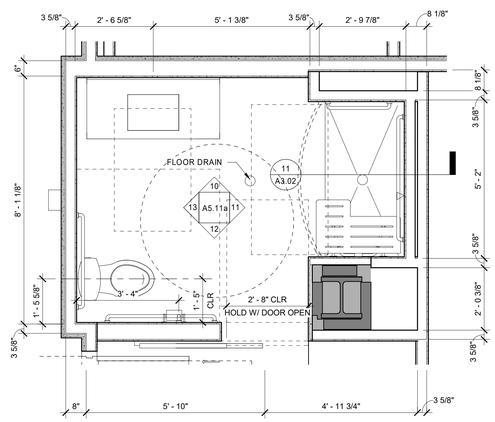
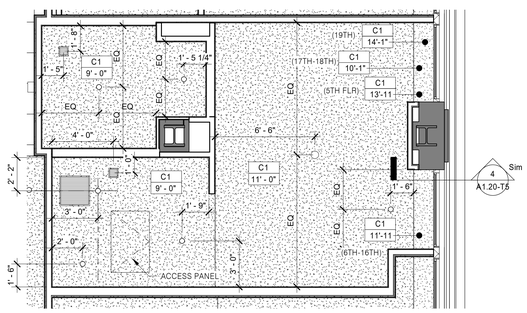
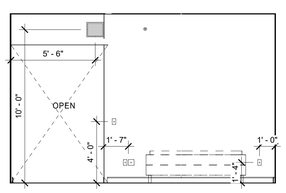


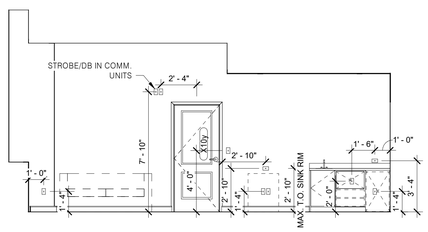
9 BATH - ACCESSIBLE
A5.11b 1/2" = 1'-0"



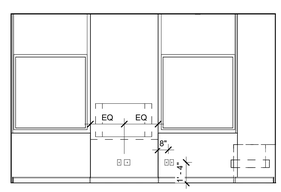
2 TYP. KING 'E'
A5.11b 1/4" = 1'-0"



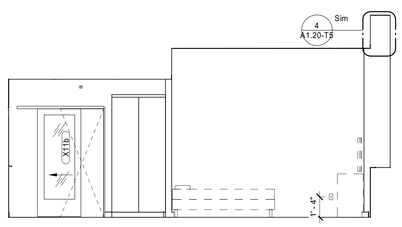
8 BEDROOM NORTH
A5.11b 1/4" = 1'-0"



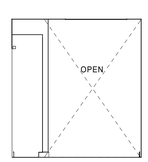
7 BEDROOM WEST
A5.11b 1/4" = 1'-0"



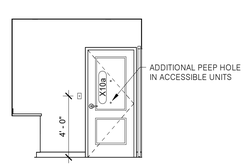
6 BEDROOM SOUTH
A5.11b 1/4" = 1'-0"



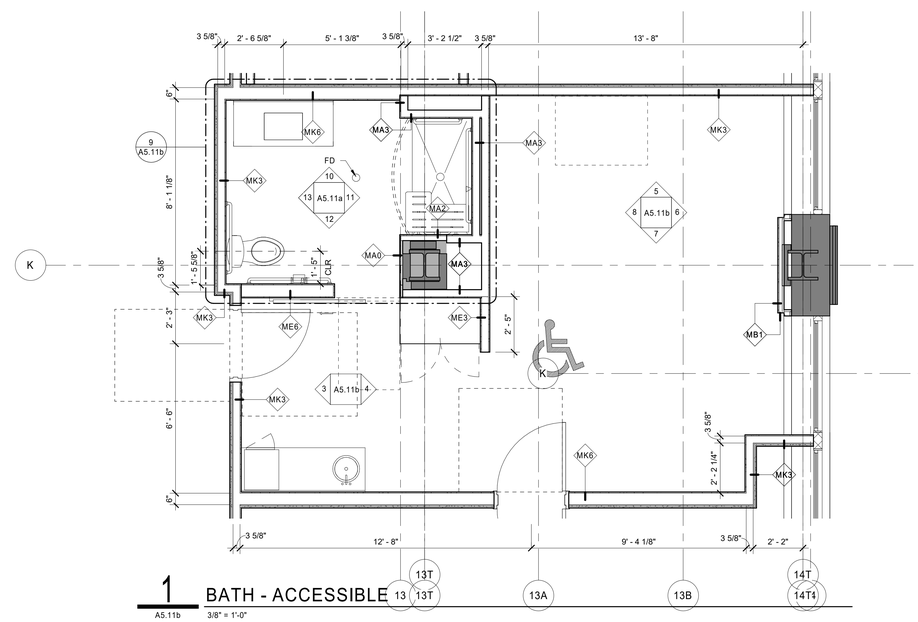
5 BEDROOM EAST
A5.11b 1/4" = 1'-0"



4 WET BAR SOUTH
A5.11b 1/4" = 1'-0"



3 WET BAR NORTH
A5.11b 1/4" = 1'-0"



1 BATH - ACCESSIBLE
A5.11b 3/8" = 1'-0"

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LEADERSHIP + DESIGN®

Browning Day Mullins Dierdorf Architects
Architecture
Landscape Architecture
Planning
Interior Design

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Phone: (317) 635-5030
Website: www.bdmd.com
MO Certificate of Authority: W00923182

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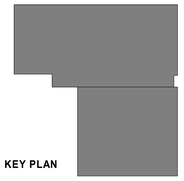

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE

Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'E' ADA

A5.11b

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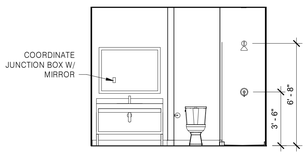
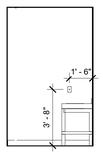
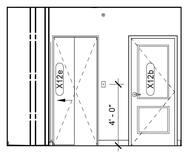


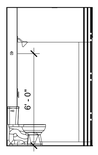
17 Interior Elevation
BATH NORTH
A5.12 1/4" = 1'-0"



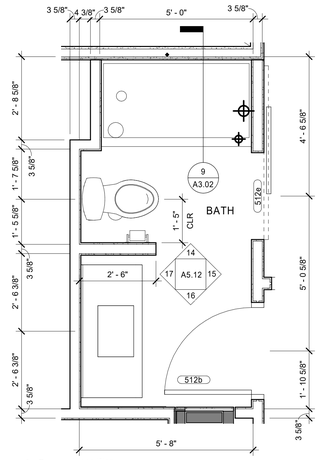
16 Interior Elevation
BATH WEST
A5.12 1/4" = 1'-0"



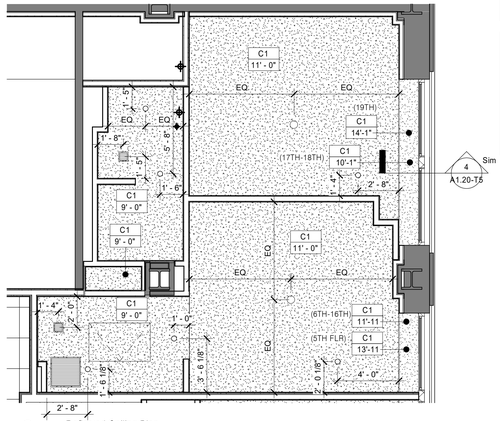
15 Interior Elevation
BATH SOUTH
A5.12 1/4" = 1'-0"



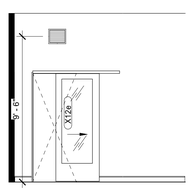
14 Interior Elevation
BATH EAST
A5.12 1/4" = 1'-0"



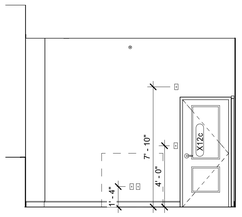
13 Floor Plan
ENLARGED BATH
A5.12 1/2" = 1'-0"



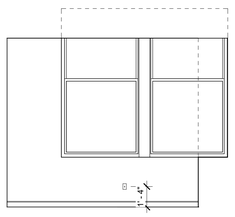
2 Reflected Ceiling Plan
TYP. KING 'F'
A5.12 1/4" = 1'-0"



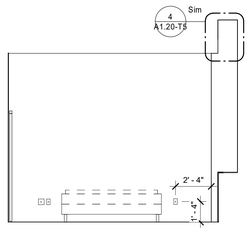
12 Interior Elevation
BEDROOM NORTH
A5.12 1/4" = 1'-0"



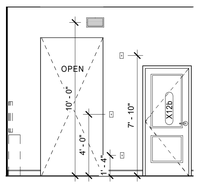
11 Interior Elevation
BEDROOM WEST
A5.12 1/4" = 1'-0"



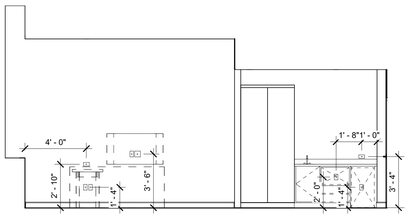
10 Interior Elevation
BEDROOM SOUTH
A5.12 1/4" = 1'-0"



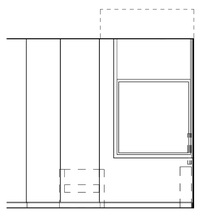
9 Interior Elevation
BEDROOM EAST
A5.12 1/4" = 1'-0"



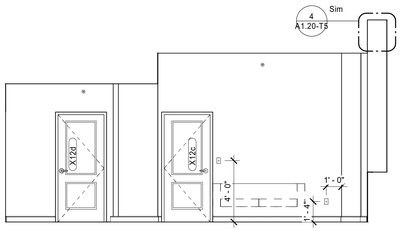
8 Interior Elevation
LIVING NORTH
A5.12 1/4" = 1'-0"



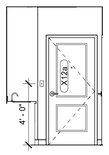
7 Interior Elevation
LIVING WEST
A5.12 1/4" = 1'-0"



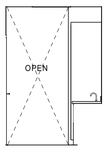
6 Interior Elevation
LIVING SOUTH
A5.12 1/4" = 1'-0"



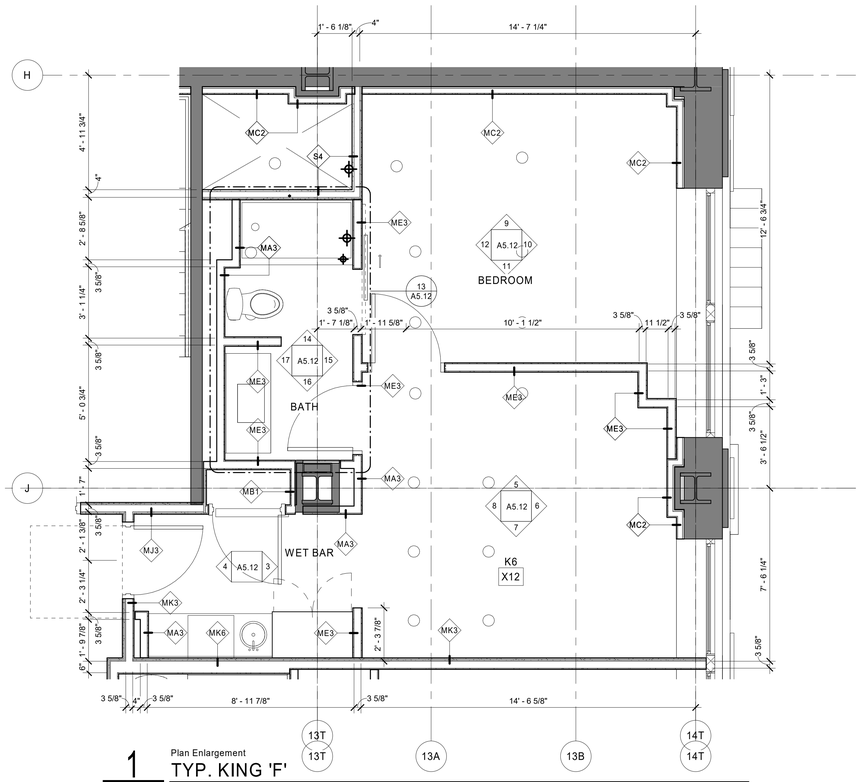
5 Interior Elevation
LIVING EAST
A5.12 1/4" = 1'-0"



4 Interior Elevation
WET BAR NORTH
A5.12 1/4" = 1'-0"



3 Interior Elevation
WET BAR SOUTH
A5.12 1/4" = 1'-0"



1 Plan Enlargement
TYP. KING 'F'
A5.12 3/8" = 1'-0"

GENERAL GUESTROOM NOTES

1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
2. THE FRAMING CONTRACTOR IS TO PROVIDE IN-WALL BLOCKING / REINFORCING FOR WALL MOUNTED AND CEILING MOUNTED ITEMS, INCLUDING BLOCKING FOR EACH TOILET, TUB, AND SHOWER REQUIRED FOR GRAB BARS.
3. IF THE CONTRACTOR DOES NOT HAVE DOCUMENTED CONFIRMATION OF THE HEIGHT AT WHICH AN OBJECT IS TO BE MOUNTED THE CONTRACTOR IS TO CONSULT THE ARCHITECT PRIOR TO THE PLACEMENT OF BLOCKING AND THE INSTALLATION OF THE ITEM.
4. FURNITURE IS SHOWN FOR REFERENCE. REFER TO INTERIOR DESIGN DRAWINGS.
5. REFER TO INTERIOR DESIGN SHEETS FOR FINISHES. ANY FINISHES SHOWN ON ARCHITECTURAL SHEETS ARE FOR REFERENCE ONLY.
6. COORDINATE OUTLETS, SWITCHES, LOW VOLTAGE, DATA, ETC. WITH RESPECTIVE DESIPLINES DRAWINGS & FURNITURE SELECTION.
7. WET BAR & VANITIES ARE SHOWN FOR REFERENCE. COORDINATE WITH MEP & INTERIOR DESIGN DRAWINGS.
8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UINTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

C1 X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 X'-X"	ACT - ACOUSTICAL CEILING TILE

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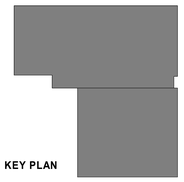

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'F'

A5.12

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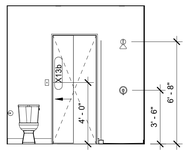
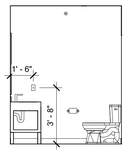
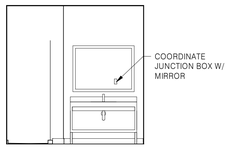
ACT-1 X'-X"	ACT - ACOUSTICAL CEILING TILE



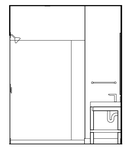
19 Interior Elevation
BATH NORTH
A5.13 1/4" = 1'-0"



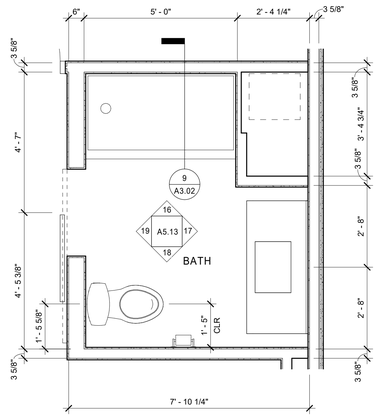
18 Interior Elevation
BATH WEST
A5.13 1/4" = 1'-0"



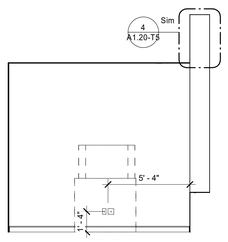
17 Interior Elevation
BATH SOUTH
A5.13 1/4" = 1'-0"



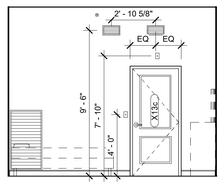
16 Interior Elevation
BATH EAST
A5.13 1/4" = 1'-0"



15 Plan Enlargement
ENLARGED BATH
A5.13 1/2" = 1'-0"



14 Interior Elevation
BEDROOM NORTH
A5.13 1/4" = 1'-0"



13 Interior Elevation
BEDROOM WEST
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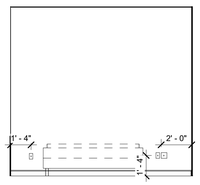
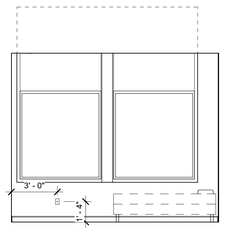
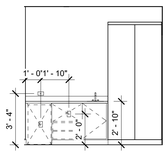


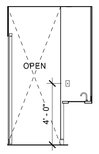
12 Interior Elevation
BEDROOM SOUTH
A5.13 1/4" = 1'-0"



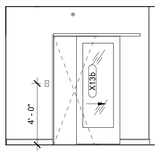
11 Interior Elevation
BEDROOM EAST
A5.13 1/4" = 1'-0"



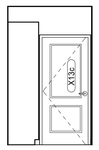
10 Interior Elevation
WET BAR NORTH
A5.13 1/4" = 1'-0"



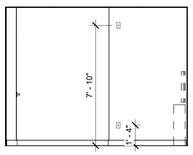
9 Interior Elevation
WET BAR WEST
A5.13 1/4" = 1'-0"



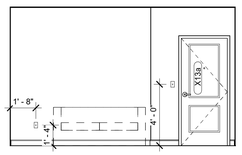
8 Interior Elevation
WET BAR SOUTH
A5.13 1/4" = 1'-0"



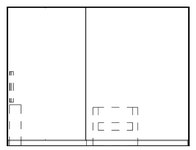
7 Interior Elevation
WET BAR EAST
A5.13 1/4" = 1'-0"



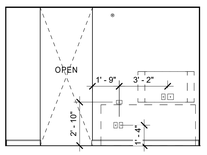
6 Interior Elevation
LIVING NORTH
A5.13 1/4" = 1'-0"



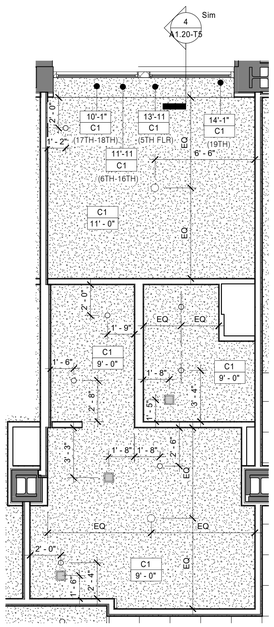
5 Interior Elevation
LIVING WEST
A5.13 1/4" = 1'-0"



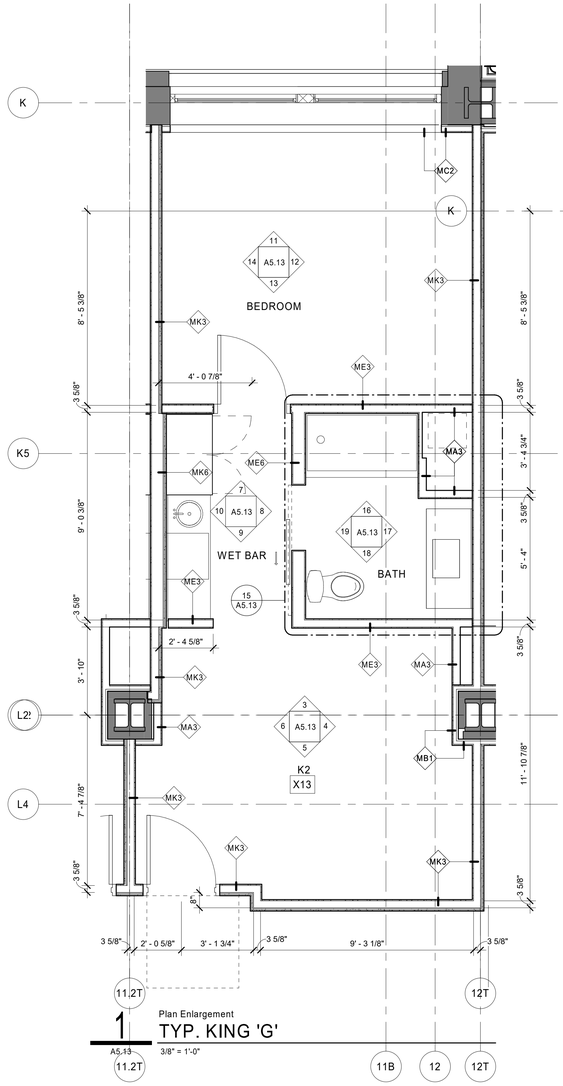
4 Interior Elevation
LIVING SOUTH
A5.13 1/4" = 1'-0"



3 Interior Elevation
LIVING EAST
A5.13 1/4" = 1'-0"



2 Reflected Ceiling Plan
TYP. KING 'G'
A5.13 1/4" = 1'-0"



1 Plan Enlargement
TYP. KING 'G'
A5.13 3/8" = 1'-0"

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LEADERSHIP + DESIGN®

Browning Day Mullins Dierdorf Architects
Architecture
Landscape Architecture
Planning
Interior Design

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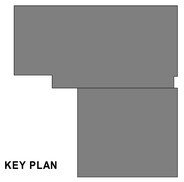
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'G'

A5.13

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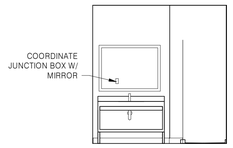
GENERAL GUESTROOM NOTES

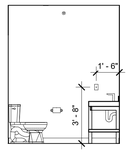
1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES. (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
2. THE FRAMING CONTRACTOR IS TO PROVIDE IN-WALL BLOCKING / REINFORCING FOR WALL MOUNTED AND CEILING MOUNTED ITEMS, INCLUDING BLOCKING FOR EACH TOILET, TUB, AND SHOWER REQUIRED FOR GRAB BARS.
3. IF THE CONTRACTOR DOES NOT HAVE DOCUMENTED CONFIRMATION OF THE HEIGHT AT WHICH AN OBJECT IS TO BE MOUNTED THE CONTRACTOR IS TO CONSULT THE ARCHITECT PRIOR TO THE PLACEMENT OF BLOCKING AND THE INSTALLATION OF THE ITEM.
4. FURNITURE IS SHOWN FOR REFERENCE. REFER TO INTERIOR DESIGN DRAWINGS.
5. REFER TO INTERIOR DESIGN SHEETS FOR FINISHES. ANY FINISHES SHOWN ON ARCHITECTURAL SHEETS ARE FOR REFERENCE ONLY.
6. COORDINATE OUTLETS, SWITCHES, LOW VOLTAGE, DATA, ETC. WITH RESPECTIVE DESIPLINES DRAWINGS & FURNITURE SELECTION.
7. WET BAR & VANITIES ARE SHOWN FOR REFERENCE. COORDINATE WITH MEP & INTERIOR DESIGN DRAWINGS.
8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UINTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

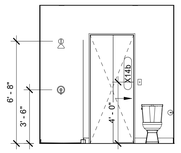
C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE



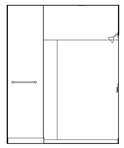
19 Interior Elevation
BATH NORTH
A5.14 1/4" = 1'-0"



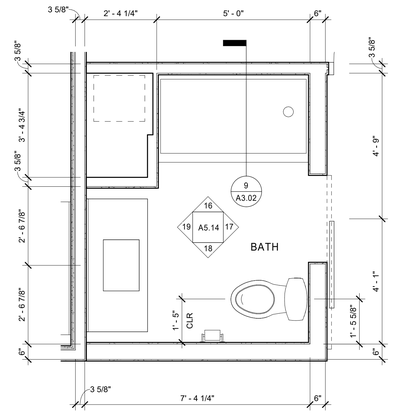
18 Interior Elevation
BATH WEST
A5.14 1/4" = 1'-0"



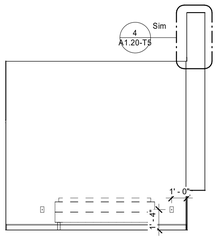
17 Interior Elevation
BATH SOUTH
A5.14 1/4" = 1'-0"



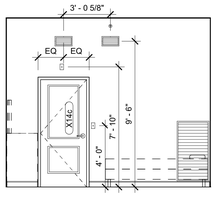
16 Interior Elevation
BATH EAST
A5.14 1/4" = 1'-0"



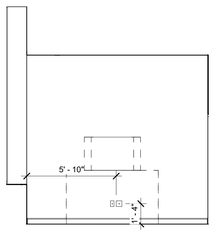
15 Plan Enlargement
ENLARGED BATH
A5.14 1/2" = 1'-0"



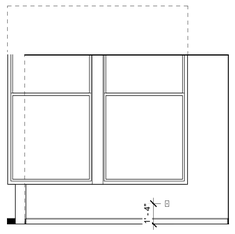
14 Interior Elevation
BEDROOM NORTH
A5.14 1/4" = 1'-0"



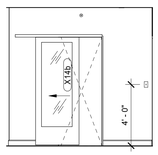
13 Interior Elevation
BEDROOM WEST
A5.14 1/4" = 1'-0"



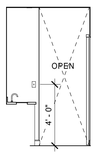
12 Interior Elevation
BEDROOM SOUTH
A5.14 1/4" = 1'-0"



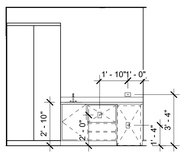
11 Interior Elevation
BEDROOM EAST
A5.14 1/4" = 1'-0"



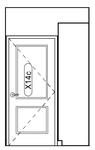
10 Interior Elevation
WET BAR NORTH
A5.14 1/4" = 1'-0"



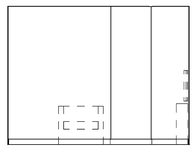
9 Interior Elevation
WET BAR WEST
A5.14 1/4" = 1'-0"



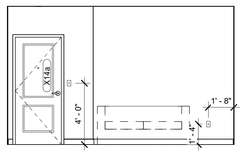
8 Interior Elevation
WET BAR SOUTH
A5.14 1/4" = 1'-0"



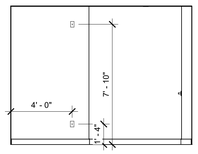
7 Interior Elevation
WET BAR EAST
A5.14 1/4" = 1'-0"



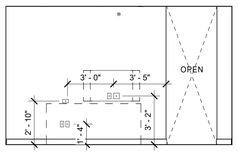
6 LIVING NORTH
A5.14 1/4" = 1'-0"



5 Interior Elevation
LIVING EAST
A5.14 1/4" = 1'-0"



4 Interior Elevation
LIVING SOUTH
A5.14 1/4" = 1'-0"



3 Interior Elevation
LIVING EAST
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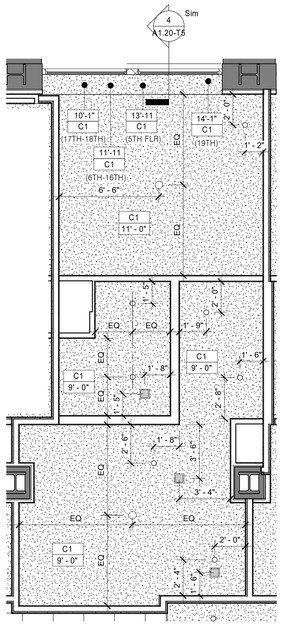
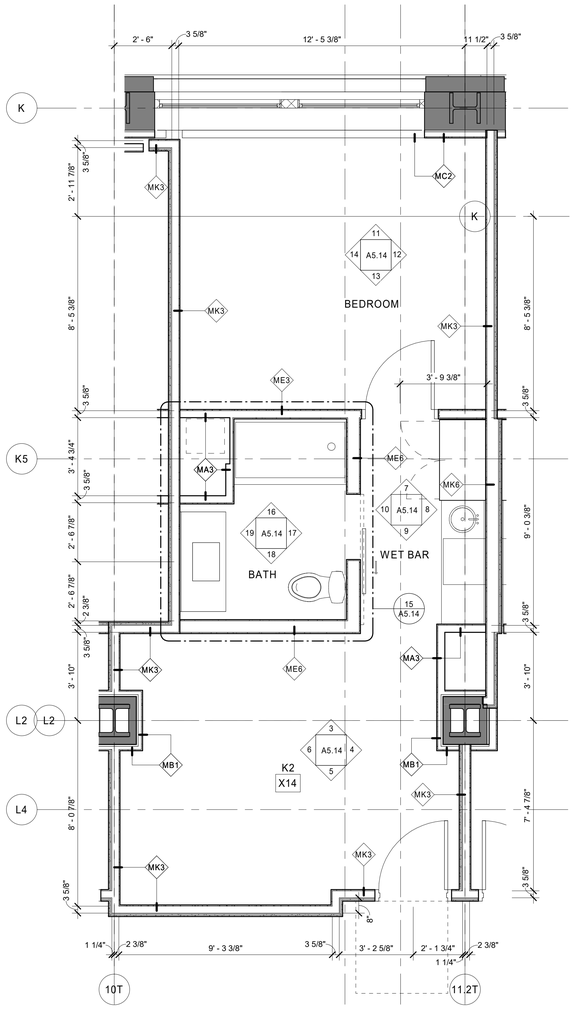


2 Reflected Ceiling Plan
TYP. KING 'H'
A5.14 1/4" = 1'-0"



1 Plan Enlargement
TYP. KING 'H'
A5.14 3/8" = 1'-0"

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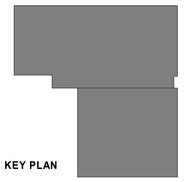
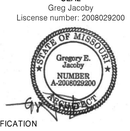


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
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Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'H'

A5.14

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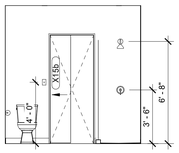
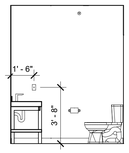
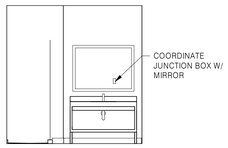


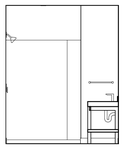
19 Interior Elevation
BATH NORTH
A5.15 1/4" = 1'-0"



18 Interior Elevation
BATH WEST
A5.15 1/4" = 1'-0"



17 Interior Elevation
BATH SOUTH
A5.15 1/4" = 1'-0"



16 Interior Elevation
BATH EAST
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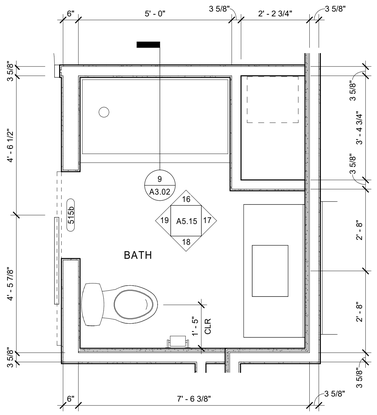
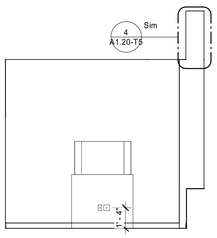


15 Plan Enlargement
ENLARGED BATH
A5.15 1/2" = 1'-0"



14 Interior Elevation
BEDROOM NORTH
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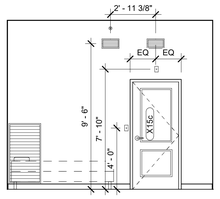
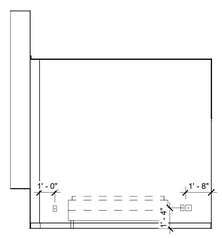
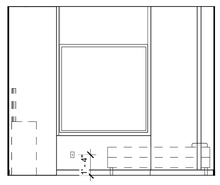


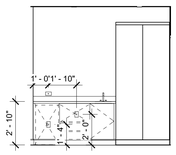
13 Interior Elevation
BEDROOM WEST
A5.15 1/4" = 1'-0"



12 Interior Elevation
BEDROOM SOUTH
A5.15 1/4" = 1'-0"



11 Interior Elevation
BEDROOM EAST
A5.15 1/4" = 1'-0"



10 Interior Elevation
WET BAR NORTH
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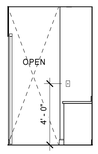
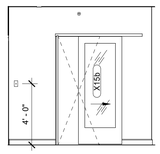
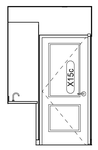


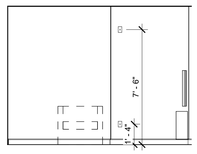
9 Interior Elevation
WET BAR WEST
A5.15 1/4" = 1'-0"



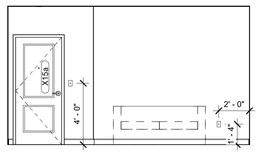
8 Interior Elevation
WET BAR SOUTH
A5.15 1/4" = 1'-0"



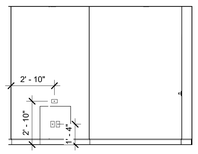
7 Interior Elevation
WET BAR EAST
A5.15 1/4" = 1'-0"



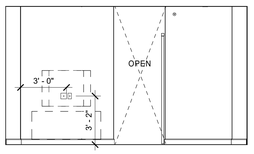
6 Interior Elevation
LIVING NORTH
A5.15 1/4" = 1'-0"



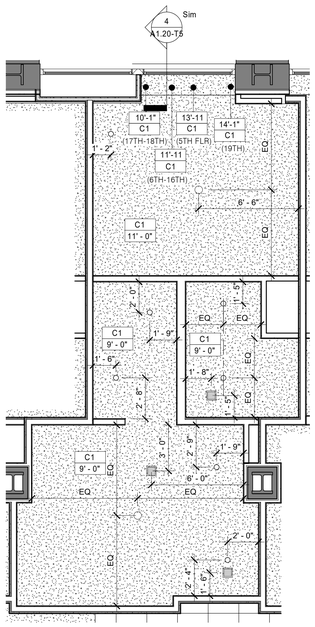
5 Interior Elevation
LIVING WEST
A5.15 1/4" = 1'-0"



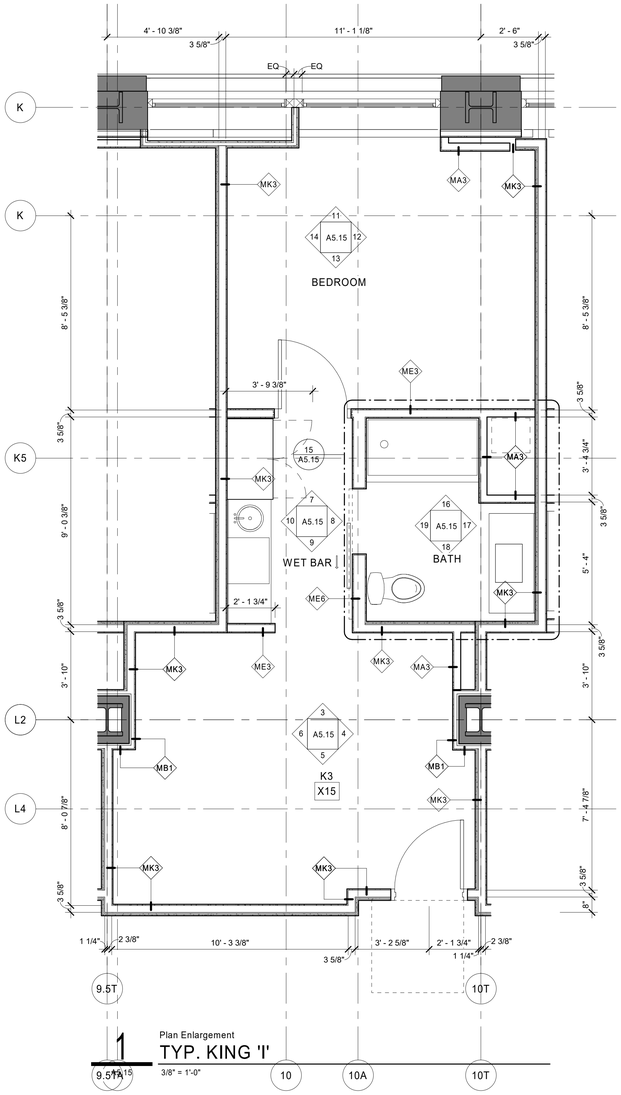
4 Interior Elevation
LIVING SOUTH
A5.15 1/4" = 1'-0"



3 Interior Elevation
LIVING EAST
A5.15 1/4" = 1'-0"



2 Reflected Ceiling Plan
TYP. KING 'I'
A5.15 1/4" = 1'-0"



1 Plan Enlargement
TYP. KING 'I'
A5.15 3/8" = 1'-0"

GENERAL GUESTROOM NOTES

1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
2. THE FRAMING CONTRACTOR IS TO PROVIDE IN-WALL BLOCKING / REINFORCING FOR WALL MOUNTED AND CEILING MOUNTED ITEMS, INCLUDING BLOCKING FOR EACH TOILET, TUB, AND SHOWER REQUIRED FOR GRAB BARS.
3. IF THE CONTRACTOR DOES NOT HAVE DOCUMENTED CONFIRMATION OF THE HEIGHT AT WHICH AN OBJECT IS TO BE MOUNTED THE CONTRACTOR IS TO CONSULT THE ARCHITECT PRIOR TO THE PLACEMENT OF BLOCKING AND THE INSTALLATION OF THE ITEM.
4. FURNITURE IS SHOWN FOR REFERENCE. REFER TO INTERIOR DESIGN DRAWINGS.
5. REFER TO INTERIOR DESIGN SHEETS FOR FINISHES. ANY FINISHES SHOWN ON ARCHITECTURAL SHEETS ARE FOR REFERENCE ONLY.
6. COORDINATE OUTLETS, SWITCHES, LOW VOLTAGE, DATA, ETC. WITH RESPECTIVE DESIPLINES DRAWINGS & FURNITURE SELECTION.
7. WET BAR & VANITIES ARE SHOWN FOR REFERENCE. COORDINATE WITH MEP & INTERIOR DESIGN DRAWINGS.
8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UNTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE

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Delta Quad Holdings, LLC
Owner

Rau Construction Co.
Construction Manager

9101 West 110th Street, Suite 150
Overland Park, Kansas 66210
Phone: (913) 642-6000
Website: www.website.com

Lawson Elser, Inc.
Structural Engineer

650 East Carmel Drive, Suite 150
Carmel, Indiana 46032
Phone: (317) 574-5409
Website: www.lawsonelser.com

Hoss & Brown Engineers, Inc.
MEP Engineer

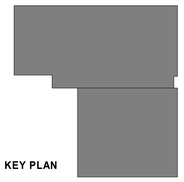
11205 West 79th Street, Suite 102
Lenexa, Kansas 66214
Phone: (913) 362-9090
Website: www.h-be.com

SK Design Group, Inc.
Civil Engineer

4600 College Boulevard, Suite 100
Overland Park, KS 66211
Phone: (913) 451-1818
Website: www.skdesigngroup.net

Matchline Design Group, LLC
Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'I'

A5.15

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GENERAL GUESTROOM NOTES

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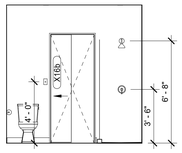
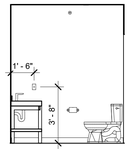
SYMBOL LEGEND

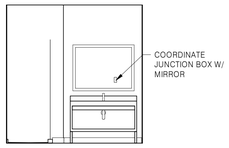
C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE



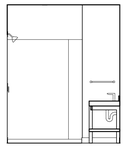
19 Interior Elevation
BATH NORTH
A5.16 1/4" = 1'-0"



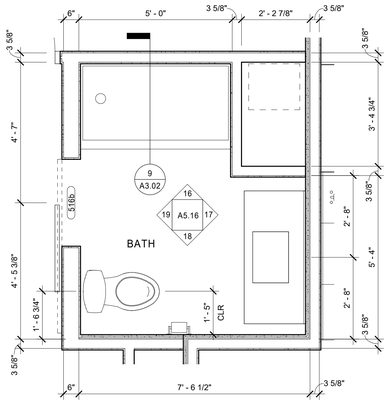
18 Interior Elevation
BATH WEST
A5.16 1/4" = 1'-0"



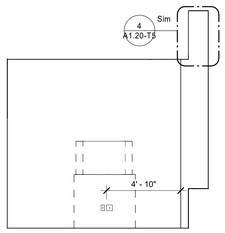
17 Interior Elevation
BATH SOUTH
A5.16 1/4" = 1'-0"



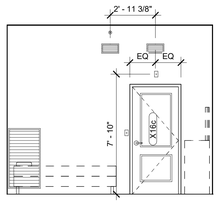
16 Interior Elevation
BATH EAST
A5.16 1/4" = 1'-0"



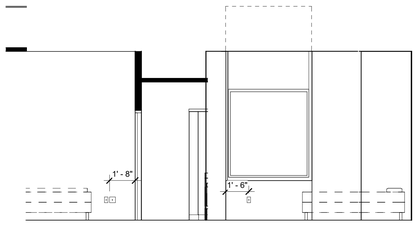
15 Plan Enlargement
ENLARGED BATH
A5.16 1/2" = 1'-0"



14 Interior Elevation
BEDROOM NORTH
A5.16 1/4" = 1'-0"

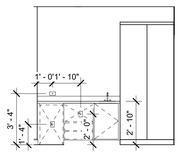


13 Interior Elevation
BEDROOM WEST
A5.16 1/4" = 1'-0"

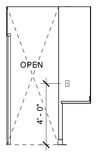


12 Interior Elevation
BEDROOM SOUTH
A5.16 1/4" = 1'-0"

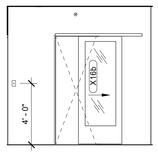
11 Interior Elevation
BEDROOM EAST
A5.16 1/4" = 1'-0"



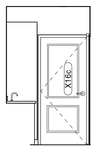
10 Interior Elevation
AMENITY NORTH
A5.16 1/4" = 1'-0"



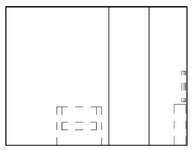
9 Interior Elevation
WET BAR WEST
A5.16 1/4" = 1'-0"



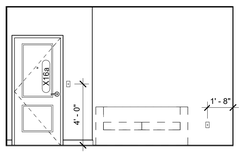
8 Interior Elevation
WET BAR SOUTH
A5.16 1/4" = 1'-0"



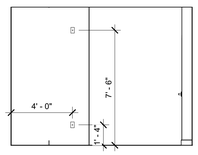
7 Interior Elevation
WET BAR EAST
A5.16 1/4" = 1'-0"



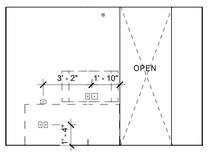
6 Interior Elevation
LIVING NORTH
A5.16 1/4" = 1'-0"



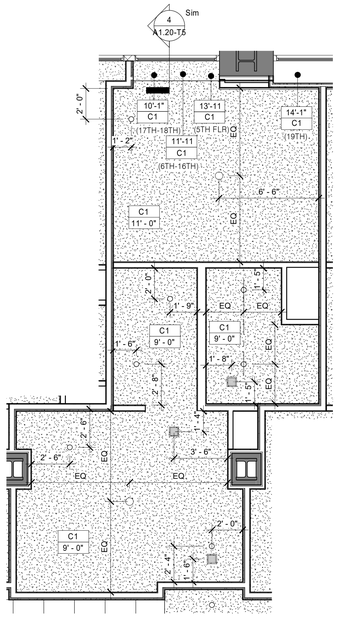
5 Interior Elevation
LIVING WEST
A5.16 1/4" = 1'-0"



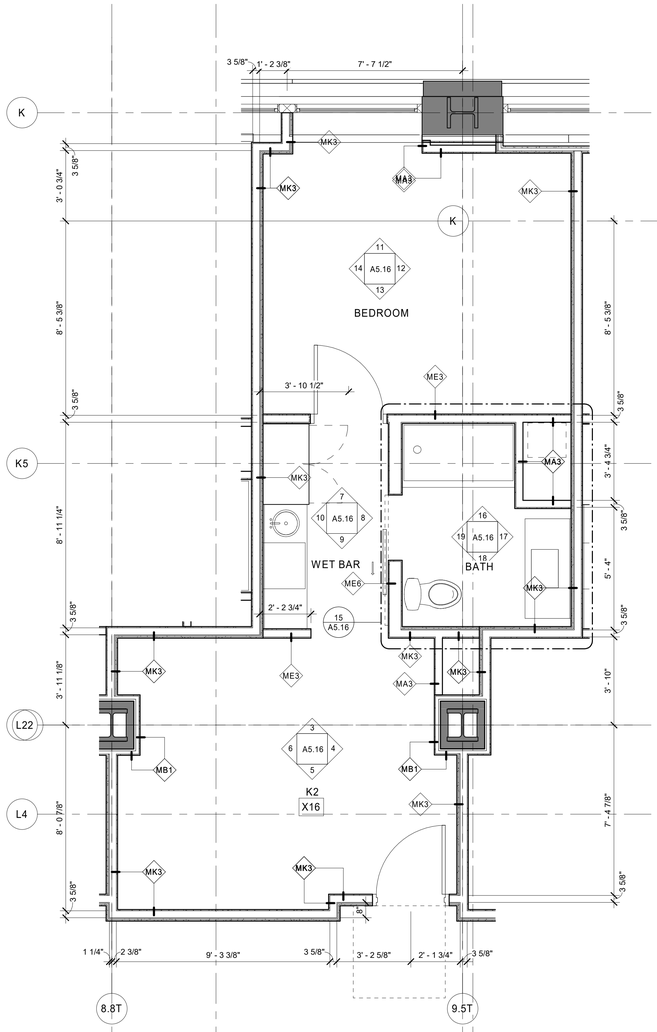
4 Interior Elevation
LIVING SOUTH
A5.16 1/4" = 1'-0"



3 Interior Elevation
LIVING EAST
A5.16 1/4" = 1'-0"



2 Reflected Ceiling Plan
TYP. KING 'J'
A5.16 1/4" = 1'-0"



1 Plan Enlargement
TYP. KING 'J'
A5.16 3/8" = 1'-0"

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Indianapolis, Indiana 46204
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Website: www.bdmd.com
MO Certificate of Authority: W00923182

Delta Quad Holdings, LLC
Owner

Rau Construction Co.
Construction Manager

9101 West 110th Street, Suite 150
Overland Park, Kansas 66210
Phone: (913) 642-6000
Website: www.website.com

Lawson Elser, Inc.
Structural Engineer

650 East Carmel Drive, Suite 150
Carmel, Indiana 46032
Phone: (317) 574-5409
Website: www.lawsonelser.com

Hoss & Brown Engineers, Inc.
MEP Engineer

11205 West 79th Street, Suite 102
Lenexa, Kansas 66214
Phone: (913) 362-9090
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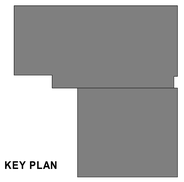
SK Design Group, Inc.
Civil Engineer

4600 College Boulevard, Suite 100
Overland Park, KS 66211
Phone: (913) 451-1818
Website: www.skdesigngroup.net

Matchline Design Group, LLC
Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'J'

A5.16

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GENERAL GUESTROOM NOTES

1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
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8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UINTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

SYMBOL LEGEND

C1 / X'-X'	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X'	ACT - ACOUSTICAL CEILING TILE

BROWNING DAY MULLINS DIERDORF

LEADERSHIP + DESIGN®

Browning Day Mullins Dierdorf Architects
Architecture
Landscape Architecture
Planning
Interior Design

626 North Illinois Street
Indianapolis, Indiana 46204
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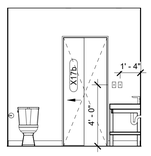
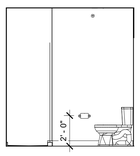
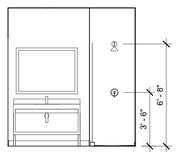


19 Interior Elevation
BATH NORTH
A5.17 1/4" = 1'-0"

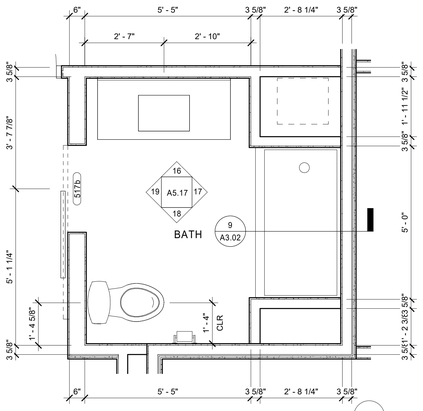


18 BATH WEST
A5.17 1/4" = 1'-0"

17 Interior Elevation
BATH SOUTH
A5.17 1/4" = 1'-0"



16 Interior Elevation
BATH EAST
A5.17 1/4" = 1'-0"



15 Plan Enlargement
BATH - STANDARD
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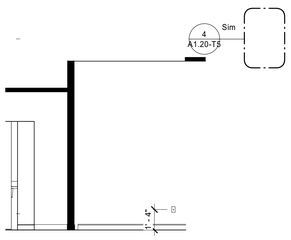

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BEDROOM NORTH
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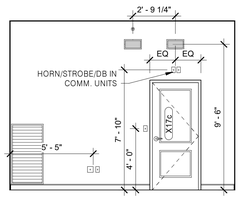
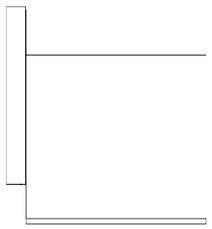
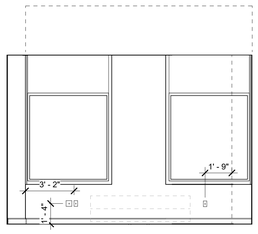


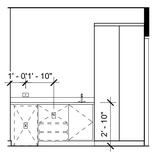
13 Interior Elevation
BEDROOM WEST
A5.17 1/4" = 1'-0"



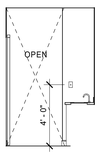
12 Interior Elevation
BEDROOM SOUTH
A5.17 1/4" = 1'-0"



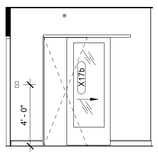
11 Interior Elevation
BEDROOM EAST
A5.17 1/4" = 1'-0"



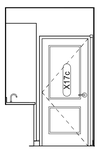
10 WET BAR NORTH
A5.17 1/4" = 1'-0"



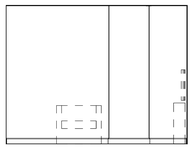
9 Interior Elevation
WET BAR WEST
A5.17 1/4" = 1'-0"



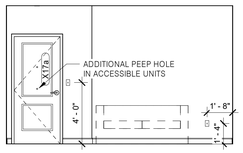
8 Interior Elevation
WET BAR SOUTH
A5.17 1/4" = 1'-0"



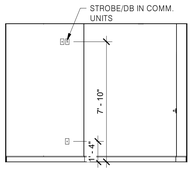
7 Interior Elevation
WET BAR EAST
A5.17 1/4" = 1'-0"



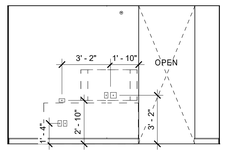
6 Interior Elevation
LIVING NORTH
A5.17 1/4" = 1'-0"



5 Interior Elevation
LIVING WEST
A5.17 1/4" = 1'-0"



4 Interior Elevation
LIVING SOUTH
A5.17 1/4" = 1'-0"



3 Interior Elevation
LIVING EAST
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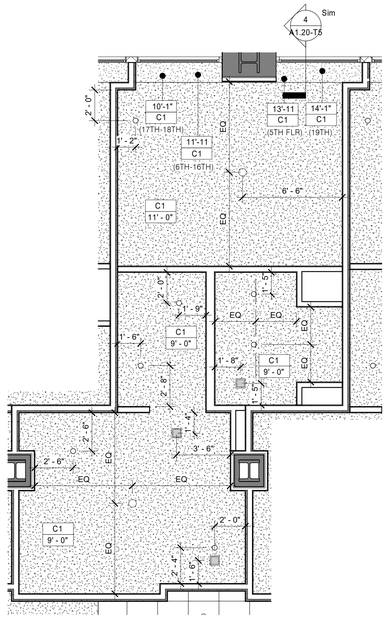
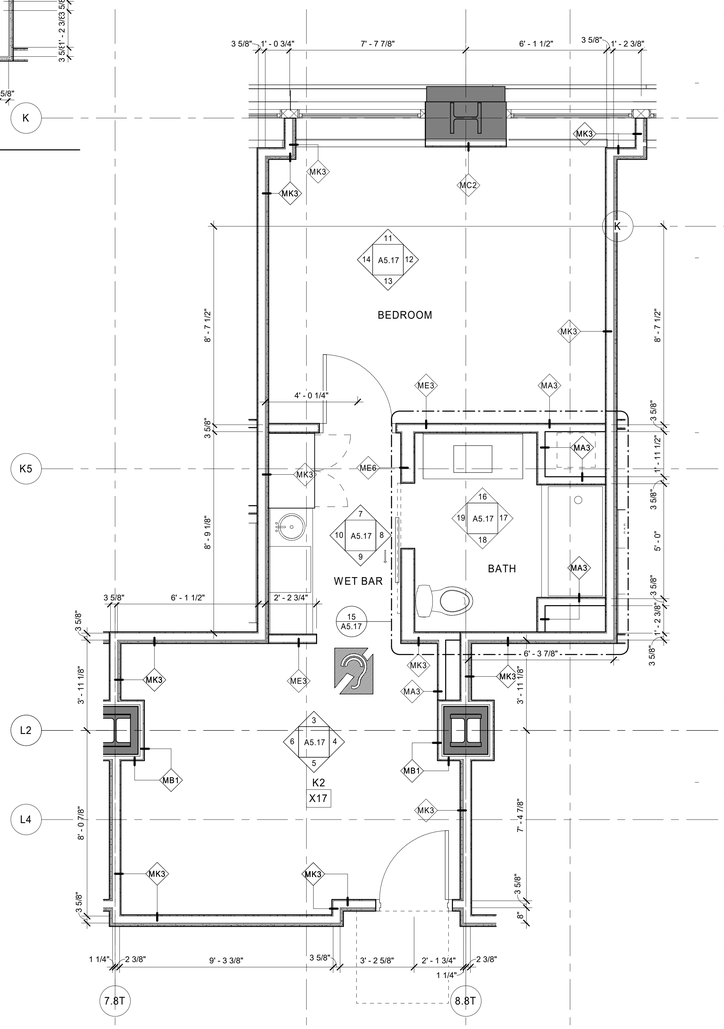
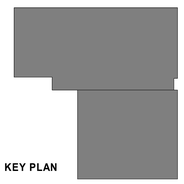


2 Reflected Ceiling Plan
TYP. KING 'K'
A5.17 1/4" = 1'-0"



1 Plan Enlargement
TYP. KING 'K'
A5.17 3/8" = 1'-0"



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
REGISTERED ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'K'

A5.17

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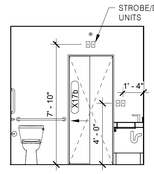
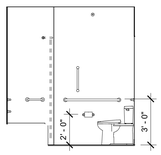
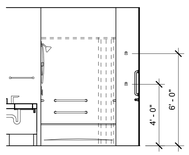
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE



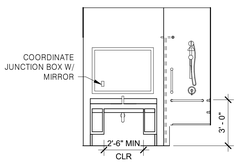
19 BATH NORTH-ADA
A5.17a 1/4" = 1'-0"



18 BATH WEST-ADA
A5.17a 1/4" = 1'-0"



17 BATH SOUTH-ADA
A5.17a 1/4" = 1'-0"



16 BATH EAST-ADA
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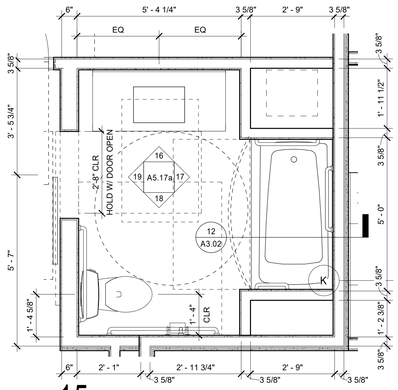

15 BATH - ACCESSIBLE - TUB
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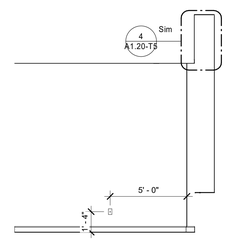
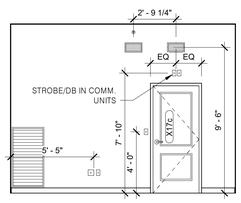
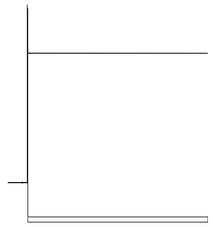


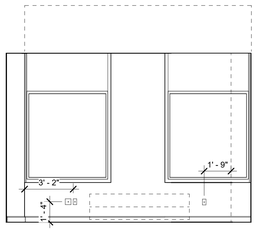
14 BEDROOM NORTH
A5.17a 1/4" = 1'-0"



13 BEDROOM WEST
A5.17a 1/4" = 1'-0"



12 BEDROOM SOUTH
A5.17a 1/4" = 1'-0"



11 BEDROOM EAST
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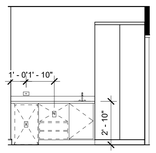
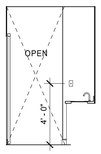


10 WET BAR NORTH
A5.17a 1/4" = 1'-0"



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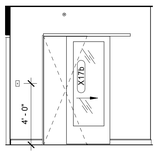
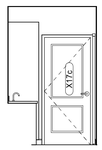
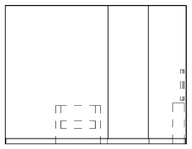


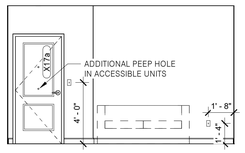
8 WET BAR SOUTH
A5.17a 1/4" = 1'-0"



7 WET BAR EAST
A5.17a 1/4" = 1'-0"



6 LIVING NORTH
A5.17a 1/4" = 1'-0"



5 LIVING WEST
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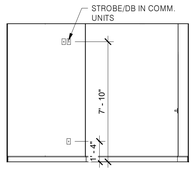
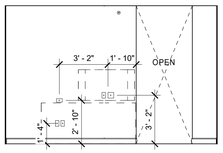
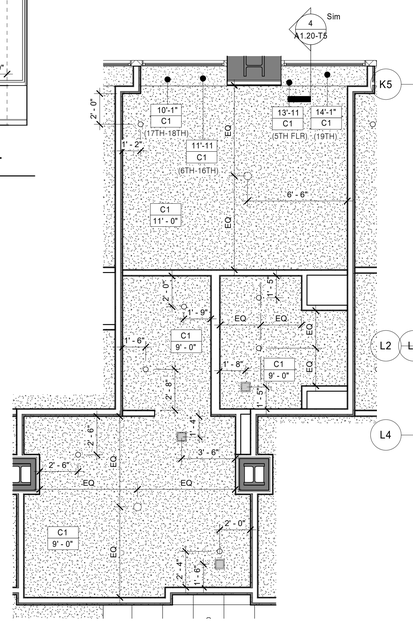


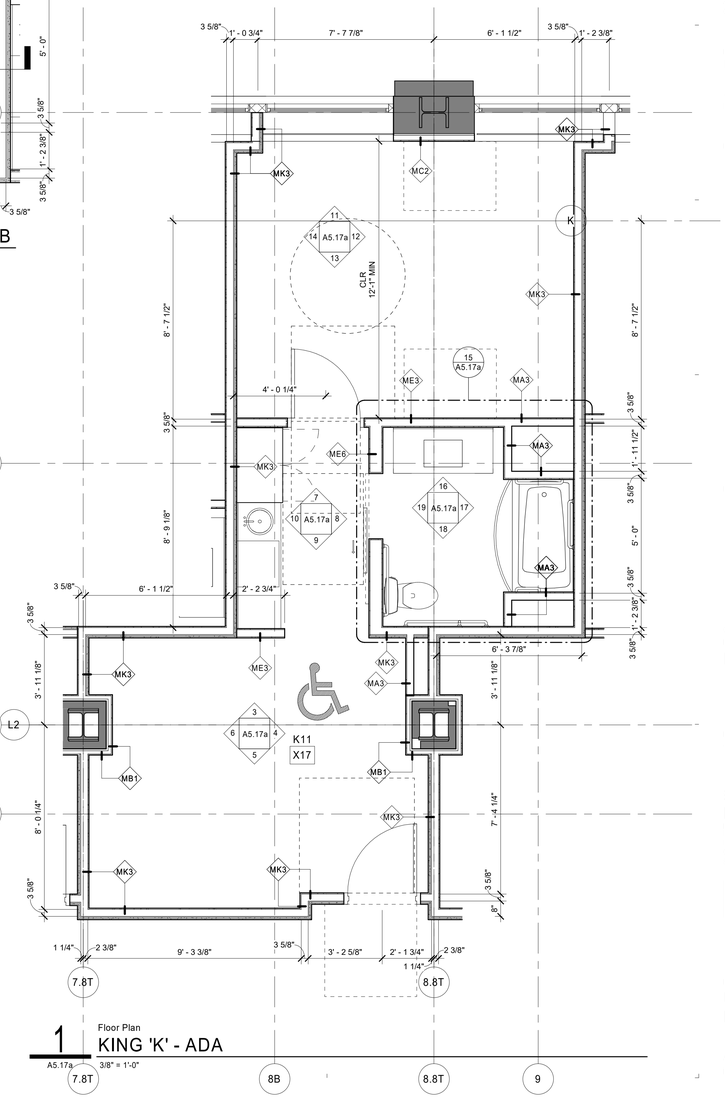
4 LIVING SOUTH
A5.17a 1/4" = 1'-0"



3 LIVING EAST
A5.17a 1/4" = 1'-0"



2 Reflected Ceiling Plan
KING 'K' - ADA
A5.17a 1/4" = 1'-0"



1 Floor Plan
KING 'K' - ADA
A5.17a 3/8" = 1'-0"

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LEADERSHIP + DESIGN®

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Dallas, TX 75231
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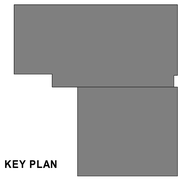

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl
King - 'K' - ADA

A5.17a

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GENERAL GUESTROOM NOTES

1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
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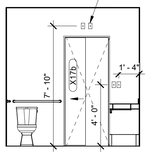
7. WET BAR & VANITIES ARE SHOWN FOR REFERENCE. COORDINATE WITH MEP & INTERIOR DESIGN DRAWINGS.
8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UNTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

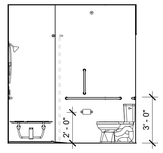
SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE

NOTE: ROLL-IN SHOWERS TO RECEIVE GRAB BARS & FOLDING SEAT. SEE SHEET A0.20 FOR ROOM MATRIX.



19 BATH NORTH-ADA
A5.17b 1/4" = 1'-0"



18 BATH WEST-ADA
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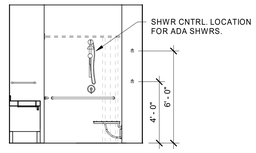

17 BATH SOUTH-ADA
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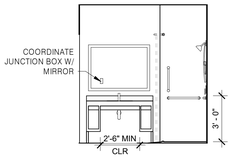
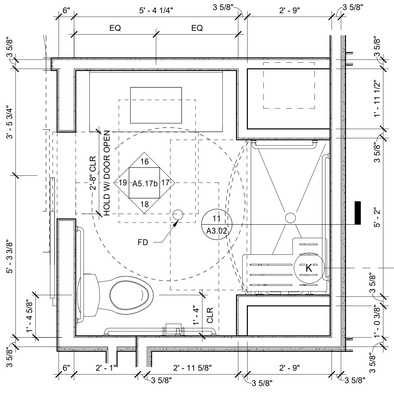
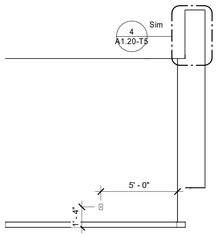


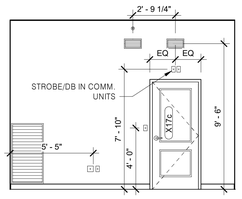
16 BATH EAST-ADA
A5.17b 1/4" = 1'-0"



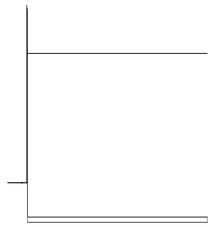
15 BATH - ACCESSIBLE
A5.17b 1/2" = 1'-0"



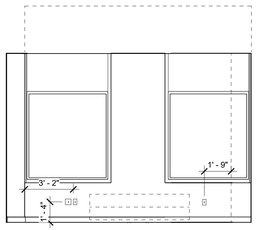
14 BEDROOM NORTH
A5.17b 1/4" = 1'-0"



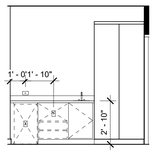
13 BEDROOM WEST
A5.17b 1/4" = 1'-0"



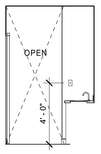
12 BEDROOM SOUTH
A5.17b 1/4" = 1'-0"



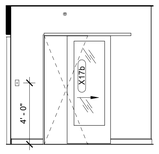
11 BEDROOM EAST
A5.17b 1/4" = 1'-0"



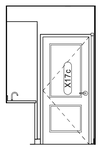
10 WET BAR NORTH
A5.17b 1/4" = 1'-0"



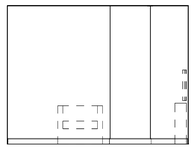
9 WET BAR WEST
A5.17b 1/4" = 1'-0"



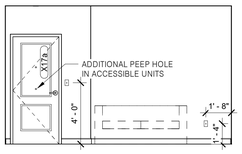
8 WET BAR SOUTH
A5.17b 1/4" = 1'-0"



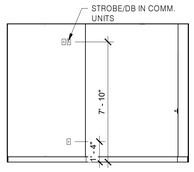
7 WET BAR EAST
A5.17b 1/4" = 1'-0"



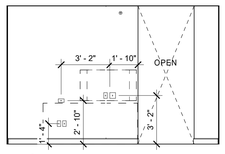
6 LIVING NORTH
A5.17b 1/4" = 1'-0"



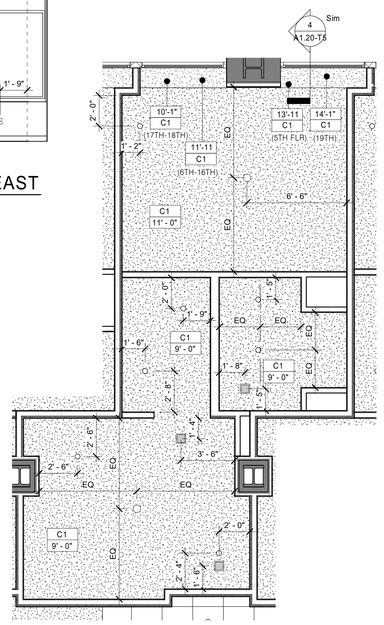
5 LIVING WEST
A5.17b 1/4" = 1'-0"



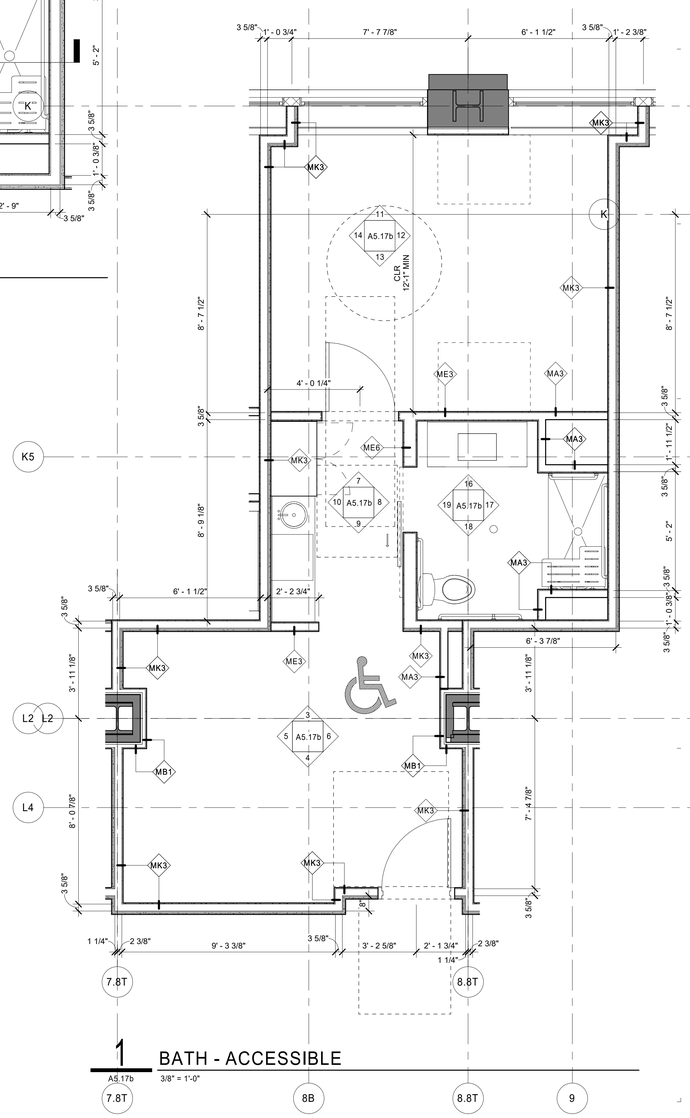
4 LIVING SOUTH
A5.17b 1/4" = 1'-0"



3 LIVING EAST
A5.17b 1/4" = 1'-0"



2 KING 'K' - ADA
A5.17b 1/4" = 1'-0"



1 BATH - ACCESSIBLE
A5.17b 3/8" = 1'-0"

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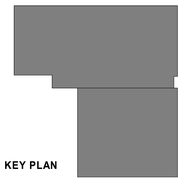

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
REGISTERED ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl
King - 'K' - ADA

A5.17b

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GENERAL GUESTROOM NOTES

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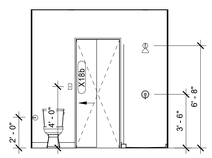
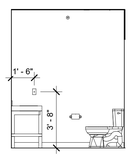
SYMBOL LEGEND

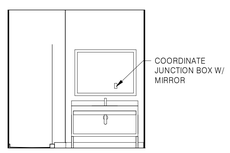
C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE



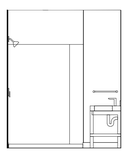
19 Interior Elevation
BATH NORTH
A5.18 1/4" = 1'-0"



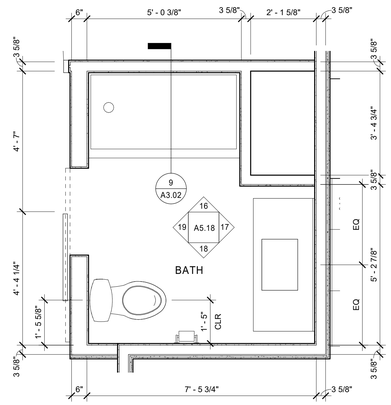
18 Interior Elevation
BATH WEST
A5.18 1/4" = 1'-0"



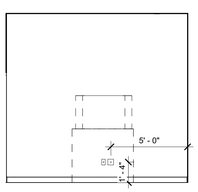
17 Interior Elevation
BATH SOUTH
A5.18 1/4" = 1'-0"



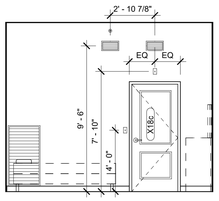
16 Interior Elevation
BATH EAST
A5.18 1/4" = 1'-0"



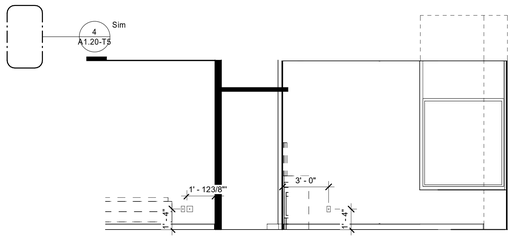
15 Plan Enlargement
ENLARGED BATH
A5.18 1/2" = 1'-0"



14 Interior Elevation
BEDROOM NORTH
A5.18 1/4" = 1'-0"

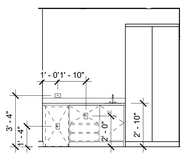


13 Interior Elevation
BEDROOM WEST
A5.18 1/4" = 1'-0"

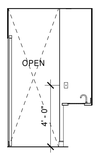


12 Interior Elevation
BEDROOM SOUTH
A5.18 1/4" = 1'-0"

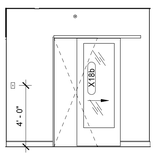
11 Interior Elevation
BEDROOM EAST
A5.18 1/4" = 1'-0"



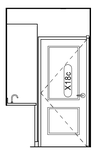
10 Interior Elevation
WET BAR NORTH
A5.18 1/4" = 1'-0"



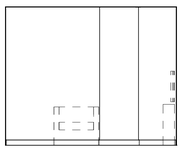
9 Interior Elevation
WET BAR WEST
A5.18 1/4" = 1'-0"



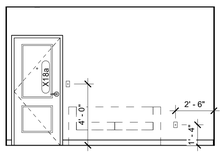
8 Interior Elevation
WET BAR SOUTH
A5.18 1/4" = 1'-0"



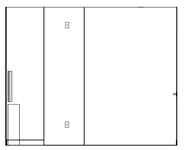
7 Interior Elevation
WET BAR EAST
A5.18 1/4" = 1'-0"



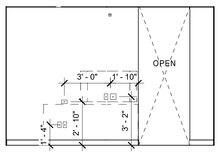
6 Interior Elevation
LIVING NORTH
A5.18 1/4" = 1'-0"



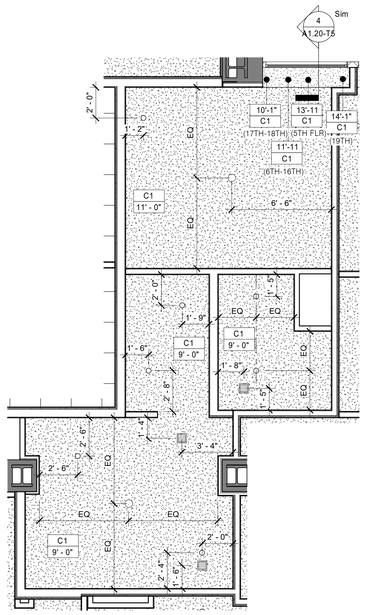
5 Interior Elevation
LIVING WEST
A5.18 1/4" = 1'-0"



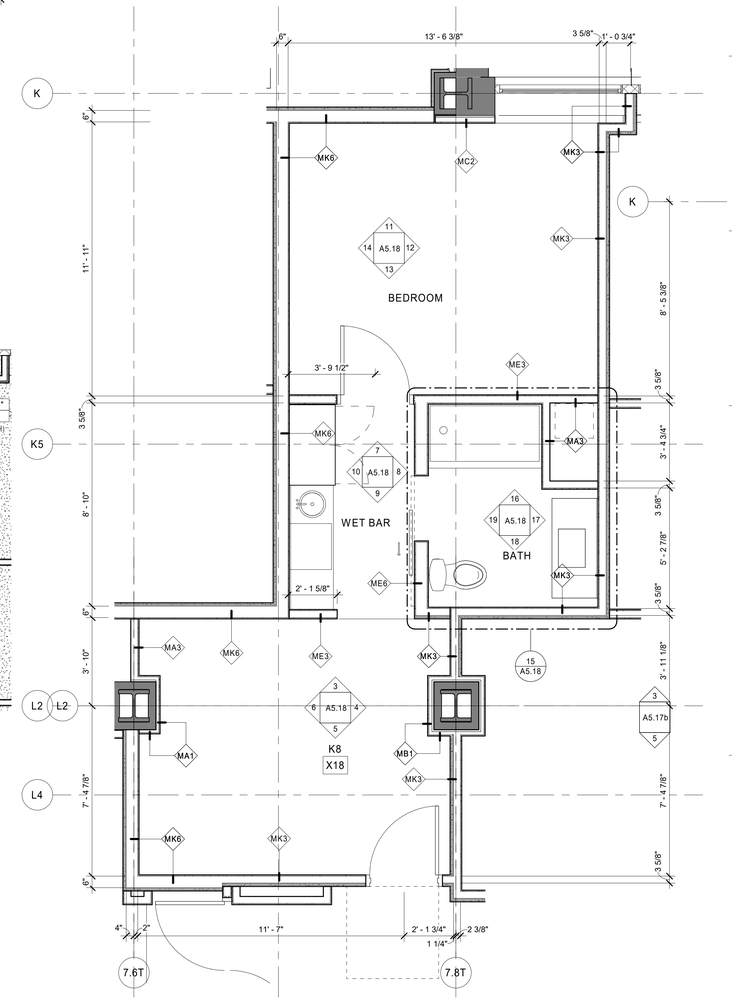
4 Interior Elevation
LIVING SOUTH
A5.18 1/4" = 1'-0"



3 Interior Elevation
LIVING EAST
A5.18 1/4" = 1'-0"



2 Reflected Ceiling Plan
TYP. KING 'L'
A5.18 1/4" = 1'-0"



1 Plan Enlargement
TYP. KING 'L'
A5.18 3/8" = 1'-0"

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

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Landscape Architecture
Planning
Interior Design

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MO Certificate of Authority: W00923182

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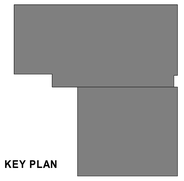
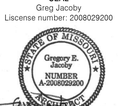


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'L'

A5.18

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9/10/2020 4:48:08 PM

GENERAL GUESTROOM NOTES

1. UNIT LAYOUTS ARE SIMILAR FOR FLOORS 5 THROUGH 19. REFER TO OVERALL FLOOR PLANS & SHEET A0.20 FOR ROOM TYPES, (ie. STANDARD, MOBILITY AND/OR COMMUNICATION TYPES)
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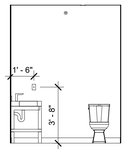
8. COORDINATE CEILING ACCESS PANELS W/ IN-CEILING MECHANICAL UINTS. COORDINATE OTHER CEILING MOUNTED ITEMS W/MEP DRAWINGS.
9. REFER & COORDINATE W/ ALL DISCIPLINES.
10. REFER TO SHEET A0.02 FOR THE ACCESSIBILITY STANDARDS.

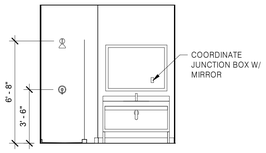
SYMBOL LEGEND

C1 / X'-X"	C1 - GYPSUM BOARD CEILING
ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE

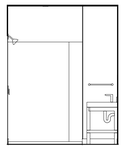
19 Interior Elevation
BATH NORTH
A5.19 1/4" = 1'-0"



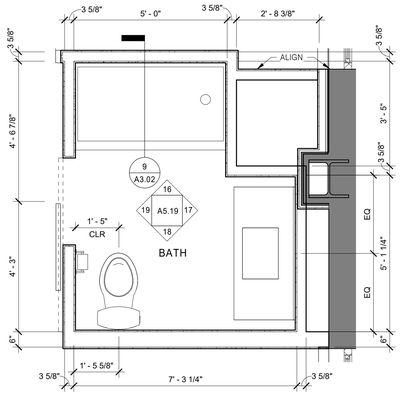
18 Interior Elevation
BATH WEST
A5.19 1/4" = 1'-0"



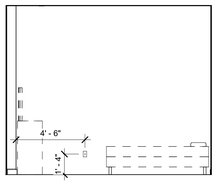
17 Interior Elevation
BATH SOUTH
A5.19 1/4" = 1'-0"



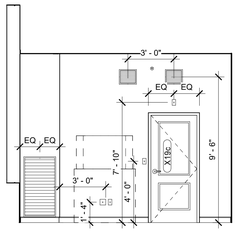
16 Interior Elevation
BATH EAST
A5.19 1/4" = 1'-0"



15 Plan Enlargement
ENLARGED BATH
A5.19 1/2" = 1'-0"



14 Interior Elevation
BEDROOM NORTH
A5.19 1/4" = 1'-0"



13 Interior Elevation
BEDROOM WEST
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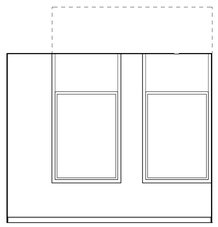
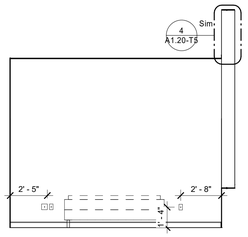
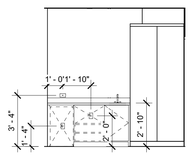


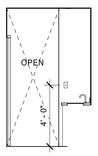
12 Interior Elevation
BEDROOM SOUTH
A5.19 1/4" = 1'-0"



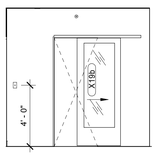
11 Interior Elevation
BEDROOM EAST
A5.19 1/4" = 1'-0"



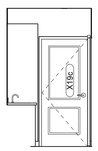
10 Interior Elevation
WET BAR NORTH
A5.19 1/4" = 1'-0"



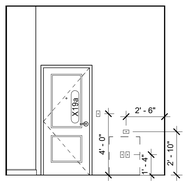
9 Interior Elevation
WET BAR WEST
A5.19 1/4" = 1'-0"



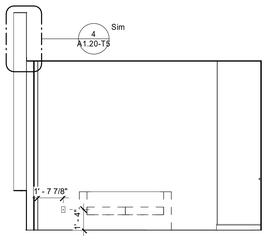
8 Interior Elevation
WET BAR SOUTH
A5.19 1/4" = 1'-0"



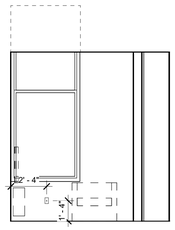
7 Interior Elevation
WET BAR EAST
A5.19 1/4" = 1'-0"



6 Interior Elevation
LIVING NORTH
A5.19 1/4" = 1'-0"



5 Interior Elevation
LIVING WEST
A5.19 1/4" = 1'-0"



4 Interior Elevation
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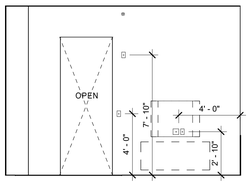
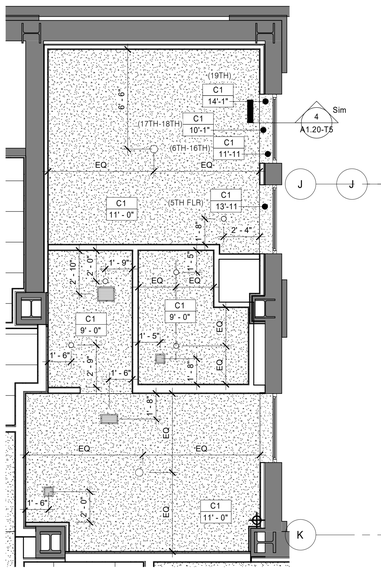
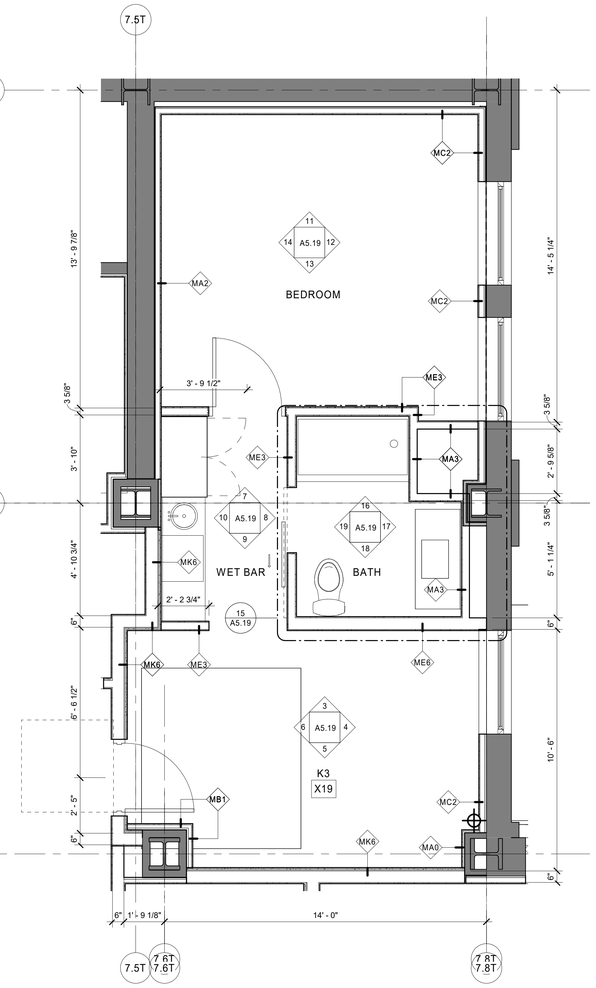
A5.19 1/4" = 1'-0"



3 Interior Elevation
LIVING EAST
A5.19 1/4" = 1'-0"



2 Reflected Ceiling Plan
TYP. KING 'M'
A5.19 1/4" = 1'-0"



1 Plan Enlargement
TYP. KING 'M'
A5.19 3/8" = 1'-0"

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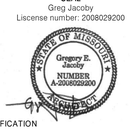
KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'M'

A5.19

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ACT-1 / X'-X"	ACT - ACOUSTICAL CEILING TILE

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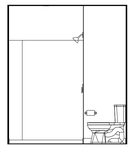
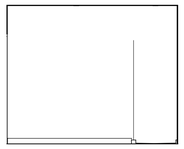
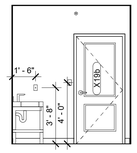
A5.20 1/4" = 1'-0"



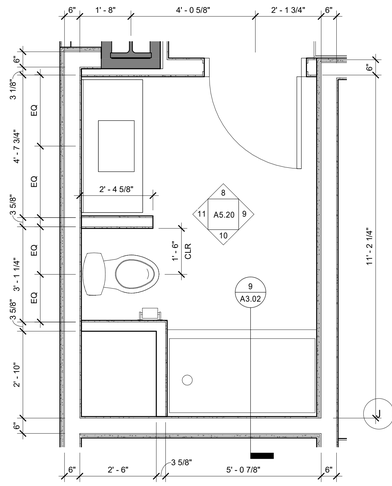
10 BATH WEST
A5.20 1/4" = 1'-0"



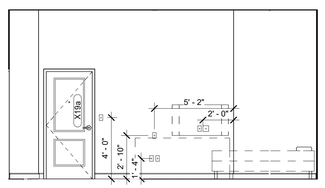
9 BATH SOUTH
A5.20 1/4" = 1'-0"



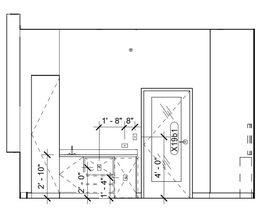
8 BATH EAST
A5.20 1/4" = 1'-0"



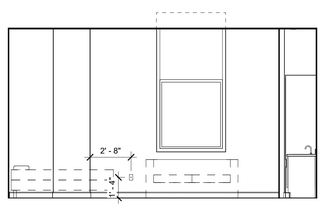
Plan Detail
7 ENLARGED BATH
A5.20 1/2" = 1'-0"



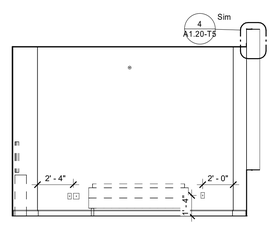
6 LIVING NORTH
A5.20 1/4" = 1'-0"



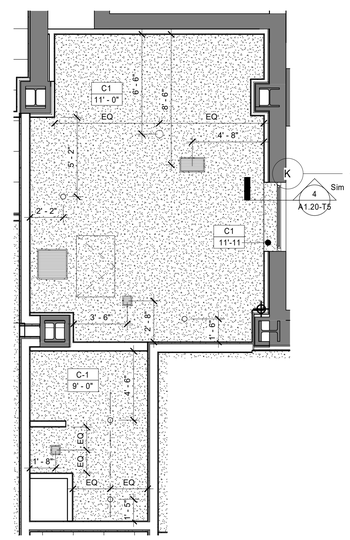
5 LIVING WEST
A5.20 1/4" = 1'-0"



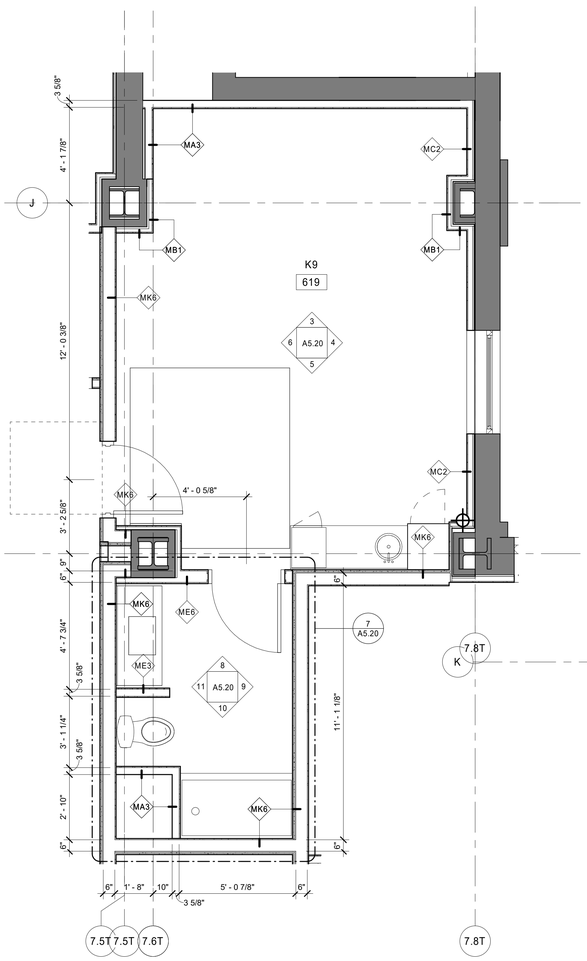
4 LIVING SOUTH
A5.20 1/4" = 1'-0"



3 LIVING EAST
A5.20 1/4" = 1'-0"



Reflected Ceiling Plan
2 TYP. KING 'M1'
A5.20 1/4" = 1'-0"



Floor Plan
1 TYP. KING 'M1'
A5.20 3/8" = 1'-0"

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

Browning Day Mullins Dierdorf Architects
Architecture
Landscape Architecture
Planning
Interior Design

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Indianapolis, Indiana 46204
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Owner

Rau Construction Co.
Construction Manager

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Phone: (913) 642-6000
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Structural Engineer

650 East Carmel Drive, Suite 150
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Hoss & Brown Engineers, Inc.
MEP Engineer

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Civil Engineer

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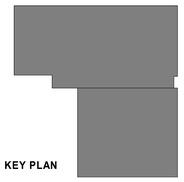
Overland Park, KS 66211
Phone: (913) 451-1818
Website: www.skdesigngroup.net

Matchline Design Group, LLC
Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
ARCHITECT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Unit Plans & Elevations Sgl King - 'M1'

A5.20

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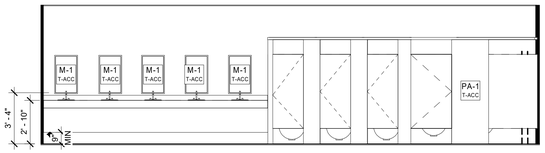
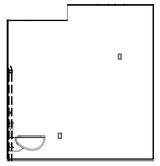
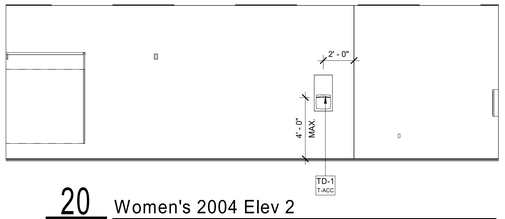


22 Women's 2004 Elev 4
A6.01 1/4" = 1'-0"



21 Women's 2004 Elev 3
A6.01 1/4" = 1'-0"



20 Women's 2004 Elev 2
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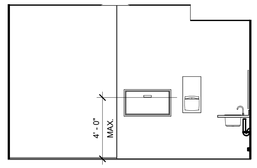
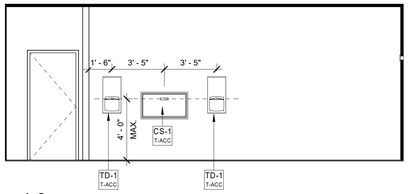
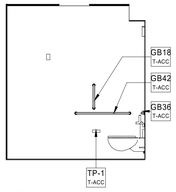


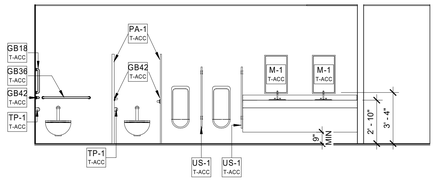
19 Women's 2004 Elev 1
A6.01 1/4" = 1'-0"



18 Men's 2003 Elev 3
A6.01 1/4" = 1'-0"



17 Men's 2003 Elev 2
A6.01 1/4" = 1'-0"



16 Men's 2003 Elev 1
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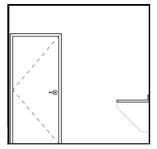
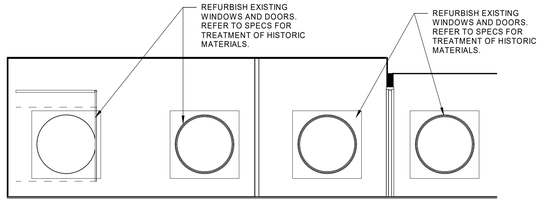
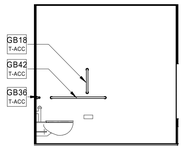


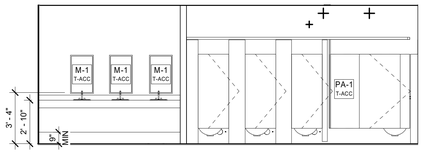
15 Women 406 Elev 4
A6.01 1/4" = 1'-0"



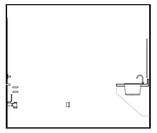
14 Women 406 Elev 3
A6.01 1/4" = 1'-0"



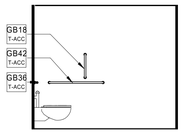
13 Women 406 Elev 2
A6.01 1/4" = 1'-0"



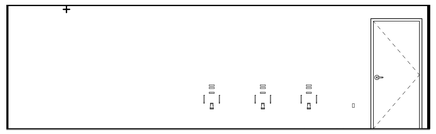
12 Women 406 Elev 1
A6.01 1/4" = 1'-0"



10 Men 405 Elev 3
A6.01 1/4" = 1'-0"



9 Men 405 Elev 2
A6.01 1/4" = 1'-0"



11 Men 405 Elev 4
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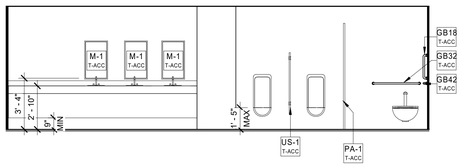
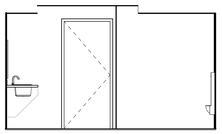
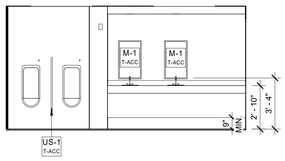


8 Men 405 Elev 1
A6.01 1/4" = 1'-0"

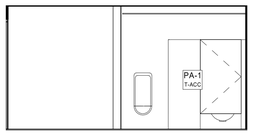


7 Men 211 Elev 4
A6.01 1/4" = 1'-0"

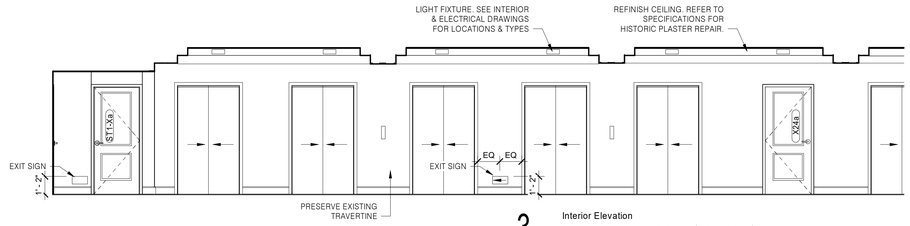


6 Men 211 Elev 3
A6.01 1/4" = 1'-0"

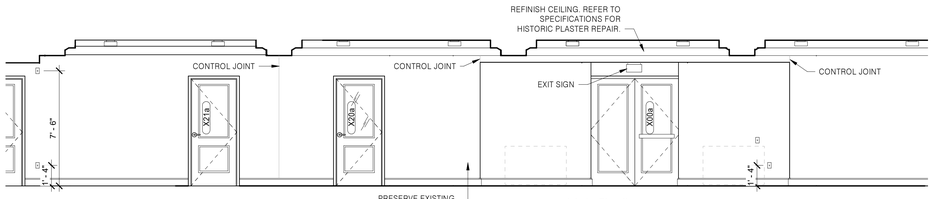
5 Men 211 Elev 2
A6.01 1/4" = 1'-0"



4 Men 211 Elev 1
A6.01 1/4" = 1'-0"



Interior Elevation
3 Elevator Lobby (Partial)
A6.01 1/4" = 1'-0"



Interior Elevation
2 Elevator Lobby (Partial)
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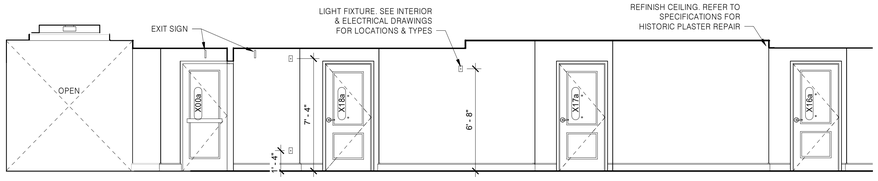

Interior Elevation
1 Corridor Elevation (Partial)
A6.01 1/4" = 1'-0"

TOILET ACCESSORY NOTES

EACH ITEM IS PROVIDED AND INSTALLED BY CONTRACTOR. STUD CONTRACTOR TO PROVIDE IN WALL BLOCKING FOR WALL MOUNTING EACH ITEM.

DH-1 T-ACC	[PUBLIC RESTROOMS] DOOR HOOK. MOUNT TO INSIDE FACE OF EACH TOILET COMPARTMENT DOOR.
DH-2 T-ACC	[APARTMENT UNITS] DOOR HOOK. MOUNT TO INSIDE FACE OF BATHROOM DOOR.
GB18 T-ACC	18" GRAB BAR, 1 1/2" DIA. BRUSHED STAINLESS.
GB36 T-ACC	36" GRAB BAR, 1 1/2" DIA. BRUSHED STAINLESS.
GB42 T-ACC	42" GRAB BAR, 1 1/2" DIA. BRUSHED STAINLESS.
M-1 T-ACC	[PUBLIC RESTROOMS] 18" x 36" MIRROR. CENTER ABOVE EACH SINK.
M-2 T-ACC	[PUBLIC RESTROOMS] 24" x 60" MIRROR WITH 1/2" BRUSHED STAINLESS METAL EDGE. MOUNT TO WALL FROM BEHIND WITH CONCEALED HANGERS.
M-3 T-ACC	[APARTMENT UNITS] FRAMED WALL MIRROR. SEE DETAIL 3/A4.07.
MB-1 T-ACC	[JANITOR CLOSET] WALL MOUNTED MOP/BROOM HOLDER
MC-1 T-ACC	[APARTMENT UNITS] RECESSED WALL MOUNTED MEDICINE CABINET WITH MIRROR. SEE DETAIL 4/A4.07.
PA-1 T-ACC	[PUBLIC RESTROOMS] FLOOR MOUNTED TOILET PARTITION. PROVIDE SCRANTON PRODUCTS 1" SOLID PLASTIC, TEXTURE STAINLESS EX.
SD-1 T-ACC	[PUBLIC RESTROOMS] LIQUID SOAP DISPENSER. WALL MOUNTED BETWEEN EACH MIRROR.
TB-1 T-ACC	[APARTMENT UNITS] 24" TOWEL BAR
TD-1 T-ACC	[PUBLIC RESTROOMS] SURFACE MOUNTED PAPER TOWEL DISPENSER
TP-1 T-ACC	[PUBLIC RESTROOMS] TOILET PAPER DISPENSER
TP-2 T-ACC	[APARTMENT UNITS] TOILET PAPER DISPENSER
US-1 T-ACC	[PUBLIC RESTROOMS] WALL MOUNTED URINAL SCREEN. SCRANTON PRODUCTS 1" SOLID PLASTIC, TEXTURE STAINLESS EX. (24" x 60")

ACCESSIBILITY NOTES

SEE ACCESSIBILITY STANDARDS SHEET ON A0.02 FOR ACCESSORY MOUNTING INFORMATION.

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

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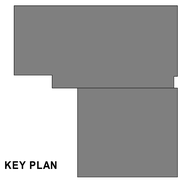

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Interior Elevations

A6.01

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M-3 T-ACC	[APARTMENT UNITS] FRAMED WALL MIRROR. SEE DETAIL 3/A4.07.
MB-1 T-ACC	[JANITOR CLOSET] WALL MOUNTED MOP/BROOM HOLDER.
MC-1 T-ACC	[APARTMENT UNITS] RECESSED WALL MOUNTED MEDICINE CABINET WITH MIRROR. SEE DETAIL 4/A4.07.
PA-1 T-ACC	[PUBLIC RESTROOMS] FLOOR MOUNTED TOILET PARTITION. PROVIDE SCRANTON PRODUCTS 1" SOLID PLASTIC, TEXTURE STAINLESS EX.
SD-1 T-ACC	[PUBLIC RESTROOMS] LIQUID SOAP DISPENSER. WALL MOUNTED BETWEEN EACH MIRROR.
TB-1 T-ACC	[APARTMENT UNITS] 24" TOWEL BAR
TD-1 T-ACC	[PUBLIC RESTROOMS] SURFACE MOUNTED PAPER TOWEL DISPENSER
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TP-2 T-ACC	[APARTMENT UNITS] TOILET PAPER DISPENSER
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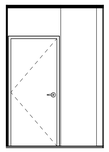
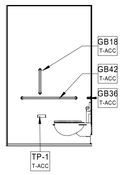
ACCESSIBILITY NOTES

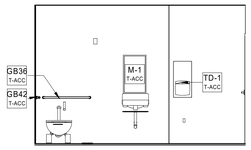
SEE ACCESSIBILITY STANDARDS SHEET ON A0.02 FOR ACCESSORY MOUNTING INFORMATION.



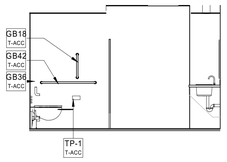
23 Family RR B Elev 3
A6.02 1/4" = 1'-0"



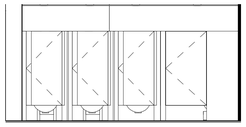
22 Family RR B Elev 2
A6.02 1/4" = 1'-0"



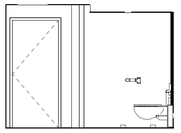
21 Family RR B Elev 1
A6.02 1/4" = 1'-0"



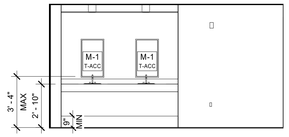
20 Women 212 Elev 4
A6.02 1/4" = 1'-0"



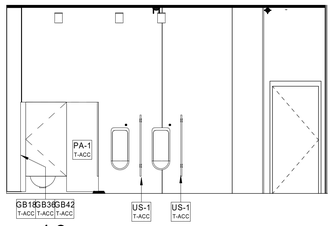
19 Women 212 Elev 3
A6.02 1/4" = 1'-0"



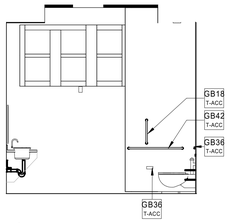
18 Women 212 Elev 2
A6.02 1/4" = 1'-0"



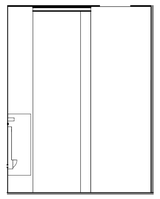
17 Women 212 Elev 1
A6.02 1/4" = 1'-0"



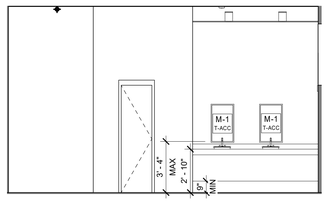
16 Men 117 Elev 4
A6.02 1/4" = 1'-0"



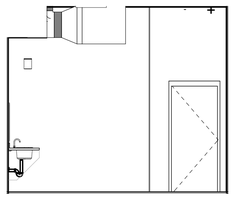
15 Men 117 Elev 3
A6.02 1/4" = 1'-0"



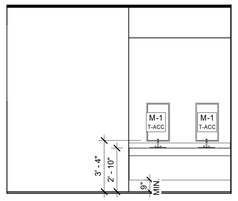
14 Men 117 Elev 2
A6.02 1/4" = 1'-0"



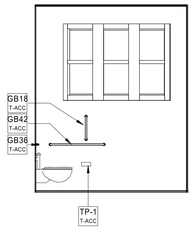
13 Men 117 Elev 1
A6.02 1/4" = 1'-0"



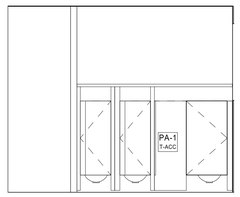
12 Women 116 Elev 4
A6.02 1/4" = 1'-0"



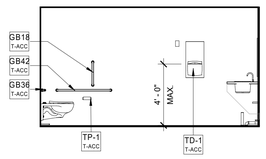
11 Women 116 Elev 3
A6.02 1/4" = 1'-0"



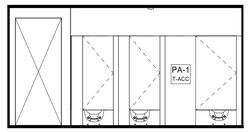
10 Women 116 Elev 2
A6.02 1/4" = 1'-0"



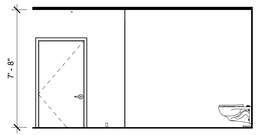
9 Women 116 Elev 1
A6.02 1/4" = 1'-0"



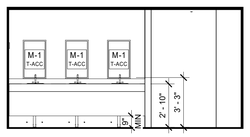
8 Women 023 Elev 4
A6.02 1/4" = 1'-0"



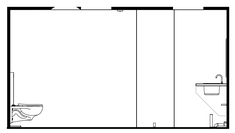
7 Women 023 Elev 3
A6.02 1/4" = 1'-0"



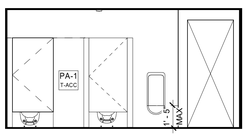
6 Women 023 Elev 2
A6.02 1/4" = 1'-0"



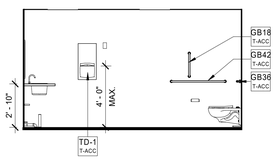
5 Women 023 Elev 1
A6.02 1/4" = 1'-0"



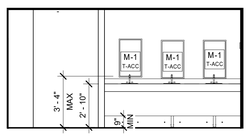
4 Men 027 Elev 4
A6.02 1/4" = 1'-0"



3 Men 027 Elev 3
A6.02 1/4" = 1'-0"



2 Men 027 Elev 2
A6.02 1/4" = 1'-0"



1 Men 027 Elev 1
A6.02 1/4" = 1'-0"

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

Browning Day Mullins Dierdorf Architects
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Planning
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Owner

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Construction Manager

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Phone: (913) 451-1818
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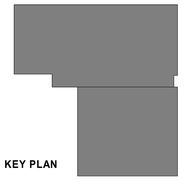
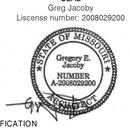
Matchline Design Group, LLC
Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

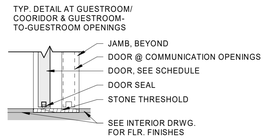
REVISION SCHEDULE

Rev. #	Revision Description	Issue Date

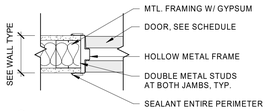
Interior Elevations - Restrooms

A6.02

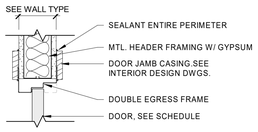
\\bdmd.local\UEM\UserShare\cmendoza\Documents\18A023 KCES R20_cmendoza.rvt
9/10/2020 4:51:47 PM



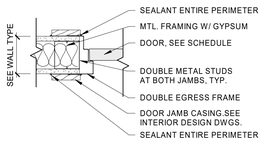
9 Threshold Detail
A8.02 1 1/2" = 1'-0"



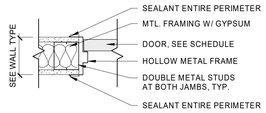
8 Jamb/Head Detail
A8.02 1 1/2" = 1'-0"



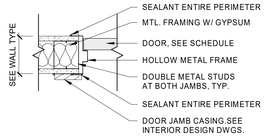
7 Head Detail
A8.02 1 1/2" = 1'-0"



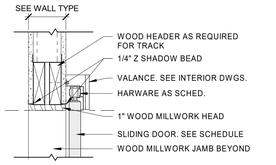
6 Jamb Detail
A8.02 1 1/2" = 1'-0"



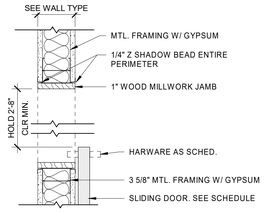
5 Jamb/Head Detail
A8.02 1 1/2" = 1'-0"



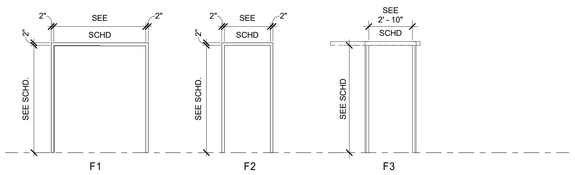
4 Jamb/Head Detail
A8.02 1 1/2" = 1'-0"



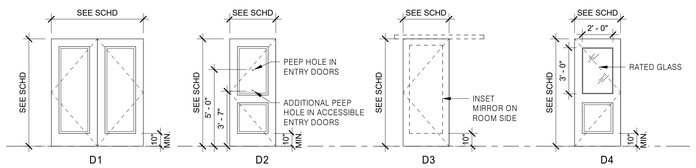
3 Barn Door Head
A8.02 1 1/2" = 1'-0"



2 Barn Door Jamb
A8.02 1 1/2" = 1'-0"



FRAME ELEVATIONS



DOOR ELEVATIONS

1 Door & Frame Elevations
A8.02 1/4" = 1'-0"

Corridor to Guestroom-Set 1

Each	REV	Item	Descr.	Remarks	Finish	Man.
3		Hinge	----	----	613/US10B	----
1		Card Lock	Vanguard Signature RFID	Straight Handle	613/US10B	Assa Abloy
1		Privacy Door Latch	#SAL-US10B	TBD	613/US10B	DHSI
1		Door Viewer	#DV x US10B	TBD	613/US10B	DHSI
1		Door Guard	----	----	----	----
1		Wall Stop	----	----	613/US10B	----
1		Door Sweep	AMDB3-3XSWE	TBD	BLACK	DHSI
1		W/S-Smokeseal	#105	STC32	BLACK	DHSI
1		Closer	----	----	613/US10B	----

Corridor to Guestroom-ADA-Set 2

Each	REV	Item	Descr.	Remarks	Finish	Man.
3		Hinge	----	----	613/US10B	----
1		Card Lock	TBD	TBD	613/US10B	TBD
1		Privacy Door Latch	#SAL-US10B	TBD	613/US10B	DHSI
2		Door Viewer	#DV x US10B	TBD	613/US10B	DHSI
1		Door Guard	----	----	613/US10B	----
1		Wall Stop	----	----	613/US10B	----
1		Door Sweep	AMDB3-3XSWE	TBD	BLACK	DHSI
1		W/S-Smokeseal	#105	STC32	BLACK	DHSI
1		Closer	----	----	613/US10B	----

Sliding Door Restrooms-Set 3

Each	REV	Item	Descr.	Remarks	Finish	Man.
1		Sliding Door Set	----	----	613/US10B	----
2		Door Pull	----	----	613/US10B	----
1		Bottom Guide	----	----	613/US10B	----

Guestroom to Guestroom-Communicating-Set 4

Each	REV	Item	Descr.	Remarks	Finish	Man.
3		Spring Hinge	----	----	613/US10B	----
1		Lockset Grade 2-Comm.	----	----	613/US10B	----
1		Deadbolt	----	----	613/US10B	----
1		Wall Stop	----	----	613/US10B	----
1		Door Sweep	AMDB3-3XSWE	TBD	BLACK	DHSI
1		W/S-Smokeseal	#105	STC32	BLACK	DHSI

Storage, Electrical, Low Voltage-Set 5

Each	REV	Item	Descr.	Remarks	Finish	Man.
3		Hinge	----	----	613/US10B	----
1		Lockset Grade 1-Storage	----	----	613/US10B	----
1		Closer	----	----	613/US10B	----
1		Wall Stop	----	----	613/US10B	----
1		Door Sweep	AMDB3-3XSWE	TBD	BLACK	DHSI
1		W/S-Smokeseal	#105	STC32	BLACK	DHSI

Housekeeping-Set 6

Each	REV	Item	Descr.	Remarks	Finish	Man.
3		Hinge	----	----	613/US10B	----
1		Card Lock-Utility	TBD	TBD	613/US10B	TBD
1		Closer	----	----	613/US10B	----
1		Wall Stop	----	----	613/US10B	----
1		Door Sweep	AMDB3-3XSWE	TBD	BLACK	DHSI
1		W/S-Smokeseal	#105	STC32	BLACK	DHSI
1		Kickplate	----	----	613/US10B	----

Corridor Bi-Acting-Set 7

Each	REV	Item	Descr.	Remarks	Finish	Man.
2		Continuous Hinge	----	----	613/US10B	----
2		Exit device with Passage Trim	----	----	613/US10B	----
1		Coordinator	----	----	613/US10B	----
2		Kick Plate	----	----	613/US10B	----
2		Wall Stop	----	----	613/US10B	----
1		Door Sweep	AMDB3-3XSWE	TBD	BLACK	DHSI
1		W/S-Smokeseal	#105-3HJ	----	BLACK	DHSI
1		Metal Edge Astragal	----	----	MATCH DOOR COLOR	----
2		Closer	----	----	613/US10B	----

Egress Stair-Set 8

Each	REV	Item	Descr.	Remarks	Finish	Man.
1		Continuous Hinge	----	----	613/US10B	----
1		Exit device with Passage Trim	----	----	613/US10B	----
1		Kick Plate	----	----	613/US10B	----
1		Wall Stop	----	----	613/US10B	----
1		Door Sweep	AMDB3-3XSWE	TBD	BLACK	DHSI
1		W/S-Smokeseal	#105-3HJ	----	BLACK	DHSI
1		Closer	----	----	613/US10B	----

Bedroom-Set 9

Each	REV	Item	Descr.	Remarks	Finish	Man.
3		Hinge	----	----	613/US10B	----
1		Wall Stop	----	----	613/US10B	----
1		Lockset Grade 1-Privacy	----	----	613/US10B	----

Note: Door lockset shall have matching handles and finishes.

DOOR HARDWARE SCHEDULE

T - GUESTROOM DOOR SCHEDULE 1

Mark	SIZE Width	SIZE Height	SIZE Thick.	DOOR Mat.	DOOR Fin.	DOOR Elev.	FRAME Mat.	FRAME Fin.	FRAME Elev.	Jamb Detail	Head Detail	Sill Detail	Fire Rtg.	Hdwr. Set	Comments
X00a	6' - 0"	7' - 0"	1 3/4"	WD	PF	D1	HM	PT	F1	6/A8.02	7/A8.02		90 MIN	7	
X01a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X01b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X01c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X01y	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	8/A8.02	8/A8.02	9/A8.02	20 MIN	4	COMMUNICATION OPNG.
X02a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X02a1	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	2	ACCESSIBLE
X02b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X02c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X02c1	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	WD	PF	F3	2/A8.02	3/A8.02			3	
X03a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X03b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X03c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X04a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X04b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X04c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X05a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X05b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X05c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X05y	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	8/A8.02	8/A8.02	9/A8.02	20 MIN	4	COMMUNICATION OPNG.
X06a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X06b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X06c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X07a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X07b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X07c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X08a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X08b	3' - 0"	7' - 0"	1 3/4"	WD	PF	D3	HM	PT	F2	5/A8.02	5/A8.02			3	
X08y	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	8/A8.02	8/A8.02	9/A8.02	20 MIN	4	COMMUNICATION OPNG.
X09a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X09b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X10a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X10b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X10y	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	8/A8.02	8/A8.02	9/A8.02	20 MIN	4	COMMUNICATION OPNG.
X11a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X11a1	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	2	ACCESSIBLE
X11b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X12a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X12b	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			3	
X12c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X12d	2' - 8"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X12e	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X13a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X13b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X13c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X14a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X14b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X14c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X15a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X15b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	HM	PT	F3	2/A8.02	3/A8.02			3	
X15c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X16a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X16b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X16c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X17a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X17a1	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	2	ACCESSIBLE
X17b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X17c	3' - 0"	7' - 0"	1 3/4"	WD	PT	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X17c1	2' - 10"	7' - 0"	1 3/4"	WD	PF	D2	WD	PF	F3	2/A8.02	3/A8.02			3	
X18a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X18b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X18c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X19a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02	9/A8.02	20 MIN	1	
X19b	2' - 10"	7' - 0"	1 3/4"	WD	PF	D3	WD	PF	F3	2/A8.02	3/A8.02			3	
X19b1	3' - 0"	7' - 0"	1 3/4"	WD	PF	D3	HM	PT	F2	5/A8.02	5/A8.02			3	
X19c	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	5/A8.02	5/A8.02			9	
X20a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D4	HM	PT	F2	4/A8.02	4/A8.02		20 MIN	5	RATED GLASS
X21a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02		20 MIN	6	
X22a	3' - 0"	7' - 0"	1 3/4"	HM	PF	D2	HM	PT	F2	4/A8.02	4/A8.02		-	6	
X24a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02		45 MIN	5	
X25a	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2	4/A8.02	4/A8.02		20 MIN	5	

DOOR SCHEDULE NOTES

1. DOORS LISTED WITH AN 'X' IN THE 'MARK' COLUMN ARE TYPICAL ON EACH FLOOR, 5 THROUGH 19. VERIFY LOCATIONS AND COUNT WITH OVERALL FLOOR PLANS.

DOOR SCHEDULE ABBREVIATIONS

HM HOLLOW METAL
PF PRE-FINISHED
PT PAINTED
WD WOOD

BROWNING DAY MULLINS DIERDORF
LEADERSHIP + DESIGN®

Browning Day Mullins Dierdorf Architects
Architecture
Landscape Architecture
Planning
Interior Design

626 North Illinois Street
Indianapolis, Indiana 46204
Phone: (317) 635-5030
Website: www.bdmd.com
MO Certificate of Authority: W00923182

Delta Quad Holdings, LLC
Owner

Rau Construction Co.
Construction Manager

9101 West 110th Street, Suite 150
Overland Park, Kansas 66210
Phone: (913) 642-6000
Website: www.website.com

Lawson Elser, Inc.
Structural Engineer

650 East Carmel Drive, Suite 150
Carmel, Indiana 46032
Phone: (317) 574-5409
Website: www.lawsonelser.com

Hoss & Brown Engineers, Inc.
MEP Engineer

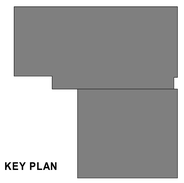
11205 West 79th Street, Suite 102
Lenexa, Kansas 66214
Phone: (913) 362-9090
Website: www.h-be.com

SK Design Group, Inc.
Civil Engineer

4600 College Boulevard, Suite 100
Overland Park, KS 66211
Phone: (913) 451-1818
Website: www.skdesigngroup.net

Matchline Design Group, LLC
Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com



KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE

Rev. #	Revision Description	Issue Date

Guestroom Levels Door Schedule

A8.02

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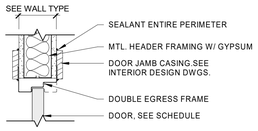
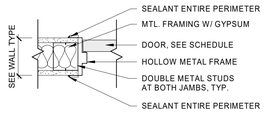
VESTIBULE 102-SET 12						
EACH	REV	ITEM	DESCR.	REMARKS	FINISH	MAN.
2		CONTINUOUS HINGE	TBD		613US10B	TBD
2		EXIT DEVICE W/PASSAGE TRIM	TBD		613US10B	TBD
2		KICK PLATE	TBD		613US10B	TBD
2		WALL STOP	TBD		613US10B	TBD
3		W/S SMOKE SEAL	TBD		GREY	TBD
2		CLOSER	TBD		613US10B	TBD
1		METAL EDGE ASTRAGAL	TBD			TBD

NURSING MOTHER'S, FAMILY RESTROOMS-SET 11						
EACH	REV	ITEM	DESCR.	REMARKS	FINISH	MAN.
3		HINGES	TBD		613US10B	TBD
1		PRIVACY SET	TBD		613US10B	TBD
1		CLOSER	TBD		613US10B	TBD
1		KICK PLATE	TBD		613US10B	TBD
1		WALL BUMPER	TBD		613US10B	TBD
3		DOOR SILENCERS	TBD		GREY	TBD

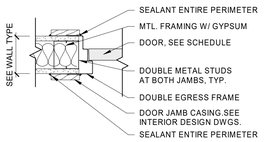
PUBLIC RESTROOMS-SET 10						
EACH	REV	ITEM	DESCR.	REMARKS	FINISH	MAN.
3		HINGES	TBD		613US10B	TBD
1		PUSH PLATE	TBD		613US10B	TBD
1		PULL PLATE	TBD		613US10B	TBD
1		CLOSER	TBD		613US10B	TBD
1		KICK PLATE	TBD		613US10B	TBD
1		WALL BUMPER	TBD		613US10B	TBD
3		DOOR SILENCERS	TBD		GREY	TBD



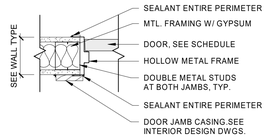
5 Head Detail
A8.03 1 1/2" = 1'-0"



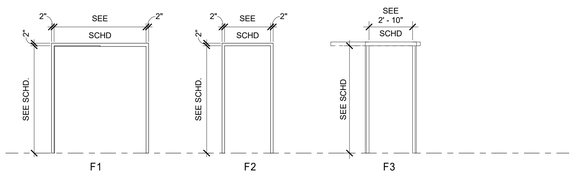
3 Jamb/Head Detail
A8.03 1 1/2" = 1'-0"



4 Jamb Detail
A8.03 1 1/2" = 1'-0"

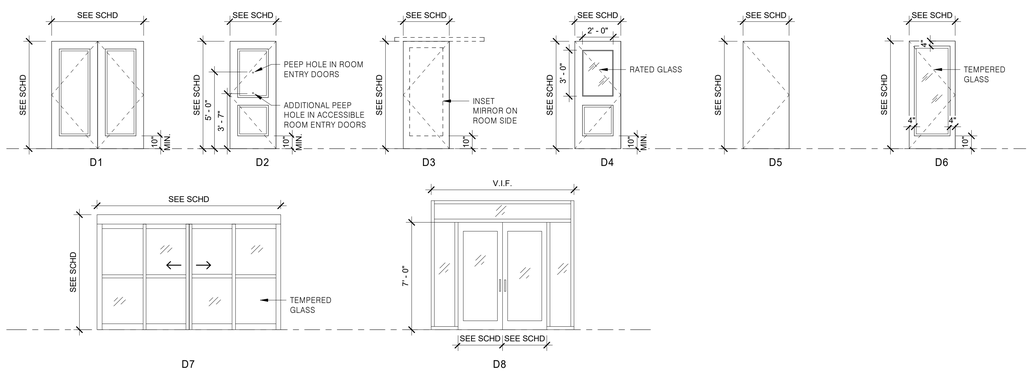


2 Jamb/Head Detail
A8.03 1 1/2" = 1'-0"



FRAME ELEVATIONS

1



DOOR ELEVATIONS

1 Door & Frame Elevations Copy 1- Phase 1
A8.03 1/4" = 1'-0"

PHASE 1 DOOR SCHEDULE														
	SIZE			DOOR			FRAME							
Mark	Width	Height	Thick.	Mat.	Fin.	Elev.	Mat.	Fin.	Elev.	Head	Jamb	Fire Rtg.	Hdwr. Set	Comments
003	3' - 0"	7' - 0"	1 3/4"	WD	ST	D2	HM	PT	F2				11	Phase 1
004	3' - 0"	7' - 0"	1 3/4"	HM	PT	D6	HM	PT	F2			-	5	Phase 1
007	3' - 0"	7' - 0"	1 3/4"	HM	PT	D6	HM	PT	F2			-	5	Phase 1
008	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2			-	5	Phase 1
011A	7' - 0"	7' - 0"	1 3/4"	HM	PT	D1	HM	PT	F1				5	Phase 1
013A	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2				5	Phase 1
014	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2			-	5	Phase 1
016	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2			-	5	Phase 1
021	3' - 0"	7' - 0"	1 3/4"	HM	ST	D2	HM	PT	F2			-	10	Phase 1
022	3' - 0"	7' - 0"	1 3/4"	HM	ST	D2	HM	PT	F2			-	10	Phase 1
025	3' - 0"	7' - 0"	1 3/4"	HM	ST	D2	HM	PT	F2			-	10	Phase 1
026	3' - 0"	7' - 0"	1 3/4"	HM	ST	D2	HM	PT	F2			-	10	Phase 1
050A	6' - 0"	7' - 0"	1 3/4"	AL/GL	PF	D1	HM	PT	F1				12	Phase 1
060	6' - 0"	7' - 0"	1 3/4"	HM	PT	D1	HM	PT	F1				12	Phase 1
100A	6' - 0"	7' - 0"	1 3/4"	WD	PF	D6	HM	PT	F1				12	Phase 1, WITH RATED GLASS
102A	3' - 0"	7' - 0"	1 3/4"	AL/GL	PF	D6	HM	PT	F1				12	Phase 1, WITH RATED GLASS
102B	3' - 0"	7' - 0 1/32"	1 3/4"	AL/GL	PF	D8	HM	PF				20 MIN	12	Phase 1, WITH RATED GLASS
106	3' - 0"	7' - 0"	1 3/4"	WD	PF	D2	HM	PT	F2				5	Phase 1
108	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2			-	5	Phase 1
110	3' - 0"	7' - 0"	1 3/4"	WD										Phase 1
115A	3' - 0"	7' - 0"	1 3/4"	WD	ST	D2	HM	PT	F2					Phase 1
115B	3' - 0"	7' - 0"	1 3/4"	HM	ST	D2	HM	PT				-	11	Phase 1
201A	11' - 11 1/2"	7' - 5 3/4"		AL/GL	PF	D7	HM	PF	F1					Phase 1, WITH RATED GLASS. REFER TO SPECIFICATIONS
201B	11' - 11 1/2"	7' - 5 3/4"		AL/GL	PF	D7	HM	PF	F1					Phase 1, WITH RATED GLASS. REFER TO SPECIFICATIONS
206	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2					Phase 1, SEE KEY NOTES
211	3' - 0"	7' - 0"	1 3/4"	WD	ST	D2	HM	PT	F2				10	Phase 1
212	3' - 0"	7' - 0"	1 3/4"	WD	ST	D2	HM	PT	F2				10	Phase 1
229	3' - 0"	7' - 0"	1 3/4"	HM	ST	D4	HM	PT	F2			-	5	Phase 1
232	6' - 0"	7' - 0"	1 3/4"	HM	PF	D1	HM	PT	F1			90 MIN	12	Phase 1, WITH RATED GLASS
233	6' - 0"	7' - 0"	1 3/4"	HM	PT	D1	HM	PT	F1			90 MIN	12	Phase 1, WITH RATED GLASS
401A	6' - 0"	7' - 0"	1 3/4"	WD	ST	D1	HM	PT	F1			90 MIN	7	Phase 1
401B	6' - 0"	7' - 0"	1 3/4"	WD	ST	D1	HM	PT	F1			90 MIN	7	Phase 1
405	3' - 0"	7' - 0"	1 3/4"	HM	ST	D2	HM	PT	F2			-	10	Phase 1
406	3' - 0"	7' - 0"	1 3/4"	HM	ST	D2	HM	PT	F2			-	10	Phase 1
411	3' - 0"	7' - 0"	1 3/4"	AL/GL	PF	D6	HM	PT	F2			20 MIN		Phase 1, SEE KEY NOTES
419	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2				5	Phase 1
420	2' - 11 19/32"	7' - 0 1/2"	1 3/4"	AL/GL	PF	D6	HM	PT	F2			20 MIN		Phase 1, SEE KEY NOTES
2001	3' - 0"	7' - 0"	1 3/4"	WD	ST	D2	HM	PT	F2				11	Phase 1
2002A	6' - 0"	7' - 0"	1 3/4"	WD	ST	D1	HM	PT	F1			90 MIN	7	Phase 1
2002B	6' - 0"	7' - 0"	1 3/4"	WD	ST	D1	HM	PT	F1			90 MIN	7	Phase 1
2003	3' - 0"	7' - 0"	1 3/4"	WD	ST	D2	HM	PT	F2				10	Phase 1
2004	3' - 0"	7' - 0"	1 3/4"	WD	ST	D2	HM	PT	F2				10	Phase 1
2008	6' - 0"	7' - 0"	1 3/4"	WD	ST	D1	HM	PT	F1			90 MIN	7	Phase 1
2014A	6' - 0"	7' - 0"	1 3/4"	WD	ST	D1	HM	PT	F1			20 MIN		Phase 1, SEE KEY NOTES
2016A	6' - 0"	7' - 0"	1 3/4"	WD	ST	D1	HM	PT	F1			90 MIN	7	Phase 1
2016B	6' - 0"	7' - 0"	1 3/4"	WD	ST	D1	HM	PT	F1			90 MIN	7	Phase 1
2025	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2			-	5	Phase 1
ST1-2	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN		Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST1-4	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST1-20	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST1G-0	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST1G-1	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST1G-2	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1,UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST2-1	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST2-2	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2			90 MIN	8	Phase 1
ST2-2B	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST2-3B	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST2-4	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST2-20	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2			90 MIN	8	Phase 1,UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST2G-0	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST2G-1	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST3-2	3' - 0"	7' - 0"	1 3/4"	HM	PT	D5	HM	PT	F2			90 MIN	8	Phase 1
ST3-2B	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN		Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST3-3B	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST3-4	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST3G-0	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST3G-1	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST3G-2	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1,UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST4G-0	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST4G-1	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION
ST4G-2	3' - 0"	7' - 0"	1 3/4"	EX	PT	EX	EX	PT	EX			90 MIN	8	Phase 1, UTILIZE EXISTING HINGES IF IN GOOD CONDITION

DOOR SCHEDULE NOTES

1. DOORS LISTED WITH AN 'X' IN THE 'MARK' COLUMN ARE TYPICAL ON EACH FLOOR, 5 THROUGH 19. VERIFY LOCATIONS AND COUNT WITH OVERALL FLOOR PLANS.

DOOR SCHEDULE ABBREVIATIONS

HM	HOLLOW METAL
PF	PRE-FINISHED
PT	PAINTED
WD	WOOD

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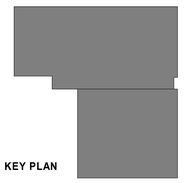

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

STATE OF MISSOURI
Gregory E. Jacoby
NUMBER A-2008029200
SEALED DOCUMENT

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Phase 1 Door Schedule

A8.03

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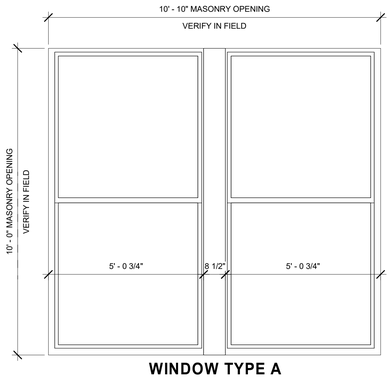

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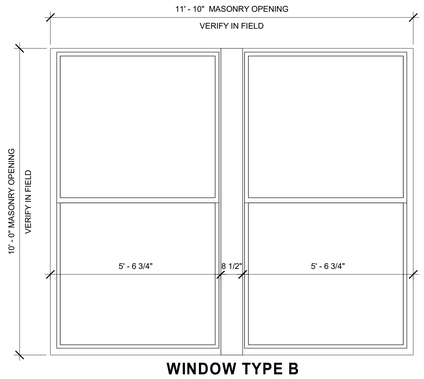

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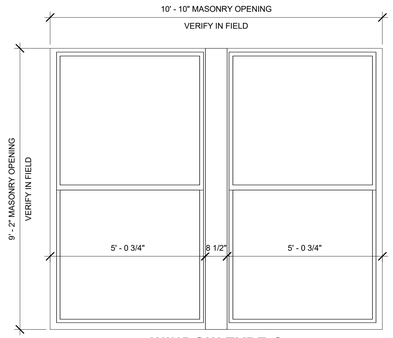

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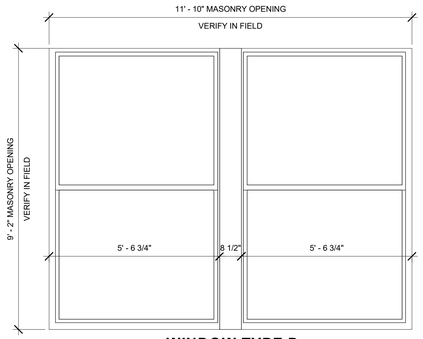

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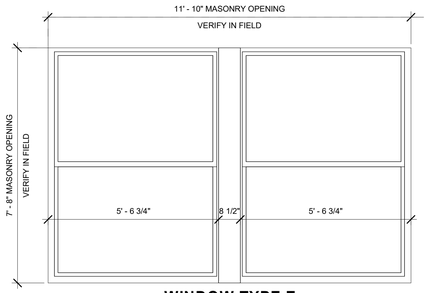

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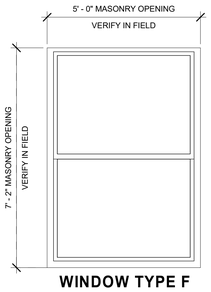

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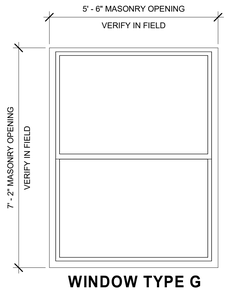

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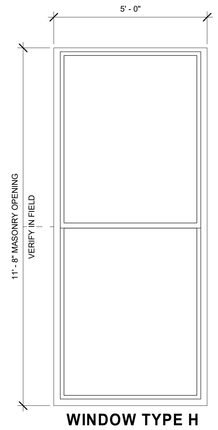

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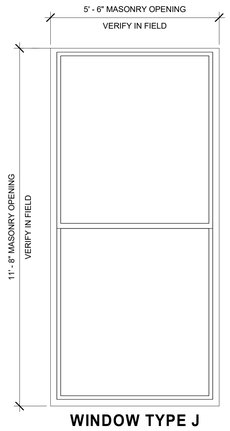

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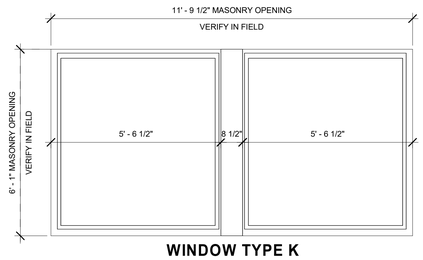

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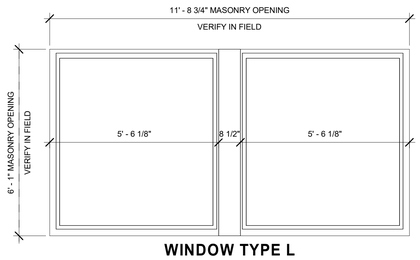

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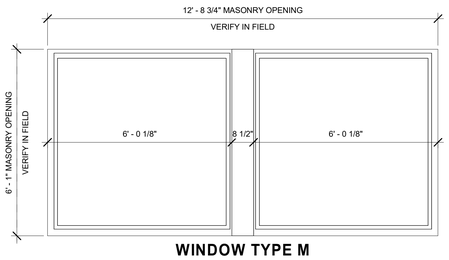

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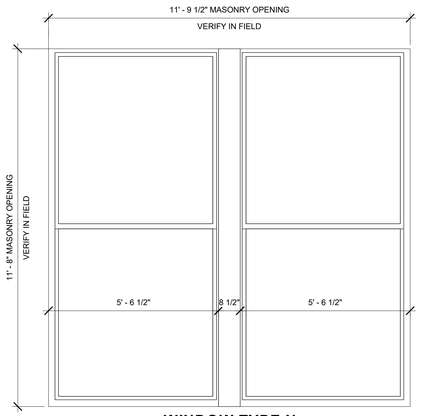

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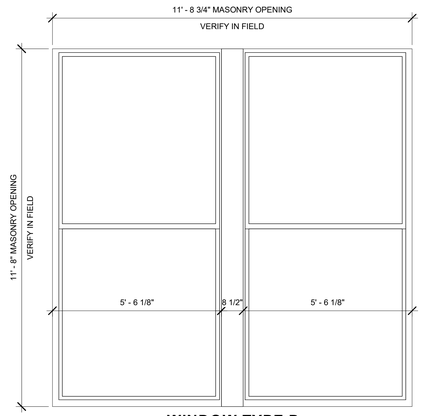

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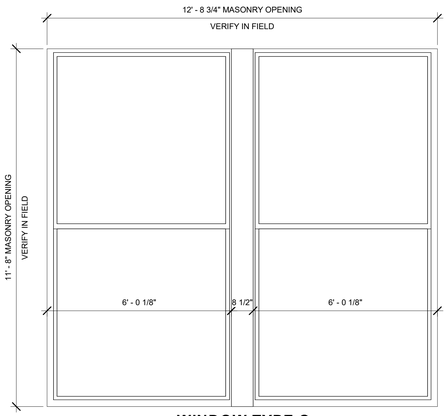

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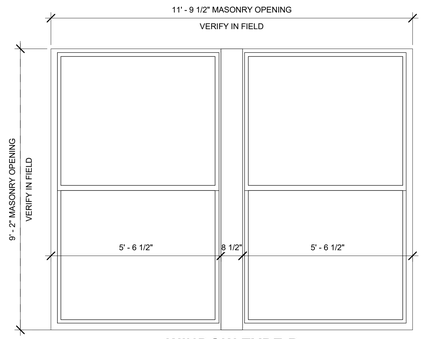

WINDOW TYPE R

Window Elevations
1/2" = 1'-0"

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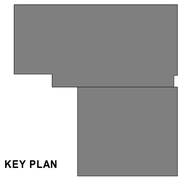
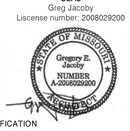


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: JWY
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Window Elevations

A8.20

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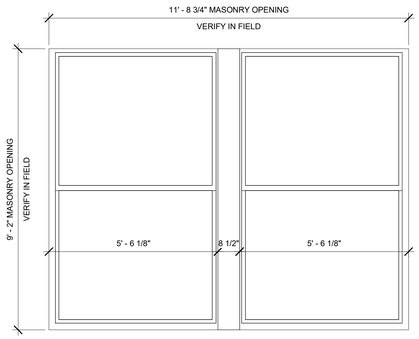

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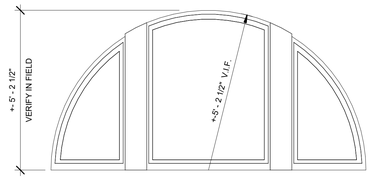

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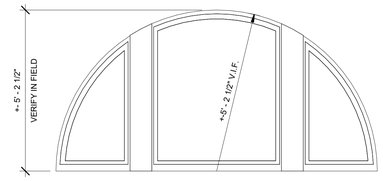

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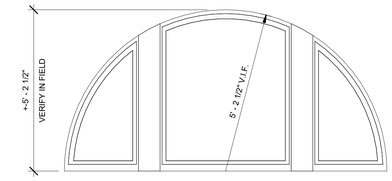

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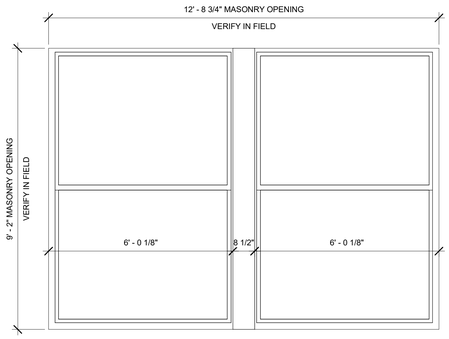

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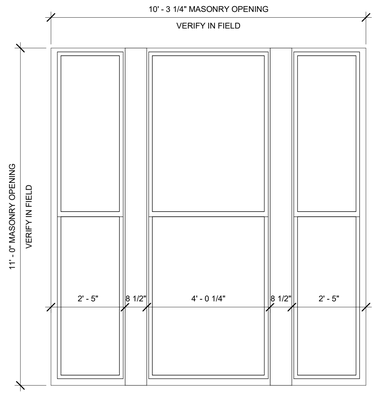

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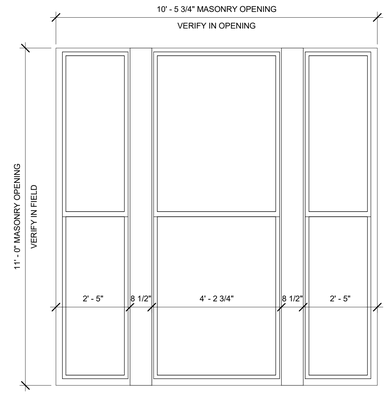

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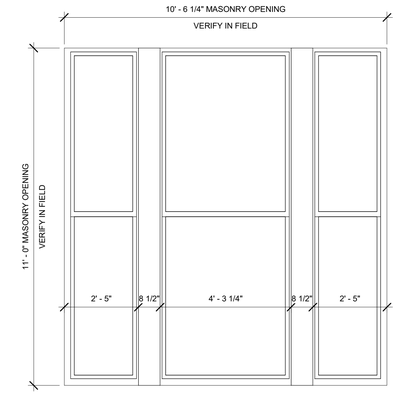

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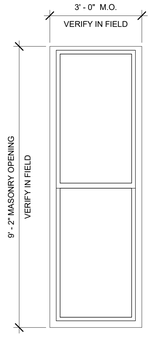

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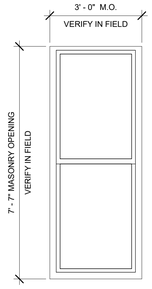

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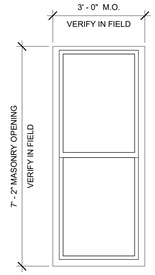

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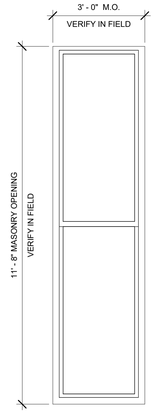

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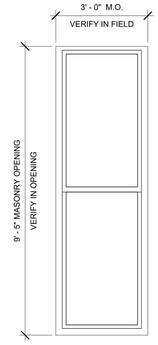

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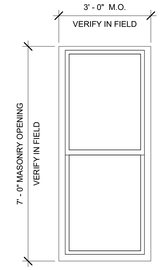

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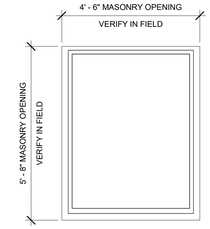

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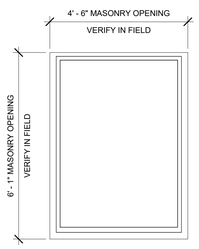

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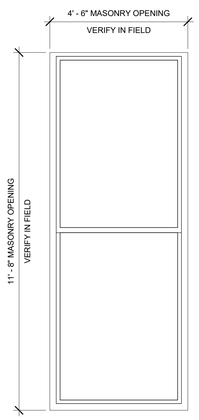

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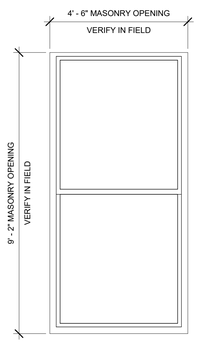

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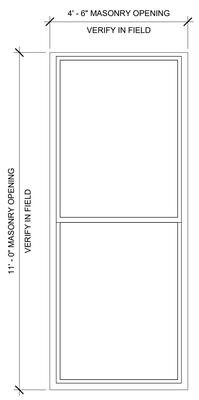

WINDOW TYPE HH

Window Elevations
1/2" = 1'-0"

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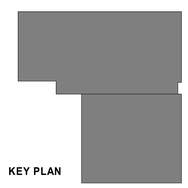
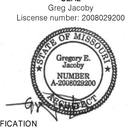


KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200



CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: JWY
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Window Elevations

A8.21

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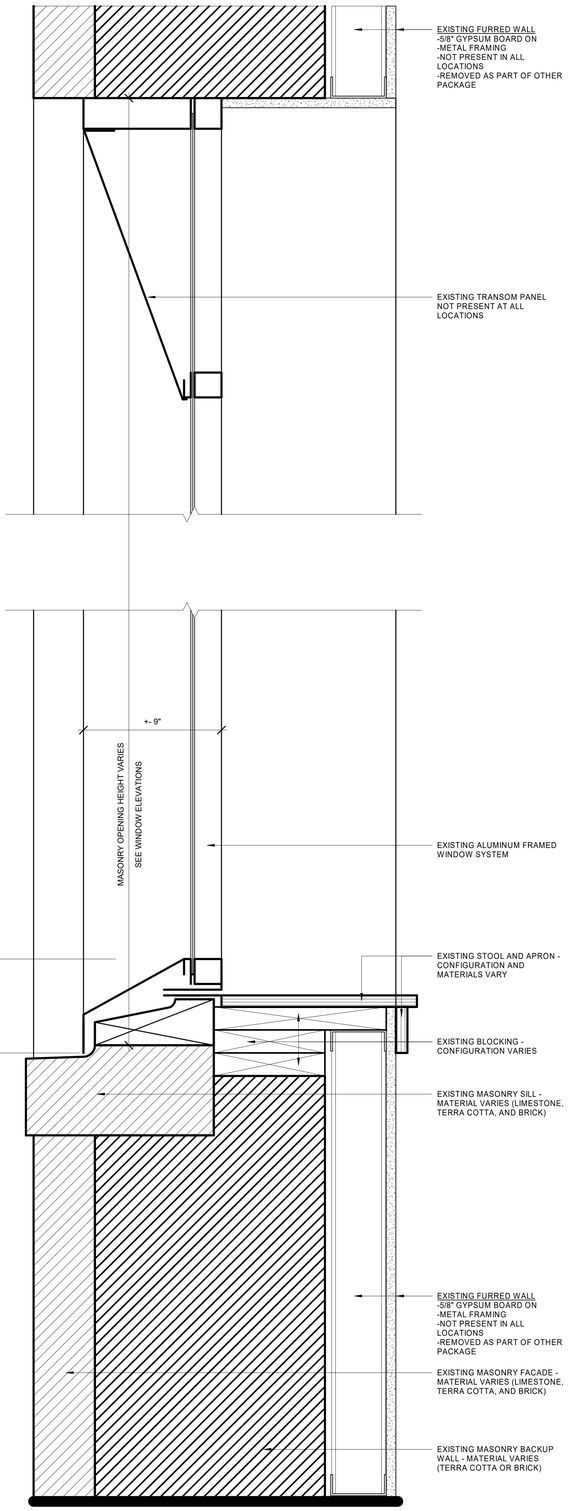
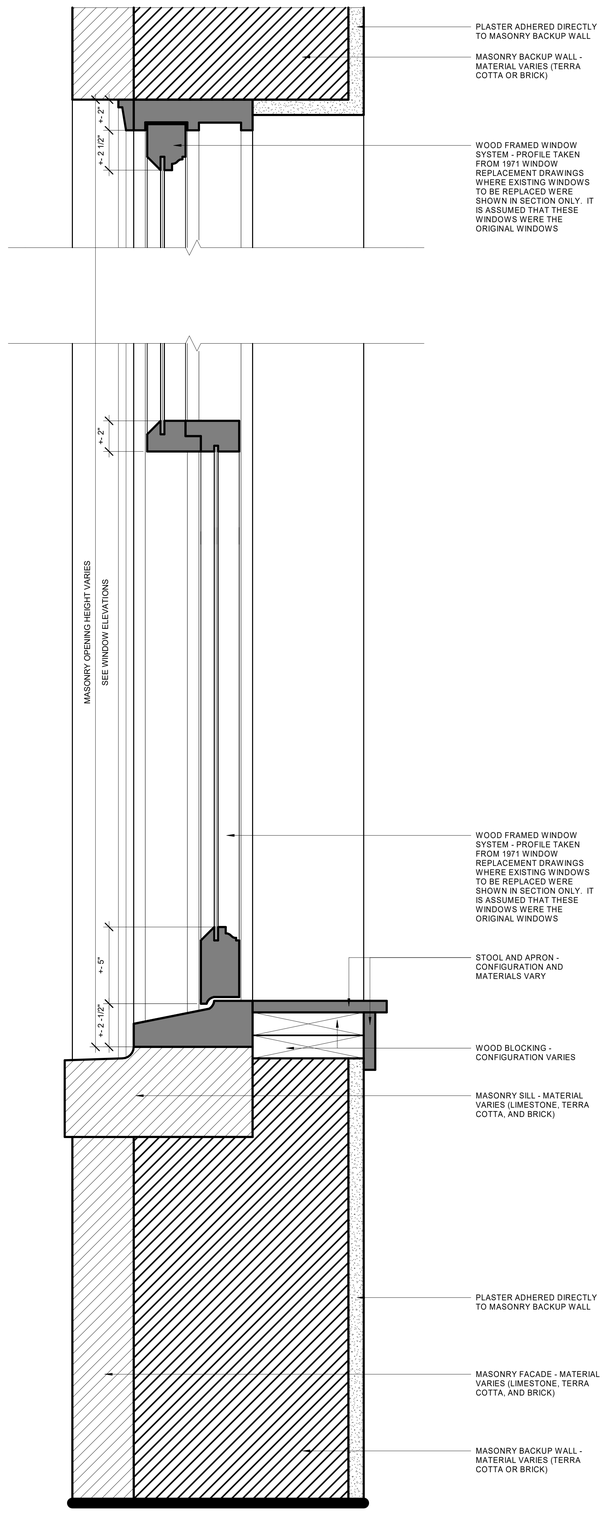


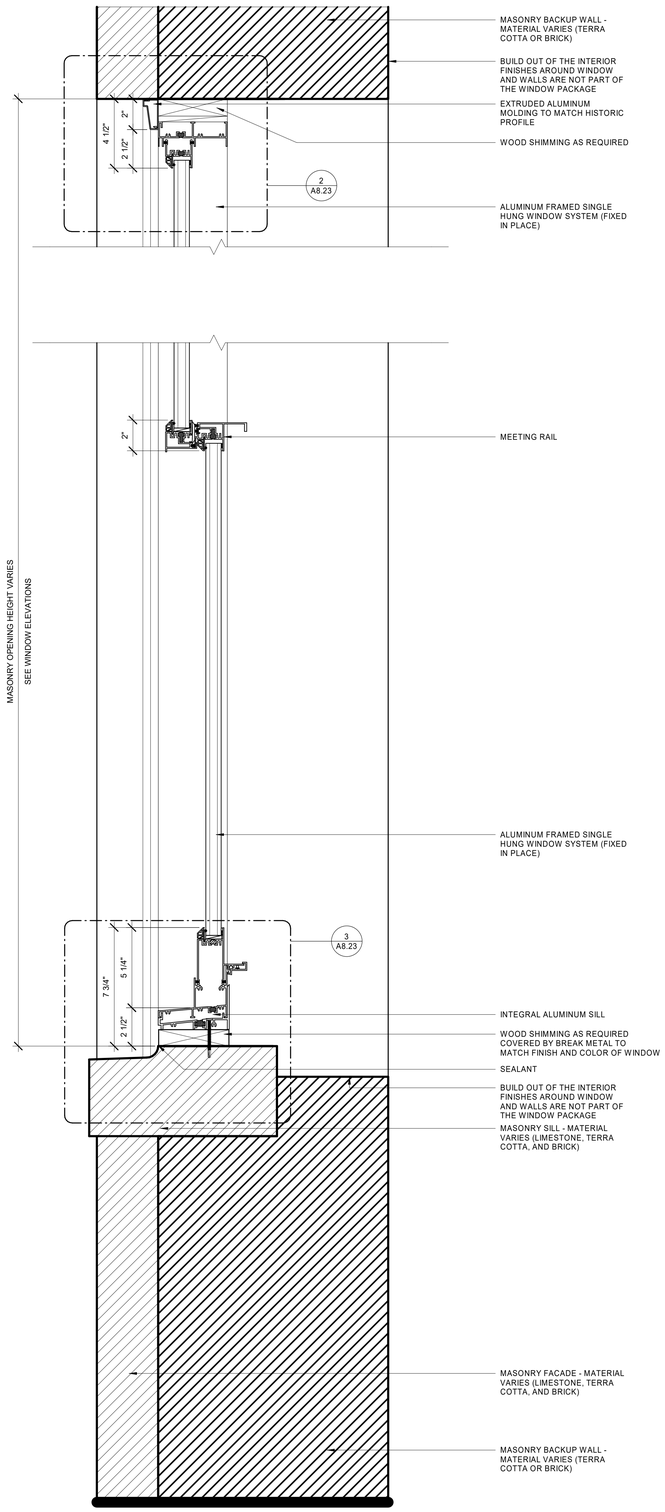
1 A8.22 EXISTING WINDOW SECTION, TYPICAL

3" = 1'-0"



2 A8.22 HISTORIC WINDOW SECTION, TYPICAL

3" = 1'-0"



3 A8.22 NEW WINDOW SECTION, TYPICAL

3" = 1'-0"

BROWNING DAY MULLINS DIERDORF

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Browning Day Mullins Dierdorf Architects
Architecture
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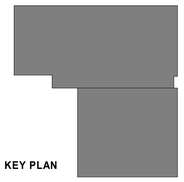

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

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Window Details

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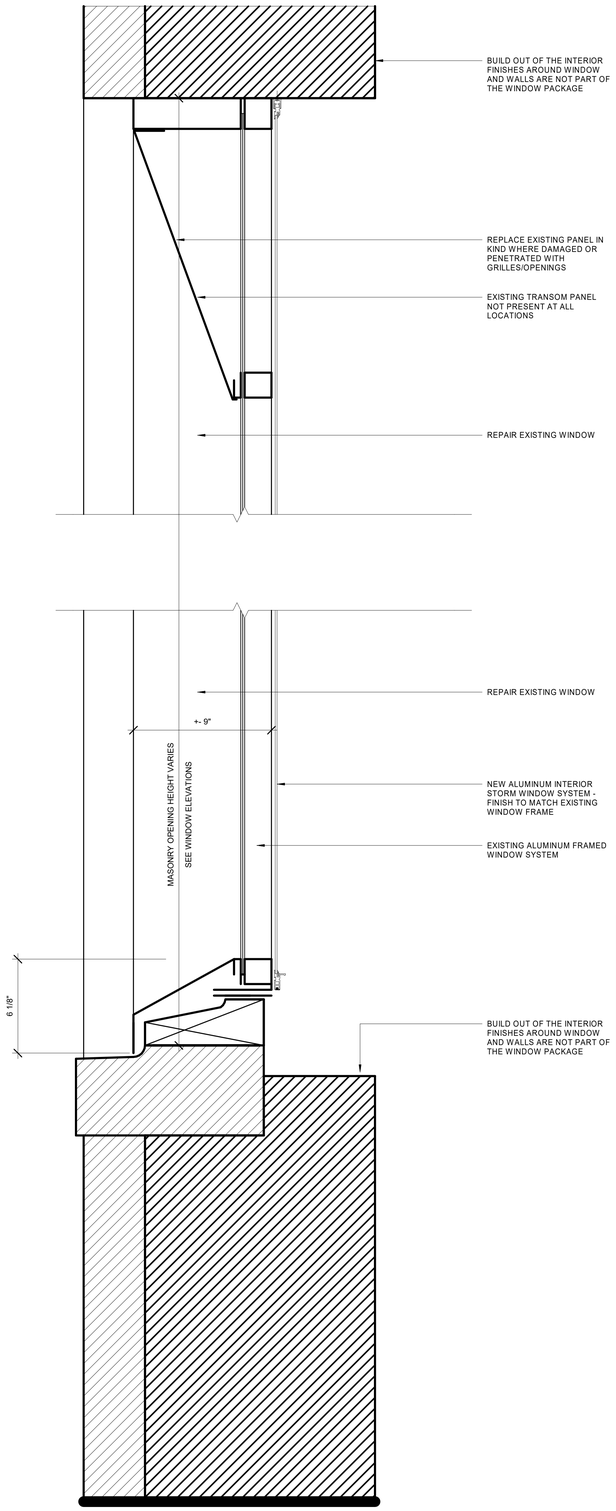
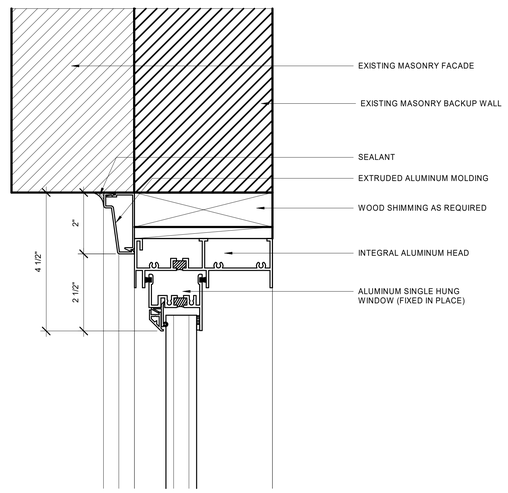


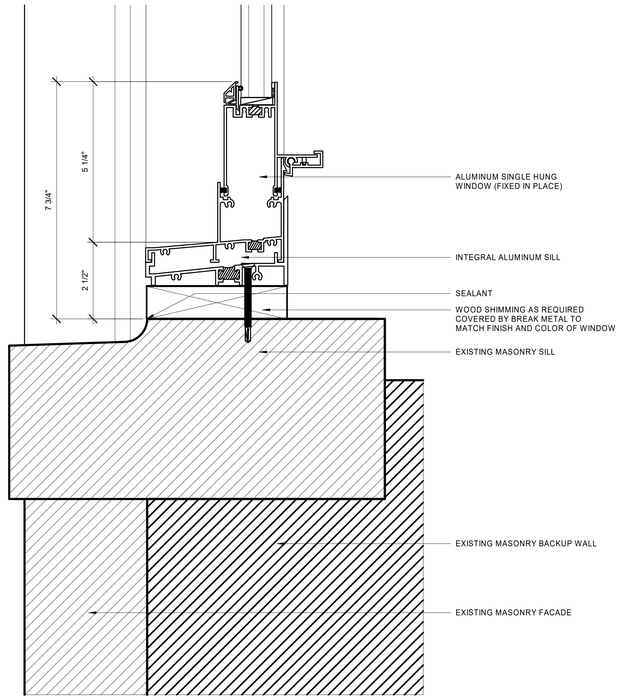
1 A8.23 ALTERNATE WINDOW SECTION, TYPICAL

3" = 1'-0"



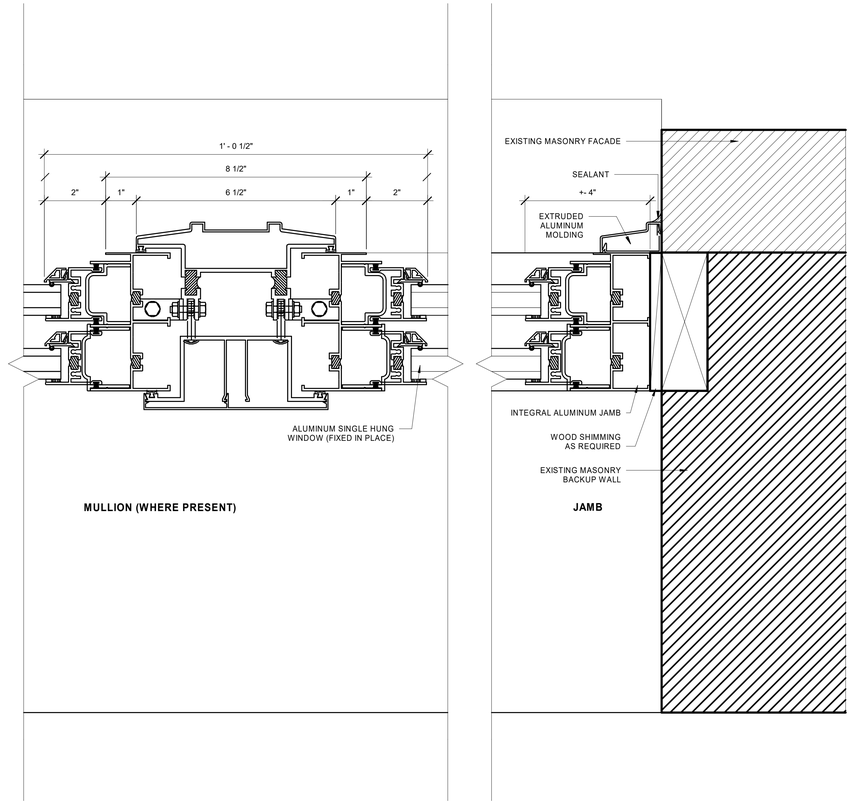
2 A8.23 NEW WINDOW HEAD DETAIL, TYPICAL

6" = 1'-0"



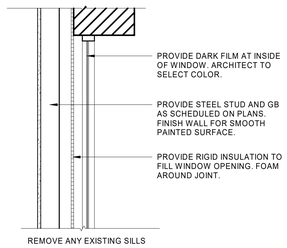
3 A8.23 NEW WINDOW SILL DETAIL, TYPICAL

6" = 1'-0"



4 A8.23 NEW WINDOW JAMB AND MULLION DETAIL, TYPICAL

6" = 1'-0"



5 A8.23 Typical Window Infill

1" = 1'-0"

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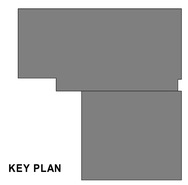

KEY PLAN

SEAL
Greg Jacoby
Liscense number: 2008029200

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The Grand Reserve

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Window Details

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SYMBOLS

PIPING

- DIRECTION OF FLOW
- UNION
- FLANGE CONNECTION
- CAP
- ELBOW UP
- ELBOW DOWN
- TEE UP
- TEE DOWN
- PIPE REDUCER
- PIPE GUIDE
- PIPE ANCHOR
- EXPANSION JOINT
- SHUT-OFF VALVE
- CHECK VALVE
- BALANCING VALVE WITH PRESSURE PORTS
- TRIPLE DUTY VALVE
- STRAINER
- STRAINER WITH BLOWOFF
- RELIEF/SAFETY VALVE
- MANUAL AIR VENT
- SOLENOID VALVE
- THREE-WAY CONTROL VALVE
- TWO-WAY CONTROL VALVE
- PRESSURE REDUCING VALVE
- PRESSURE GAUGE
- THERMOMETER
- BACKFLOW PREVENTER
- AIR OUTLET
- OXYGEN OUTLET
- VACUUM OUTLET
- NITROGEN OUTLET
- NITROUS OXIDE OUTLET

Symbol	Description
FS-1	FLOOR SINK
FD-1	FLOOR DRAIN
RD-1	ROOF DRAIN
HB-1	HOSE BIBB
CO	FLOOR/GRADE CLEANOUT
CO	WALL CLEANOUT
CO	END OF LINE CLEANOUT

PLUMBING

Symbol	Description
	WASTE LINE-ABOVE GRADE
GW	GREASE WASTE LINE-ABOVE GRADE
	WASTE LINE-BELOW GRADE
	VENT LINE
	DOMESTIC COLD WATER
	DOMESTIC HOT WATER
T	DOMESTIC TEMPERED HOT WATER
	DOMESTIC HOT WATER RECIRC.
140	140 DEGREE DOMESTIC HOT WATER
1	VENT THROUGH ROOF NOTE

FIRE PROTECTION

Symbol	Description
	SPRINKLER HEAD (PENDANT)
	SPRINKLER HEAD (SIDEWALL)
	SPRINKLER HEAD (UPRIGHT)
FP	FIRE PROTECTION PIPING
	SIAMESE CONNECTION

DUCTWORK

Symbol	Description
AHU 1	EQUIPMENT TYPE AND NUMBER
	PUMP
	LINEAR SLOT DIFFUSER
	FLEXIBLE DUCT
	NEGATIVE PRESSURE AIR DUCT UP
	NEGATIVE PRESSURE AIR DUCT DOWN
	POSITIVE PRESSURE AIR DUCT UP
	POSITIVE PRESSURE AIR DUCT DOWN
	DUCT RISE OR DROP IN THE DIRECTION OF AIRFLOW
	SQUARE TO ROUND TRANSITION
	ROUND DUCT UP, DOWN
	ELBOW WITH TURNING VANES
	FLEXIBLE CONNECTION
	MANUAL BALANCE DAMPER
M	MOTORIZED CONTROL DAMPER
F	FIRE DAMPER
S	SMOKE DAMPER
FS	FIRE/SMOKE DAMPER
BD	BACKDRAFT DAMPER
	SPIN-IN BRANCH DUCT CONNECTOR-WITH DAMPER IF SHOWN
	HIGH EFFICIENCY BRANCH DUCT CONNECTOR-WITH DAMPER IF SHOWN
	SUPPLY AIR DIFFUSER
	DUCT MOUNTED GRILLE/WALL GRILLE
	RETURN GRILLE
	NOISE REDUCING RETURN AIR TRANSFER
	SUPPLY DIFFUSER - THREE-WAY THROW
S1	DIFFUSER, GRILLE, OR REGISTER TYPE
100	CFM
6"	CONNECTION SIZE

TEMPERATURE CONTROLS

Symbol	Description
T AHU-1	TEMPERATURE SENSOR/THERMOSTAT SERVING AHU-1
H	HUMIDITY SENSOR/HUMIDISTAT
T	REMOTE TEMPERATURE SENSOR
H	REMOTE HUMIDITY SENSOR
CO2	CARBON DIOXIDE SENSOR
OCC	OCCUPANCY SENSOR
CO	CARBON MONOXIDE SENSOR
SP	STATIC PRESSURE SENSOR
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
FM	FLOW METER

LIGHTING

- LIGHT TRACK WITH LIGHT TYPES AS INDICATED
- WALL WASHER LIGHTING FIXTURE, ARROW INDICATES DIRECTION
- LIGHT FIXTURE AND TYPE
- EMERGENCY LIGHT FIXTURE
- NIGHT LIGHT FIXTURE
- LIGHT FIXTURE AND TYPE
- LIGHT FIXTURE AND TYPE
- WALL MOUNTED FIXTURE
- WALL SCONCE
- WALL MOUNTED FIXTURE
- POLE MOUNTED LIGHT (NUMBER OF HEADS AS SHOWN)
- TENON MOUNTED POLE LIGHT
- IN-GROUND LIGHT FIXTURE
- BOLLARD LIGHT FIXTURE
- EXIT LIGHT CLG. MNTD. (SGL. FACE)
- EXIT LIGHT CLG. MNTD. (DBL. FACE)
- EXIT LIGHT WALL MNTD. (SGL. FACE)
- EXIT/EMERGENCY LIGHT
- EMERGENCY LIGHT
- CEILING FAN

POWER EQUIPMENT

Symbol	Description
	ELECTRICAL DISTRIBUTION PANEL, SWITCHBOARD, OR MOTOR CONTROL
	PANEL BOARD
	LOAD CENTER
M	METER
	J-BOX
	MOTOR
	DISCONNECT SWITCH
	VARIABLE FREQUENCY DRIVE
	COMBINATION DISCONNECT SWITCH AND MOTOR STARTER
	MAGNETIC MOTOR STARTER, NEMA SIZE AS NOTED
	BELL
	HOME RUN
	CONCEALED CONDUIT
	CONDUIT BELOW SLAB
	ONE HOT, ONE NEUTRAL, AND ONE GROUND IN CONCEALED CONDUIT (#12 in 1/2" C. U.N.O.)
	#14'S (WIRE NUMBER INDICATED)
	#16'S (WIRE NUMBER INDICATED)
	EXPOSED CONDUIT
	CONDUIT TURNING DOWN
	CONDUIT TURNING UP

WIRING DEVICES & OUTLETS

Symbol	Description
	SIMPLEX RECEPTACLE
	DUPLEX RECEPTACLE
G	GROUND FAULT INTERRUPTER
WP	WEATHERPROOF GROUND FAULT INTERRUPTER DUPLEX RECEPTACLE
USB	DUPLEX RECEPTACLE WITH USB OUTLETS
	QUAD RECEPTACLE
	HEAVY DUTY RECEPTACLE-NEMA TYPE AS NOTED
	FLOOR MOUNTED DEVICE
	CEILING MOUNTED DEVICE
	ISOLATED GROUND DUPLEX RECEPTACLE
	ISOLATED GROUND QUAD RECEPTACLE
	CONTROLLED RECEPTACLE
W	WALL MOUNTED PHONE
48 48	CENTER OF DEVICE AT 48" A.F.F.
	DATA OUTLET
	TELEPHONE/DATA OUTLET
	CABLE T.V. OUTLET
	CABLE TRAY
	SURFACE RACEWAY
S	SWITCH, SPST U.N.O.
S^2	SWITCH, DPST
S^F	FUSESTAT
S^3	3-WAY SWITCH
S^4	4-WAY SWITCH
S^D	DIMMER SWITCH
S^J	JAMB SWITCH
S^M	MOTOR RATED SWITCH
S^{WP}	SWITCH WITH WEATHERPROOF COVER
S^K	KEYED SWITCH
TS	TIME SWITCH
	PUSH BUTTON
P	PHOTOCELL SWITCH
O	OCCUPANCY SENSOR (TYPE INDICATED ON DWG)
P	POWER PACK

FIRE ALARM

Symbol	Description
FACP	FIRE ALARM CONTROL PANEL
FAA	ANNUNCIATOR PANEL
FA	FIRE ALARM POWER EXTENDER
P	PULL STATION
K	KNOX BOX
R	CONTROL RELAY
Z 1	SIGNAL ZONE ADDRESSABLE MODULE
Z 2	CONTROL ZONE ADDRESSABLE MODULE
Z 3	MONITOR ZONE ADDRESSABLE MODULE
S 1	SINGLE STATION SMOKE DETECTOR
S 2	SMOKE DETECTOR (SUP. RELAY BASE)
S 3	SYSTEM SMOKE DETECTOR
S	BEAM DETECTOR
H	HEAT/THERMAL DETECTOR
D	DUCT SMOKE DETECTOR
I	INDIVIDUAL ADDRESSABLE MONITOR
	MAGNETIC DOOR HOLD
	HORN/STROBE
	STROBE
	SPEAKER/STROBE
	SPEAKER
	HORN
T	VALVE TAMPER SWITCH
F	FLOW SWITCH
EOL	END OF LINE RESISTOR
PV	POST INDICATING VALVE
	FIRE ALARM BELL
	FIREMAN'S PHONE JACK
	SECURITY GUARD FOR DEVICE SHOWN

NURSE CALL

Symbol	Description
M	NURSE CALL MASTER STATION
P	NURSE CALL BEDSIDE STATION-SINGLE PATIENT
P 2	NURSE CALL BEDSIDE STATION-DOUBLE PATIENT
P PC	PATIENT EMERGENCY PULL CORD STATION
BI	PATIENT BED INTERFACE-37 PIN CONNECTOR
D	DUTY STATION
S	STAFF STATION
L	DOME LIGHT
L Z	ZONE DOME LIGHT
B	CODE BLUE PUSHBUTTON STATION
E	EMERGENCY STAFF STATION

COMMUNICATIONS

Symbol	Description
S	SPEAKER HORN-PROJECTION TYPE
S	SPEAKER
V	VOLUME CONTROL
MJ	MICROPHONE JACK
SC	COMBINATION SPEAKER/CLOCK
C	SYSTEM CLOCK
ET	ELAPSED TIME CLOCK
IC	INTERCOM
PS	POWER SUPPLY
A	AMPLIFIER

SECURITY

Symbol	Description
	CLOSED CIRCUIT TELEVISION CAMERA
EL	ELECTRIC DOOR LOCK
DM	DOOR MONITOR
CR	CARD READER
GB	GLASS BREAK
RE	REQUEST TO EXIT BUTTON
SM	SECURITY MONITOR
PB D	PANIC BUTTON (D=DESK, W=WALL, F=FLOOR)
KP	KEY PAD

ABBREVIATIONS

Abbreviation	Meaning
A	AMPS; AIR (COMPRESSED)
A/C	AIR CONDITIONING
AF	AMPERE FUSE
AFC	ABOVE FINISHED CEILING
AFEA	AREA FOR EVACUATION ASSISTANCE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CURRENT
AL	ALUMINUM
APD	AIR PRESSURE DROP
ATS	AUTOMATIC TRANSFER SWITCH
AV	ACID VENT
AW	ACID WASTE
AWG	AMERICAN WIRE GAUGE
BCU	BLOWER COIL UNIT
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BFF	BELOW FINISHED FLOOR
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BOS	BOTTOM OF STRUCTURE
BTUH	BRITISH THERMAL UNITS PER HOUR
C	CONDUIT
CT	CURRENT TRANSFORMER
CATV	CABLE TELEVISION SYSTEM
CAV	CONSTANT AIR VOLUME
CCTV	CLOSED CIRCUIT TELEVISION
CD	CONDENSATE DRAIN
CFCI	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CO	CLEANOUT, CARBON MONOXIDE
CO2	CARBON DIOXIDE
CT	COOLING TOWER
CTR	COOLING TOWER RETURN
CTS	COOLING TOWER SUPPLY
CU	COPPER, CONDENSING UNIT
CUH	CABINET UNIT HEATER
CW	COLD WATER
CWR	CHILLED WATER RETURN
CWS	CHILLED WATER SUPPLY
D	DRAIN
DDC	DIRECT DIGITAL CONTROL
DFU	DRAINAGE FIXTURE UNITS
DN	DOWN
DPDT	DOUBLE-POLE, DOUBLE-THROW
DPST	DOUBLE-POLE, SINGLE-THROW
DX	DIRECT EXPANSION
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
E/C	ELECTRICAL CONTRACTOR
EDB	ENTERING DRY BULB
EF	EXHAUST FAN
EJ	EXPANSION JOINT
ESFR	EARLY SUPPRESSION FAST RESPONSE
ESP	EXTERNAL STATIC PRESSURE
ETR	EXISTING TO REMAIN
EWB	ENTERING WET BULB
EWC	ELECTRIC WATER COOLER
FAA	FIRE ALARM ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
FBO	FURNISHED BY OTHERS
FCO	FLOOR CLEANOUT
FCU	FAN COOL UNIT
FD	FIRE DAMPER, FLOOR DRAIN
FF	FINISHED FLOOR
FGCO	FINISHED GRADE CLEANOUT
FL	FLOW LINE
FLA	FULL LOAD AMPS
F/C	FIRE PROTECTION CONTRACTOR
FTU	FAN TERMINAL UNIT
FVNR	FULL VOLTAGE, NON-REVERSING
G	GROUND FAULT CIRCUIT INTERRUPTER
G/C	GENERAL CONTRACTOR
GND	GROUND
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GW	GREASE WASTE
HB	HOSE BIBB
HCR	HOT/CHILLED WATER RETURN
HCS	HOT/CHILLED WATER SUPPLY
HD	HEAD, HUB DRAIN
HOA	HAND-OFF-AUTOMATIC
HP	HEAT PUMP
HPC	HIGH PRESSURE CONDENSATE
HPR	HEAT PUMP RETURN
HPS	HEAT PUMP SUPPLY, HIGH PRESSURE STEAM, HIGH PRESSURE SODIUM
HSTAT	HUMIDISTAT
HTG	HEATING
HTR	HEATER
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IG	ISOLATED GROUND
IN. WC	INCHES OF WATER COLUMN
INC.	INCANDESCENT
kcmil	1000 CIRCULAR MILS
KV	KILOVOLT
KVA	KILOVOLT-AMPS
KVAR	KILOVOLT-AMPS REACTIVE
KW	KILOWATT
KWH	KILOWATT-HOUR
L	LAVATORY
LAT	LEAVING AIR TEMPERATURE
LDB	LEAVING DRY BULB
LF	LINEAR FEET
LP	LOW PRESSURE
LPC	LOW PRESSURE STEAM CONDENSATE
LPG	LIQUIFIED PETROLEUM GAS (PROPANE)
LPS	LOW PRESSURE STEAM
LRA	LOCKED ROTOR AMPS
LWB	LEAVING WET BULB
LWT	LEAVING WATER TEMPERATURE
MBH	1000 BTU PER HOUR
M/C	MECHANICAL CONTRACTOR
MCA	MINIMUM CIRCUIT AMPACITY
MCC	MOTOR CONTROL CENTER
MCM	1000 CIRCULAR MILS
MD	MOTORIZED DAMPER
MDP	MAIN DISTRIBUTION PANEL
MFR	MANUFACTURER
MH	MANHOLE/METAL HALIDE
MLO	MAIN LUGS ONLY
MPC	MEDIUM PRESSURE CONDENSATE
MPS	MEDIUM PRESSURE STEAM
MS	MOTOR STARTER
MSB	MAIN SWITCHBOARD
MTD	MOUNTED
MAU	MAKE-UP AIR UNIT
N	NITROGEN
N/A	NOT APPLICABLE
NC	NOISE CRITERIA
NFWH	NON-FREEZE WALL HYDRANT
NIC	NOT IN CONTRACT
NO	NITROUS OXIDE
N/O N/C	NORMALLY OPEN, NORMALLY CLOSED
O	OXYGEN
OA	OUTSIDE AIR
OC	ON CENTER
OD	OUTSIDE DIAMETER
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
ORD	OVERFLOW ROOF DRAIN
PA	PIPE ANCHOR
PCWR	PRIMARY CHILLED WATER RETURN
PCWS	PRIMARY CHILLED WATER SUPPLY
PCR	PUMPED CONDENSATE RETURN
PD	PRESSURE DROP (FEET OF WATER)
PH	PHASE
PHWR	PRIMARY HEATING WATER RETURN
PHWS	PRIMARY HEATING WATER SUPPLY
PNL	PANEL
PRV	PRESSURE REDUCING VALVE
PS	PULSE START
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH-ABSOLUTE
PSIG	POUNDS PER SQUARE INCH-GAUGE
PT	POTENTIAL TRANSFORMER
QTY	QUANTITY
R	REFRIGERANT
RA	RETURN AIR
RCP	REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
REV	REVISION
RF	RETURN FAN
RH	RELATIVE HUMIDITY
RLA	RUNNING LOAD AMPS
RPM	REVOLUTIONS PER MINUTE
RTU	ROOF TOP UNIT
S	SINK, STEAM
SA	SUPPLY AIR
SAN	SANITARY SEWER
SCWR	SECONDARY CHILLED WATER RETURN
SCWS	SECONDARY CHILLED WATER SUPPLY
SD	SMOKE DAMPER, STORM DRAIN
SF	SUPPLY FAN
SHWR	SECONDARY HEATING WATER RETURN
SHWS	SECONDARY HEATING WATER SUPPLY
SPST	SINGLE-POLE SINGLE-THROW
SP	STATIC PRESSURE
SQFT	SQUARE FOOT/SQUARE FEET
S/S	START/STOP
SS	SERVICE SINK, STAINLESS STEEL
ST	STORM DRAIN, SOUND TRAP, STEAM TRAP
STC	SOUND TRANSMISSION CLASS
STM	STEAM
SW	SOFT WATER
SWBD	SWITCHBOARD
T	TEMPERED WATER
TG	TEMPERATURE GAUGE
TDH	TOTAL DYNAMIC HEAD
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TL	TWISTLOCK
TU	TERMINAL UNIT
UF	UNDER FLOOR
UG	UNDER GROUND
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORIES, INC.
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VACUUM
VAC	VOLTS ALTERNATING CURRENT
VAV	VARIABLE AIR VOLUME
VCP	VITRIFIED CLAY PIPE
VD	VOLUME DAMPER
VFD	VARIABLE FREQUENCY DRIVE
VTR	VENT THROUGH ROOF
W	WATER SERVICE, WATTS
WB	WET BULB
WCO	WALL CLEANOUT
WC	WATER COLUMN, WATER CLOSET
WH	WALL HYDRANT
WPD	WATER PRESSURE DROP
WP	WEATHERPROOF
WT	WATERTIGHT, WEIGHT
XFMR	TRANSFORMER
XP	EXPLOSION-PROOF

GENERAL

Symbol	Description
	HEAVY LINEWEIGHT INDICATES NEW WORK
	CONNECT NEW TO EXISTING
	LIGHT AND SCREENED LINEWEIGHT INDICATES EXISTING-TO-REMAIN
	DARK AND DASHED LINEWEIGHT INDICATES DEMOLITION WHEN SHOWN ON DEMOLITION PLAN OR NOTED
	POINT OF DISCONNECT FROM EXISTING
2	CONSTRUCTION NOTE
2	REVISION NUMBER
1 M201	SECTION CUT THROUGH DRAWING
1 M201	AREA OF ENLARGEMENT
1	PLAN NUMBER
M201	SHEET WHERE ENLARGED PLAN IS DRAWN

THIS IS A MASTER LEGEND.
NOT ALL SYMBOLS, ABBREVIATIONS, ETC. ARE USED ON THE DRAWINGS.

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CASEY JOHN STEINER
NUMBER PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Brandon
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Symbols Legend

MPE1.01

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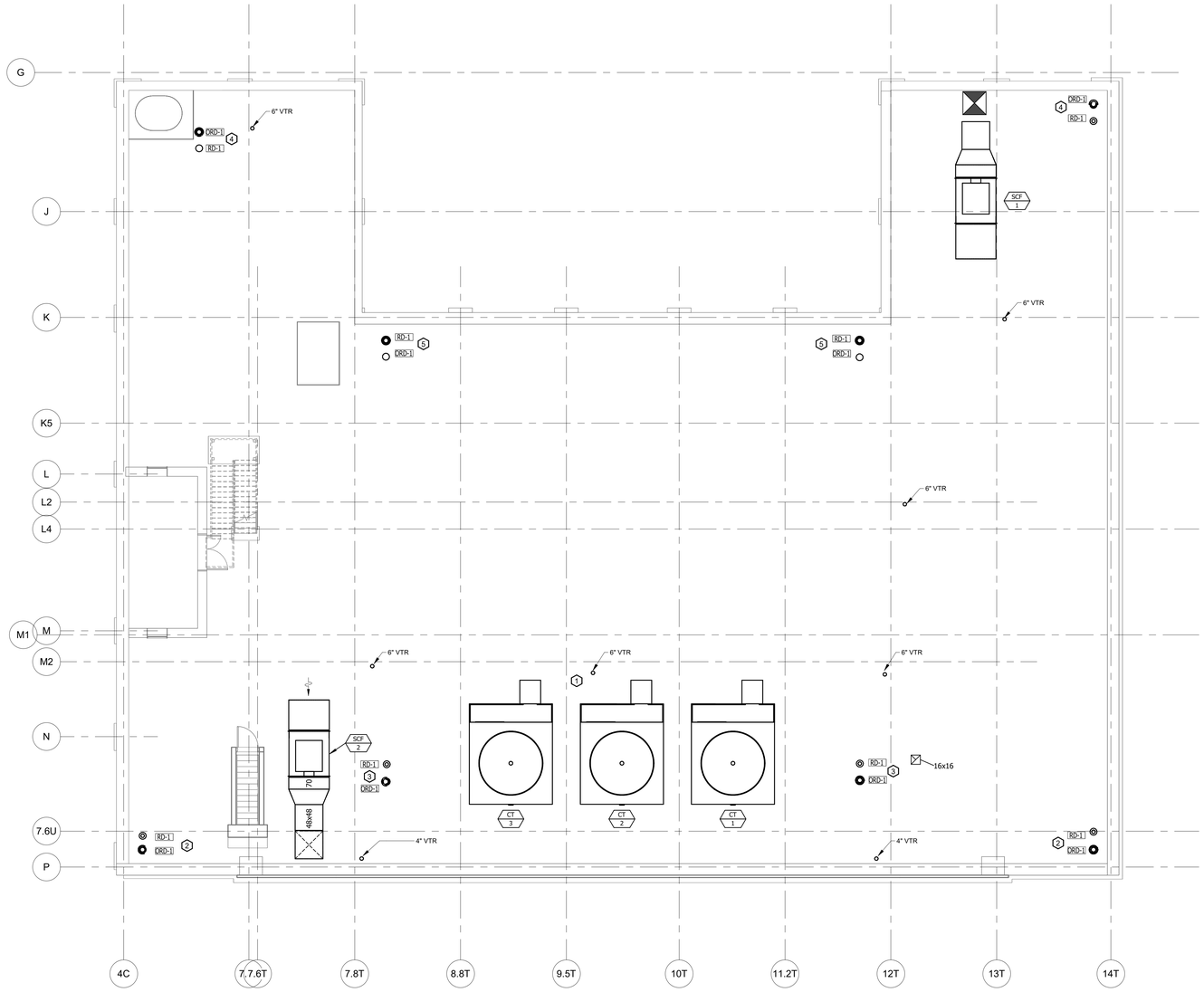
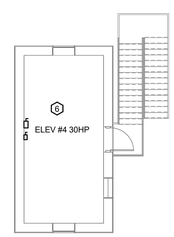


1 TOWER ROOF MPE PLAN

Scale: 1/8" = 1'-0"



2 TOWER PENTHOUSE MPE PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE SHEET METAL AND PLUMBING SYSTEMS COMPLETE AND PER APPLICABLE CODES INCLUDING ALL NECESSARY OFFSETS, FITTINGS AND SPECIAL RADIUS OR MITRED ELBOWS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR OTHER CONDITIONS. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL PULL BOXES, JUNCTION BOXES AND INCIDENTAL MATERIALS AND LABOR FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.

B. COORDINATE THE INSTALLATION OF THE DUCTWORK AND PIPING AND EQUIPMENT WITH THE WORK OF ALL OTHER TRADES. VERIFY ALL CLEARANCES PRIOR TO THE FABRICATION OF ANY SYSTEM COMPONENTS.

C. DUCTWORK AND PIPING SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT OR PANELS. PROVIDE THE CODE REQUIRED WORKING CLEARANCE AROUND ALL ELECTRICAL EQUIPMENT AND PANELS.

D. PROVIDE ALL MISCELLANEOUS SUPPORTING STEEL, ETC. FOR THE PROPER INSTALLATION OF ALL MECHANICAL SYSTEMS.

E. COORDINATE FLOOR, WALL, ROOF PENETRATIONS, LOUVER SIZES, PAD LOCATIONS, ETC. WITH THE ARCHITECTURAL TRADES.

F. ALL DUCTWORK DIMENSIONS INDICATE THE INSIDE CLEAR DIMENSION.

G. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL PLUMBING SYSTEMS.

H. PLUMBING VENT PIPING THROUGH THE ROOF SHALL BE LOCATED A MINIMUM OF 10'-0" AWAY FROM ANY FRESH AIR INTAKE LOCATION AND A MINIMUM OF 18" CLEAR FROM THE INSIDE FACE OF THE PARAPET.

I. ELECTRICAL CONTRACTOR SHALL DERATE CONDUCTORS AS REQUIRED BY THE N.E.C. WHEN GROUPED IN COMMON RACEWAYS.

J. VERIFY REQUIREMENTS OF ALL MECHANICAL EQUIPMENT WITH CONTRACTOR PROVIDED SUBMITTALS. NOTIFY ENGINEER OF ANY CONFLICTS BETWEEN THE SUBMITTALS AND ELECTRICAL DRAWINGS.

K. REFERENCE MECHANICAL SHEETS FOR LOCATION OF SMOKE DAMPERS. PROVIDE 20A/120V POWER TO SMOKE DAMPERS AND INTERLOCK WITH FIRE ALARM RELAY(S). CIRCUIT SHALL ONLY SERVE SMOKE DAMPERS.

L. REFERENCE MECHANICAL PLANS FOR LOCATION OF SMOKE DAMPERS. PROVIDE FIRE ALARM RELAY(S) TO CLOSE SMOKE DAMPERS UPON SMOKE DETECTION.

M. PROVIDE DUCT SMOKE DETECTORS IN RETURN AND SUPPLY AIR PATHS FOR AIR HANDLING EQUIPMENT 5 NOMINAL TONS AND LARGER AND WHERE SHOWN ON PLANS. INTERLOCK WITH AIR HANDLING EQUIPMENT TO SHUT DOWN UNIT UPON SMOKE DETECTION.

N. REFERENCE SAFETY SWITCH SCHEDULE FOR DISCONNECT, VFD AND CONDUCTOR SIZES OF EQUIPMENT NOT NOTED ON DRAWINGS.

PLAN NOTES:

1 EXISTING STEEL STRUCTURE REMAIN FOR NEW COOLING TOWERS. STRUCUTAL

2 ROOF STORM DRAIN AND OVERFLOW ROOF DRAIN SIZED FOR 585 SQFT OF ROOF AREA.

3 ROOF STORM DRAIN AND OVERFLOW ROOF DRAIN SIZED FOR 1034 SQFT OF ROOF AREA.

4 ROOF STORM DRAIN AND OVERFLOW ROOF DRAIN SIZED FOR 1026 SQFT OF ROOF AREA.

5 ROOF STORM DRAIN AND OVERFLOW ROOF DRAIN SIZED FOR 2926 SQFT OF ROOF AREA.

6 TOWER PENTHOUSE TO DRAIN STORM WATER TO MAIN ROOF LEVEL WITH DOWNSPOUT. REFER TO ARCHITECURAL DRAWINGS.

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The Grand Reserve

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MPE Roof Plan

MPE1.02

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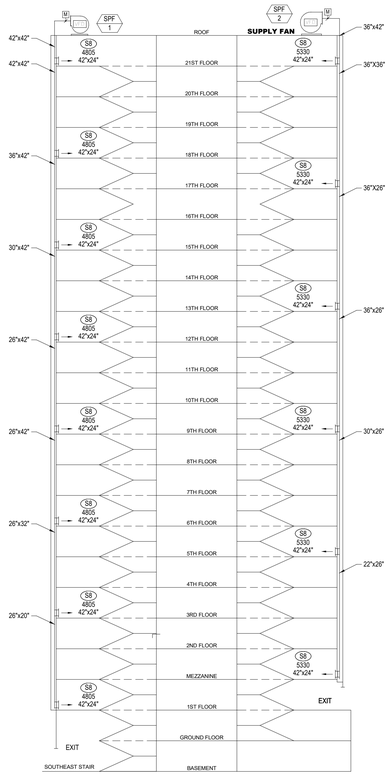
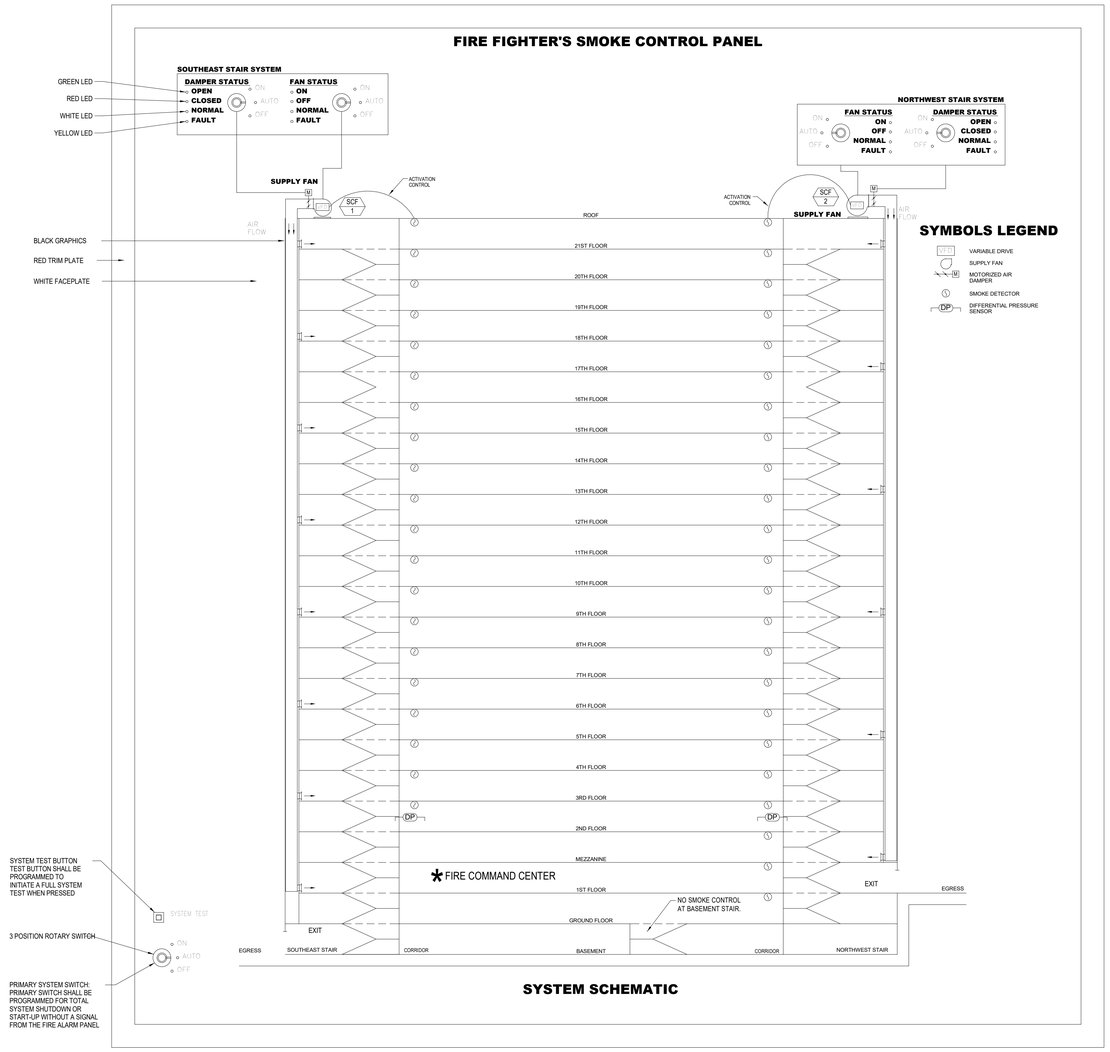


02 Smoke Control Duct Riser Diagram

Scale: Not to Scale



Sequence of Operation - Smoke Control System:

All smoke control system controls shall be by the fire alarm manufacturer and shall be connected to the master fire alarm control panel. Provide a fire fighters' control panel as described below. The entire system shall be designed and installed per section 909 of the International Building Code.

Upon a signal from the fire alarm system due to flow in the sprinkler system or activation of a smoke detector adjacent to the shaft, or in the elevator machine room, the following shall occur. The isolation damper shall open and the supply fan shall energize. The fan variable frequency drive shall then be controlled by the differential pressure sensor. The variable frequency drive shall modulate to maintain a differential pressure of 0.20" elevator shaft (adjustable) and 0.25" stair (adjustable). Upon a signal from the smoke detector located at the top of the elevator hoistway, the smoke control system shall be de-activated and the elevator vent damper shall open.

System Test: On a weekly basis, the system shall walk through a series of tests to verify the readiness of the system. The day of the week and time shall be adjustable, and any abnormal condition shall be recorded by printed report automatically after each test. In addition to the printed report, any abnormal condition shall be alarmed audibly and visually at the fire fighters' control panel. The tests shall include the following. The isolation damper shall open as proven by their end switch and the supply fans shall start as verified by their current switches. Shut down the fans. The relief vent and elevator machine room motorized dampers shall open fully as verified by their limit switches. Close all dampers and verify the dampers are fully closed by their limit switches. Power to each device shall be continually monitored by the power current switches.

Fire Fighters' Control Panel: A fire fighters' smoke control panel for fire department emergency response purposes only shall be provided and shall include manual control and override of automatic control for the smoke control system. Locate the panel as shown on the drawings. On the front of the panel shall be shown a complete system schematic, showing all mechanical devices, directions of airflow, and other pertinent system information. Status indicators shall be provided for all mechanical equipment, with light colors as follows. Fans, dampers, and other operating equipment in their normal status - white. Fans, dampers, and other operating equipment in their off or closed status - red. Fans, dampers, and other operating equipment in their on or open status - green. Fans, dampers, and other operating equipment in a fault status - yellow or amber.

The fire fighters' control panel shall have automatic and manual control of all equipment as follows. ON-OFF-AUTO control over each supply fan. Provide a push-button on the control panel labeled "system test." This button shall initiate a full test of the system when pressed. Provide a primary OVERRIDE-AUTO switch for the system. This will allow for manual control for all of the system components without a signal from the fire alarm system. A detailed, scalable drawing of the front of the control panel shall be submitted for review prior to fabrication.

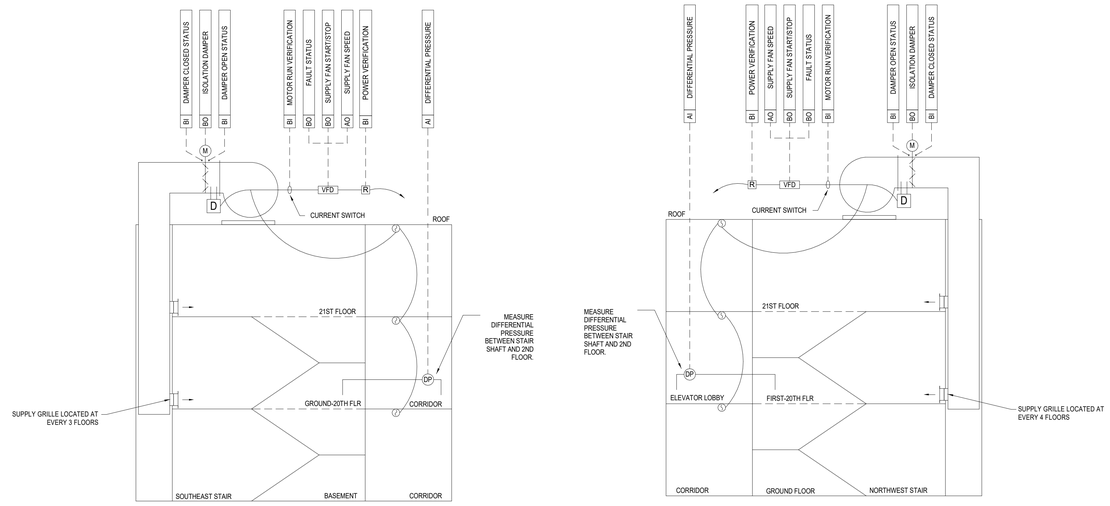
ELECTRICAL NOTES:
1. THE DETAILS AND CONTROL SCHEMATICS ON THIS SHEET ARE PROVIDED FOR CONVENIENCE FOR THE ELECTRICAL CONTRACTOR. THE SMOKE CONTROL SYSTEM CONTROL MUST BE PART OF THE FIRE ALARM SYSTEM. THE ELECTRICAL CONTRACTOR MAY USE THESE ON THEIR DRAWINGS ONLY AFTER COMPLETE REVIEW AND COORDINATION WITH THE APPLICABLE CODES.

2. ELECTRICAL ROUTING AND INSTALLATION MUST BE PER 909.12.1 AND 909.20.6.1. RECOMMENDED ROUTING FOR BOTH POWER AND CONTROL WIRING IS INSIDE THE SMOKEPROOF ENCLOSURES BEING SERVED, WITH DETECTORS SERVING SMOKE CONTROL SYSTEMS DIRECTLY CONNECTED TO THE 2-HOUR ENCLOSURE.

SMOKE CONTROL CALCULATIONS

LEAKAGE AREA (SQ. FT.)	NORTHWEST STAIR (SCF-2)	SOUTHEAST STAIR (SCF-1)	NOTES
WALL	14.61	14.84	
DOOR (CLOSED)	4.62	5.46	
DOOR (OPEN)	0.00	0.00	
WINDOW	0.10	3.07	
FLOORS & ROOF	0.28	0.19	
TOTAL	19.60	23.56	
FAN SIZING			
REQUIRED AIRFLOW	25,579	30,747	1
SAFETY AIRFLOW	6,395	7,687	2
DESIGN AIRFLOW	31,974	38,433	

NOTES:
1. Q = K X TOTAL LEAKAGE AREA X SQRT(DESIGN PRESSURE DIFFERENTIAL) WHERE K = 2610 TLA = SQ. FT.
PD = .15-.25 INCHES OF WATER.
2. APPROXIMATELY 25% ADDITIONAL AIRFLOW IS ADDED TO STAIRWELL SHAFT CALCULATION.



SOUTHEAST STAIR

NOTE: ALL DAMPERS SHOWN SHALL BE UL LISTED FOR USE WITHIN A SMOKE CONTROL SYSTEM. DAMPERS SHALL BE QUICK-ACTING TYPE SO AS NOT TO IMPEDE SMOKE CONTROL FAN AIRFLOW UPON SYSTEM ACTIVATION.

NORTHWEST STAIR

01 Smoke Control System Schematic

Scale: Not to Scale

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9/8/2020

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FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
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Smoke Control Riser Diagram

MPE1.03

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PLAN NOTES:

1. 14" COMBUSTION AIR INLET FOR WH-2B. REFER TO VERTICAL VENTING DETAIL.
2. 14" COMBUSTION AIR OUTLET FOR WH-2B. REFER TO VERTICAL VENTING DETAIL.

GENERAL NOTES:

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B. COORDINATE THE INSTALLATION OF THE DUCTWORK AND EQUIPMENT WITH THE WORK OF ALL OTHER TRADES. VERIFY ALL CLEARANCES PRIOR TO THE FABRICATION OF ANY SYSTEM COMPONENTS.

C. DUCTWORK SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT OR PANELS. PROVIDE THE CODE REQUIRED WORKING CLEARANCE AROUND ALL ELECTRICAL EQUIPMENT AND PANELS.

D. PROVIDE ALL MISCELLANEOUS SUPPORTING STEEL, ETC. FOR THE PROPER INSTALLATION OF ALL MECHANICAL SYSTEMS.

E. COORDINATE FLOOR, WALL, ROOF PENETRATIONS, LOUVER SIZES, PAD LOCATIONS, ETC. WITH THE ARCHITECTURAL TRADES.

F. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS AND WALL ELEVATIONS FOR EXACT LOCATION OF GRILLES, REGISTERS, AND DIFFUSERS.

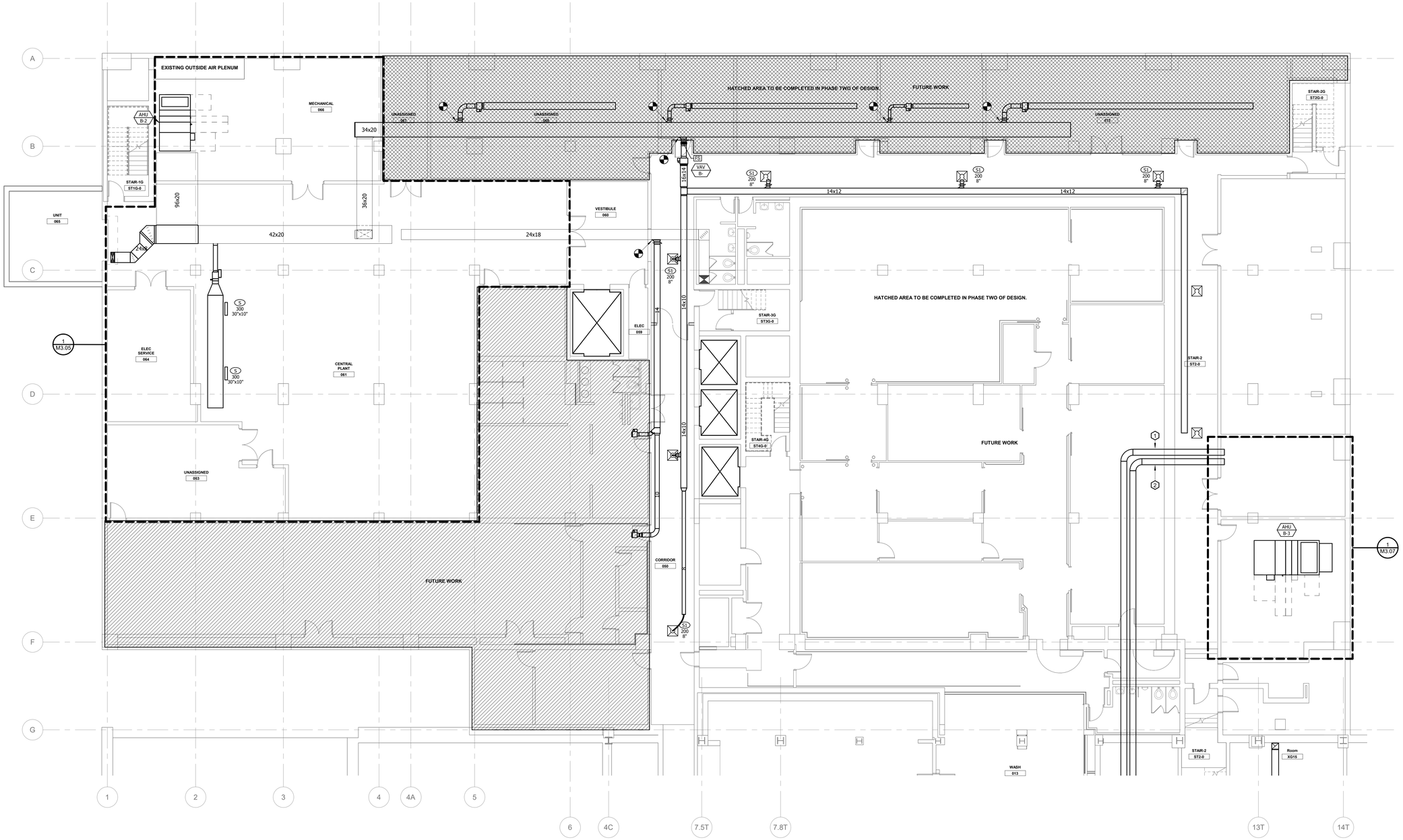
G. DUCTWORK UPSTREAM OF SUPPLY TERMINAL UNITS SHALL BE BOX INLET SIZE UNLESS NOTED OTHERWISE. PROVIDE STRAIGHT DUCT AT TERMINAL INLET. STRAIGHT DUCT LENGTH SHALL BE A MINIMUM OF 1 1/2 TIMES THE DIAMETER OF THE INLET DUCT, OR GREATER AS RECOMMENDED BY MANUFACTURER.

H. DUCTWORK DOWNSTREAM OF SUPPLY TERMINAL UNITS SHALL BE BOX OUTLET SIZE UNLESS NOTED OTHERWISE.

I. BRANCH DUCTWORK TO DIFFUSERS, REGISTERS OR GRILLES SHALL BE NECK SIZE UNLESS NOTED OTHERWISE.

J. ALL DUCTWORK DIMENSIONS INDICATE THE INSIDE CLEAR DIMENSION.

K. PROVIDE ACCESS DOORS IN HARD CEILING AREAS FOR ACCESS TO TERMINAL UNITS, BALANCING DAMPERS, TERMINAL UNIT HEATING COIL PIPING, ETC. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES. COORDINATE WITH THE ARCHITECTURAL TRADES.



1 GARAGE BASEMENT FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

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Garage Basement Floor Mechanical Plan

M1.01-G

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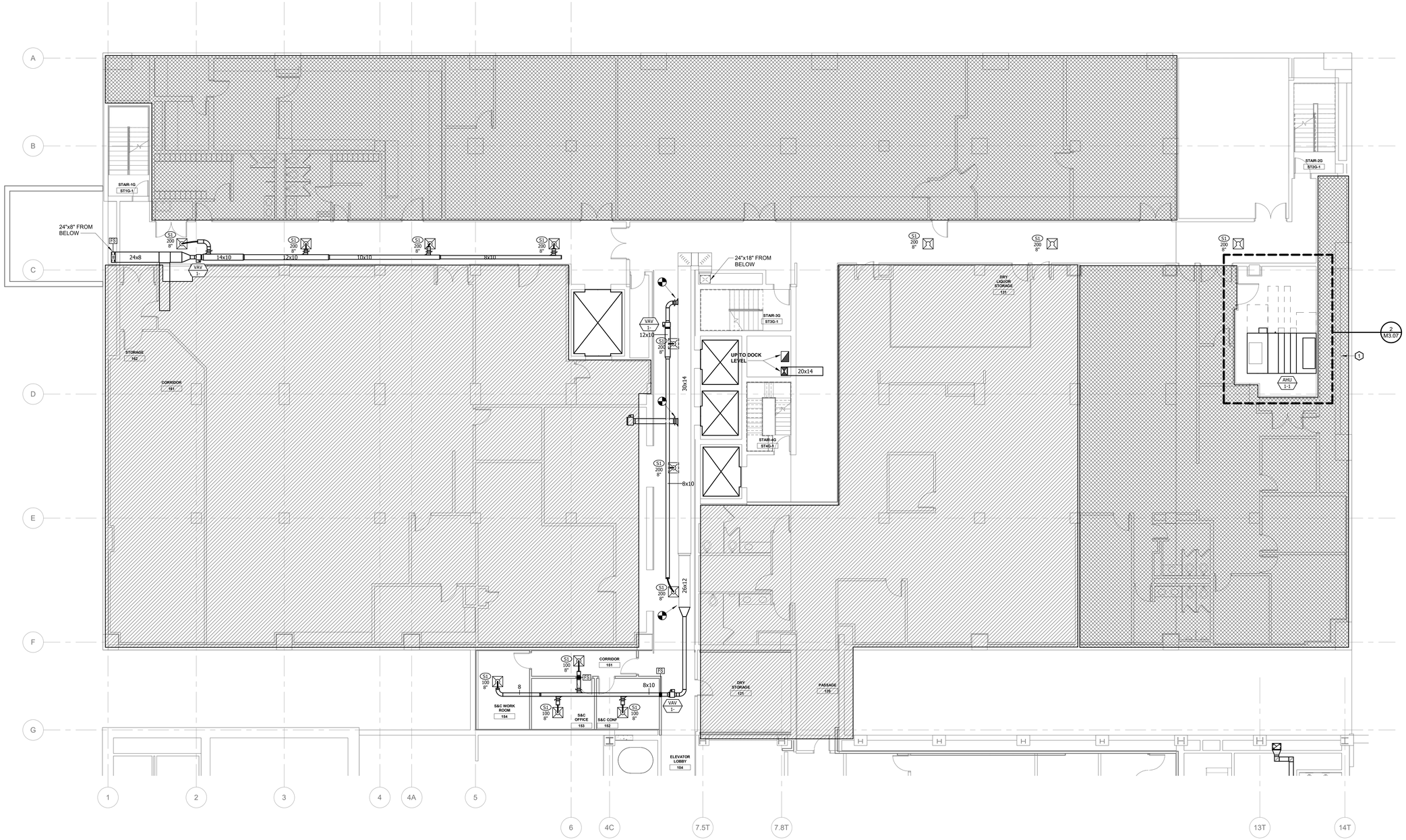
GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1 EXISTING OUTSIDE AIR PLENUM TO REMAIN AND SERVE NEW AIR HANDLING UNITS.



1 GARAGE GROUND FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

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Garage Ground Floor Mechanical Plan

M1.01-G1

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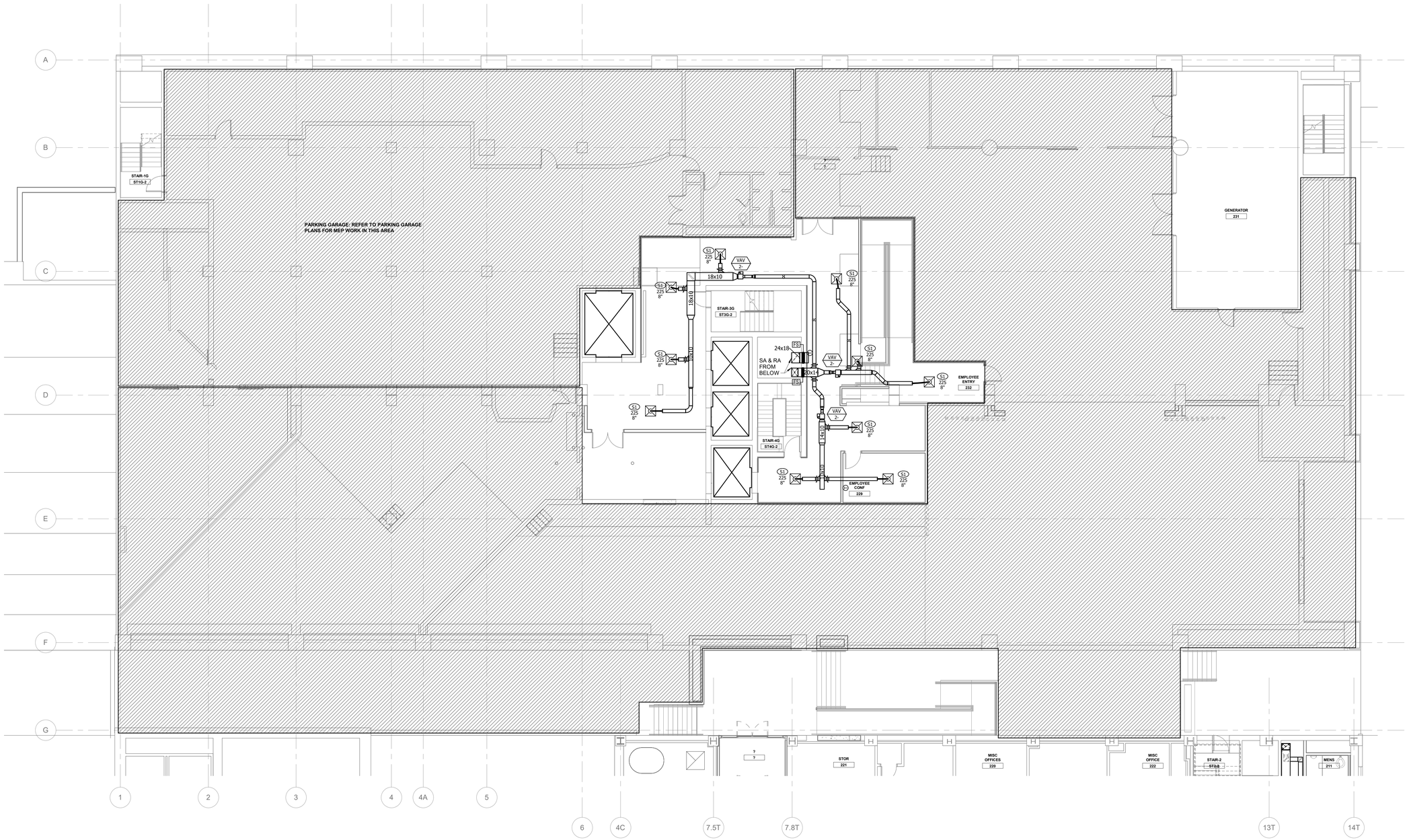
GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

DO NOT TYPE NOTES IN THIS PLAN. DESIGNER THIS TEXT AFTER BEFORE.



1 GARAGE DOCK FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

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NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage Dock Floor Mechanical Plan

M1.01-G2

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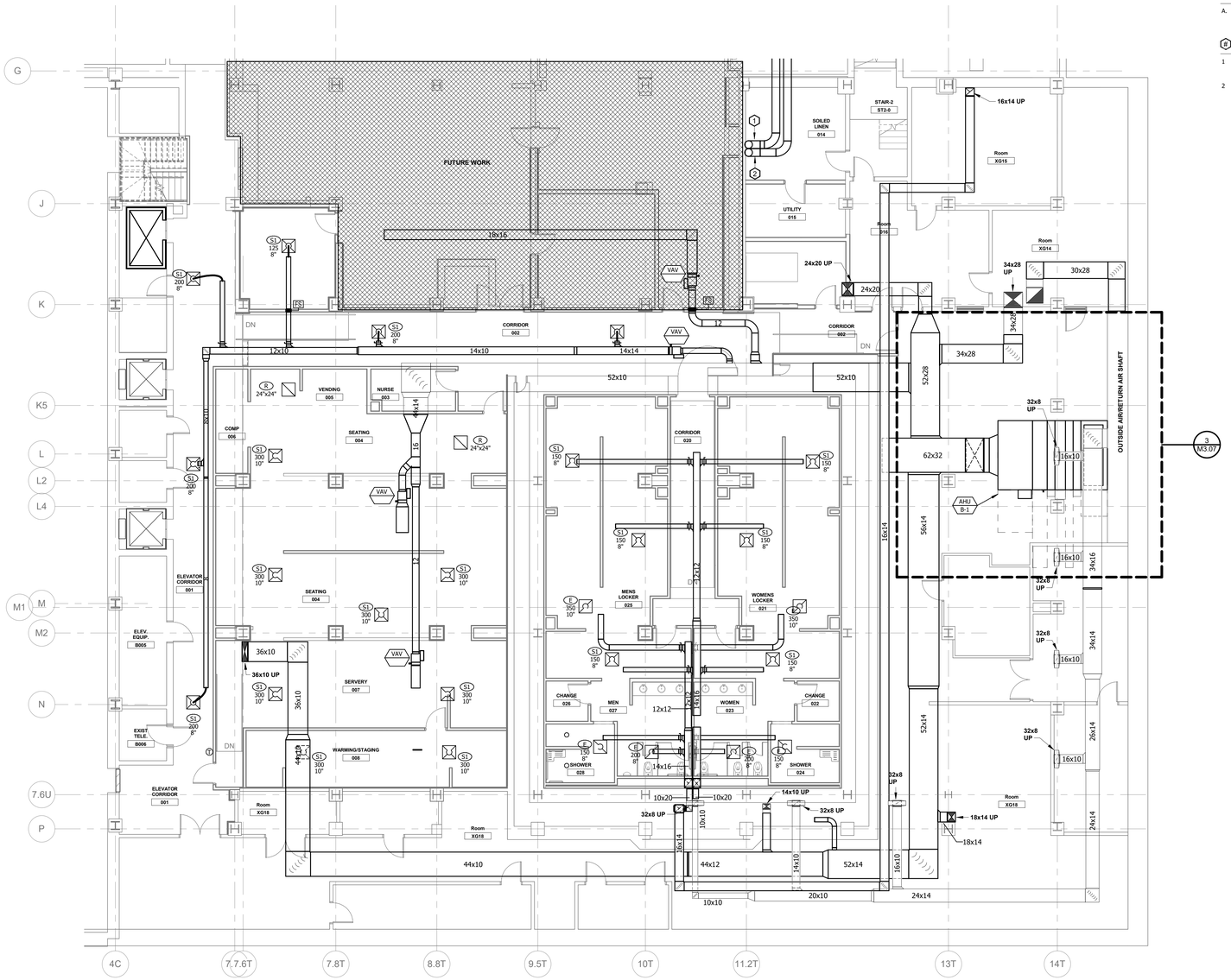
GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1. 14" COMBUSTION AIR INLET FOR WH-2B. REFER TO VERTICAL VENTING DETAIL.
2. 14" COMBUSTION AIR OUTLET FOR WH-2B. REFER TO VERTICAL VENTING DETAIL.



1 TOWER BASEMENT FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

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Tower - Basement Floor Mechanical Plan

M1.01-T

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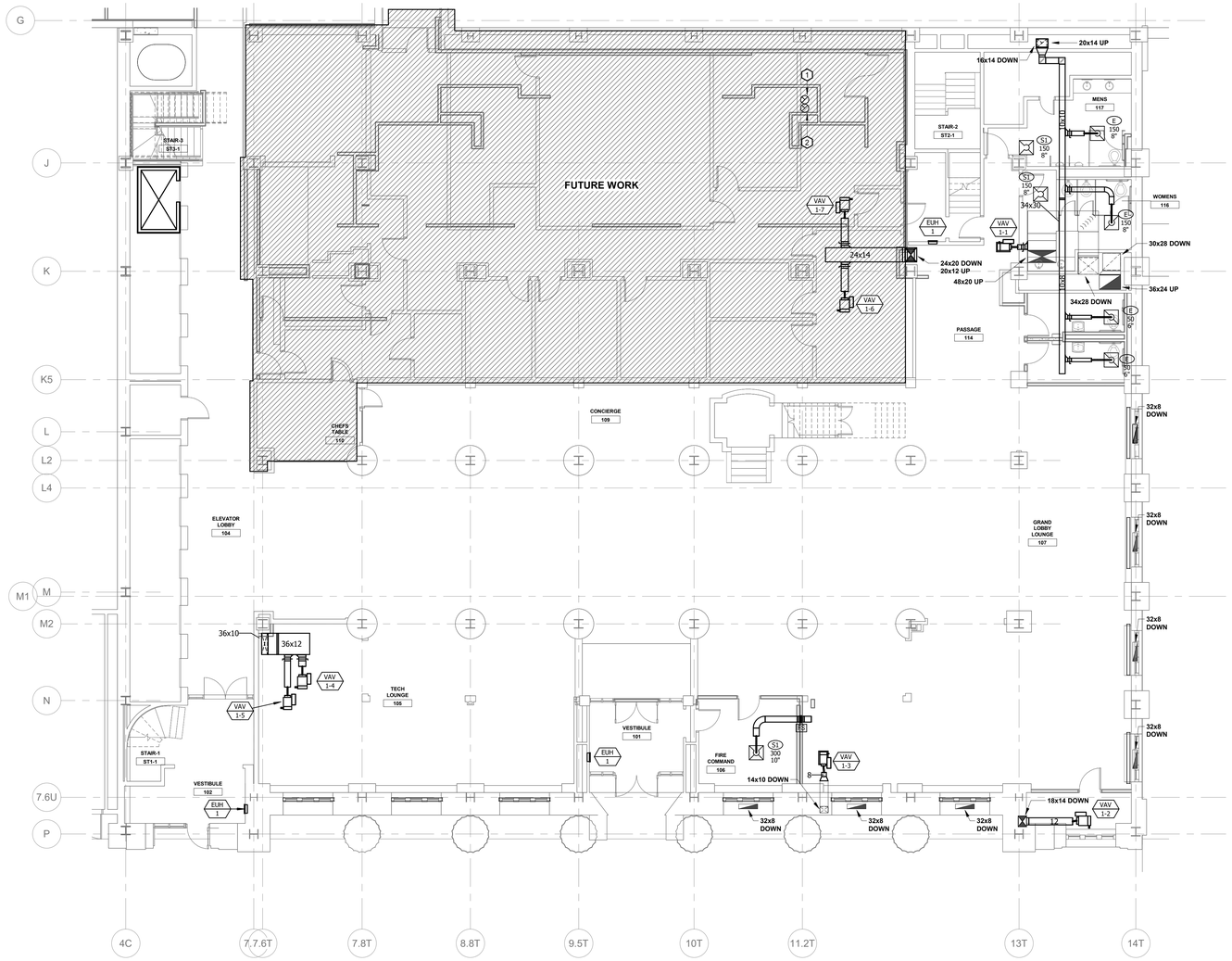

1 TOWER FIRST FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1 14" COMBUSTION AIR INLET FOR WH-ZB.

2 14" COMBUSTION AIR OUTLET FOR WH-ZB.

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Tower - First Floor
Mechanical Plan

M1.01-T1

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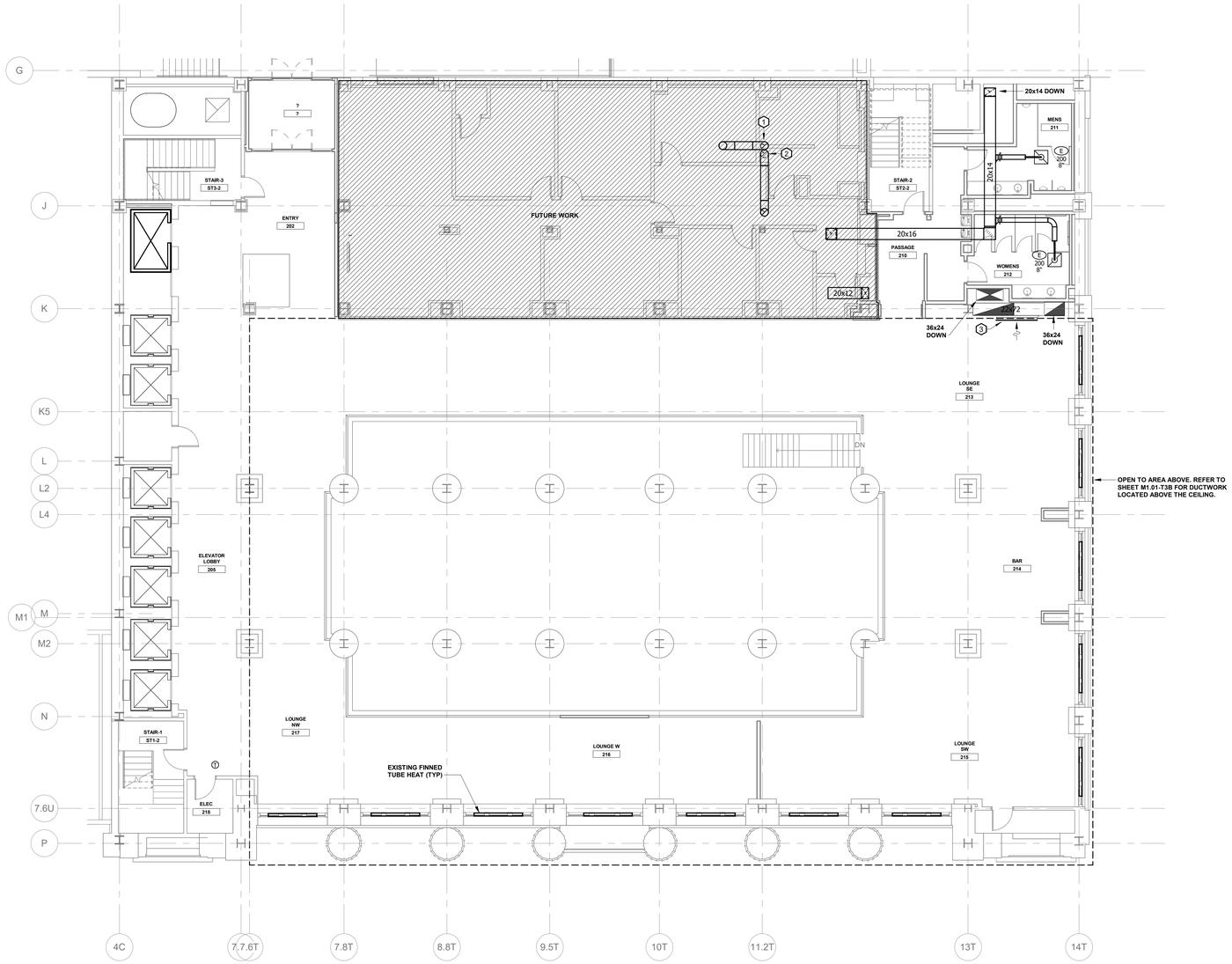

1 SECOND FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1 14" COMBUSTION AIR INLET FOR WH-ZB. OFFSET AS SHOWN AND PENETRATE THE ROOF.

2 14" COMBUSTION AIR OUTLET FOR WH-ZB. OFFSET AS SHOWN AND PENETRATE THE ROOF.

3 EXISTING 72x22 RETURN AIR GRILLE SHALL REMAIN.

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Tower - Second Floor Mechanical Plan

M1.01-T2

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GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

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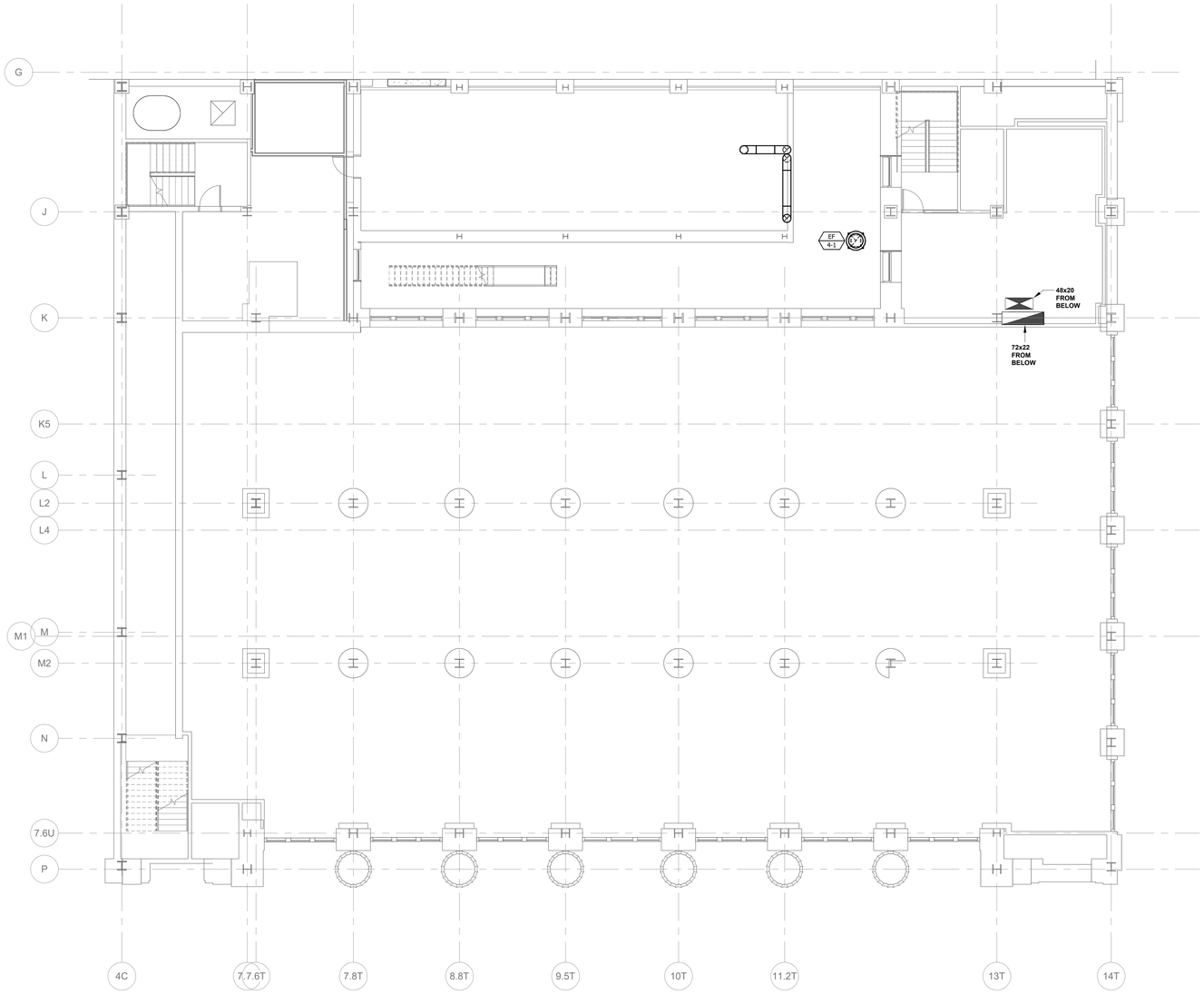

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1 TOWER THIRD 'A' FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

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Tower - Third Floor
Mechanical Plan

M1.01-T3A

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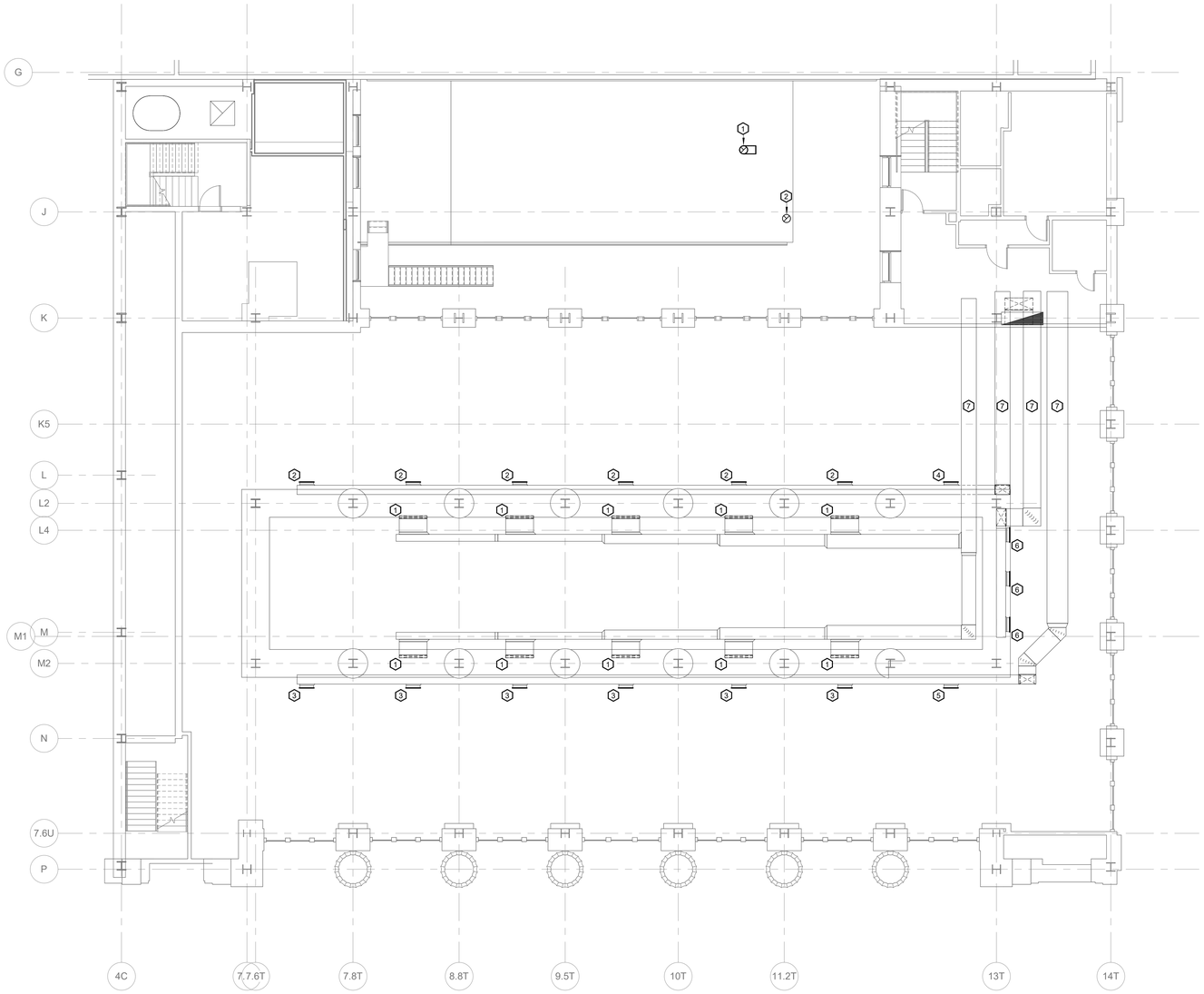

1 TOWER THIRD 'B' FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1. EXISTING CEILING-MOUNTED SUPPLY GRILLE. BALANCE TO 300 CFM.
2. EXISTING SIDE-MOUNTED SUPPLY GRILLE. BALANCE TO 400 CFM.
3. EXISTING SIDE-MOUNTED SUPPLY GRILLE. BALANCE TO 600 CFM.
4. EXISTING SIDE-MOUNTED SUPPLY GRILLE. BALANCE TO 700 CFM.
5. EXISTING SIDE-MOUNTED SUPPLY GRILLE. BALANCE TO 1000 CFM.
6. EXISTING SIDE-MOUNTED SUPPLY GRILLE. BALANCE TO 1200 CFM.
7. EXISTING SUPPLY DUCTWORK SHALL REMAIN.

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CERTIFICATION

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Tower - Third B Floor Mechanical Plan

M1.01-T3B

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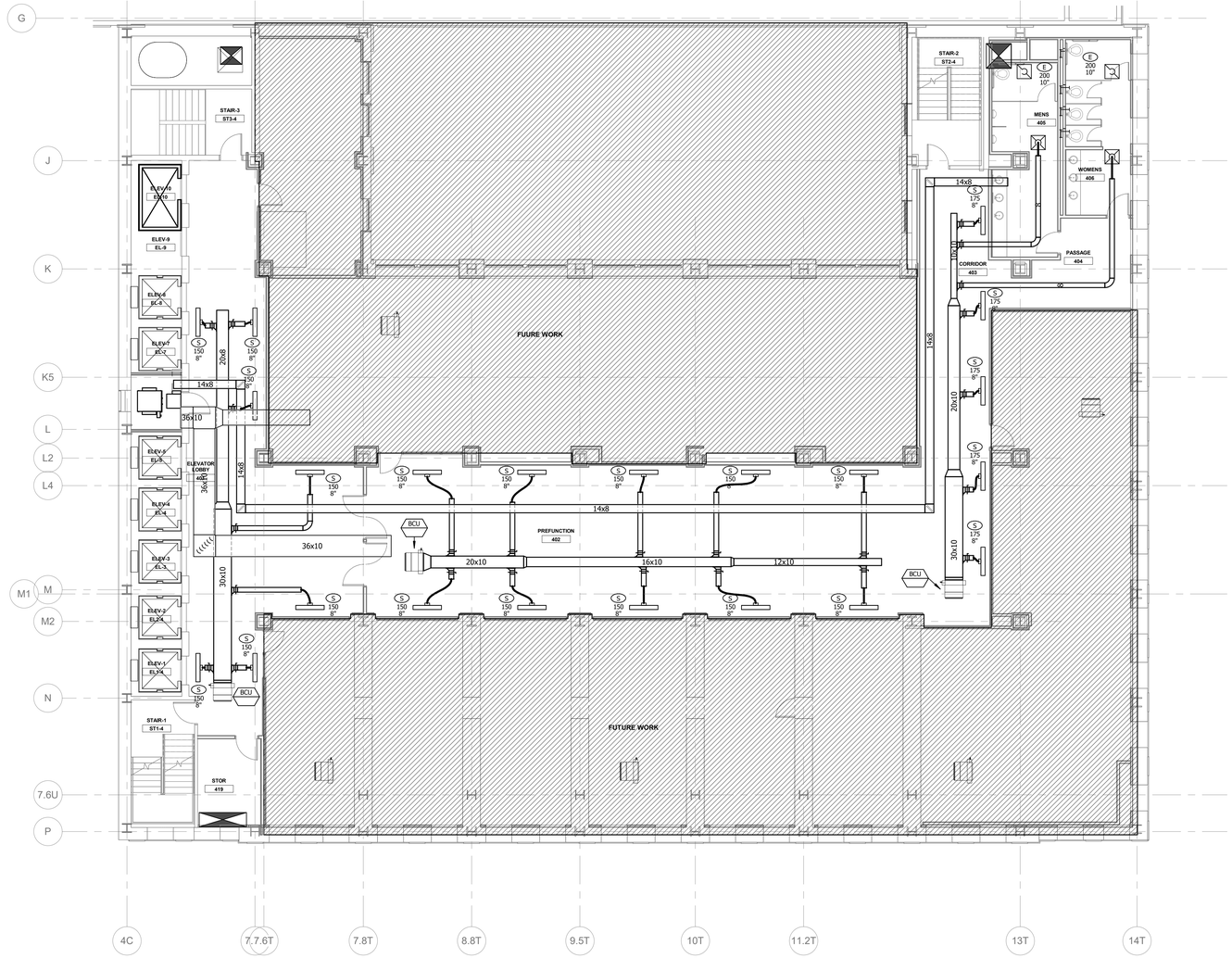

N

1 TOWER FOURTH FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

DO NOT FIXIN SCALE AS THIS PLAN DRAWING THIS NOT AFTER DRAW.

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Tower - Fourth Floor
Mechanical Plan

M1.01-T4

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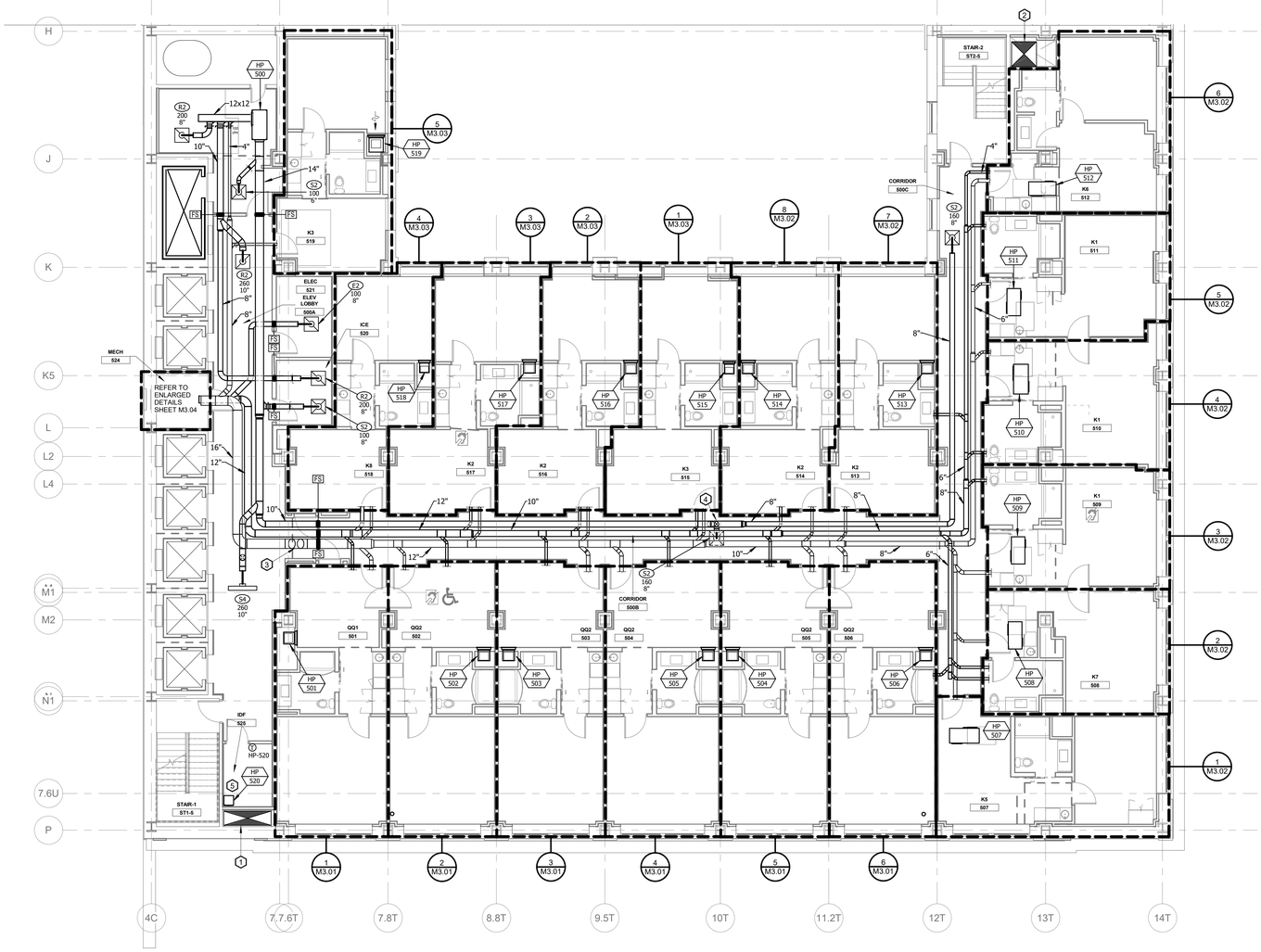

1 FIFTH FLOOR PLAN MECHANICAL

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE SHEET METAL SYSTEMS COMPLETE AND PER APPLICABLE CODES INCLUDING ALL NECESSARY OFFSETS, FITTINGS AND SPECIAL RADIUS OR MITRED ELBOWS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR OTHER CONDITIONS.

B. COORDINATE THE INSTALLATION OF THE DUCTWORK AND EQUIPMENT WITH THE WORK OF ALL OTHER TRADES. VERIFY ALL CLEARANCES PRIOR TO THE FABRICATION OF ANY SYSTEM COMPONENTS.

C. DUCTWORK SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT OR PANELS. PROVIDE THE CODE REQUIRED WORKING CLEARANCE AROUND ALL ELECTRICAL EQUIPMENT AND PANELS.

D. PROVIDE ALL MISCELLANEOUS SUPPORTING STEEL, ETC. FOR THE PROPER INSTALLATION OF ALL MECHANICAL SYSTEMS.

E. COORDINATE FLOOR, WALL, ROOF PENETRATIONS, LOUVER SIZES, PAD LOCATIONS, ETC. WITH THE ARCHITECTURAL TRADES.

F. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS AND ELEVATIONS FOR EXACT LOCATION OF GRILLES, REGISTERS, DIFFUSERS, AND LOUVERS.

G. BRANCH DUCTWORK TO DIFFUSERS, REGISTERS OR GRILLES SHALL BE DIFFUSER NECK SIZE UNLESS NOTED OTHERWISE.

H. ALL DUCTWORK DIMENSIONS INDICATE THE INSIDE CLEAR DIMENSION.

I. PROVIDE ACCESS DOORS IN HARD CEILING AREAS FOR ACCESS TO TERMINAL EQUIPMENT, DAMPERS, VALVES, ETC. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES. COORDINATE LOCATION, SIZE AND TYPE OF ACCESS DOORS WITH THE ARCHITECTURAL TRADES.

PLAN NOTES:

1 24x80 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER. SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE.

2 42x42 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER.SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE. COORDINATE LOCATION WITH PLUMBING RISERS.

3 OFFSET DUCT DOWN.

4 TAP OFF BOTTOM OF SUPPLY DUCT.

5 FRONT SUPPLY AIR ABOVE AND FRONT RETURN AIR BELOW.

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
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Project No.: 18A023
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Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
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Tower - Fifth Floor Plan Mechanical

M1.01-T5

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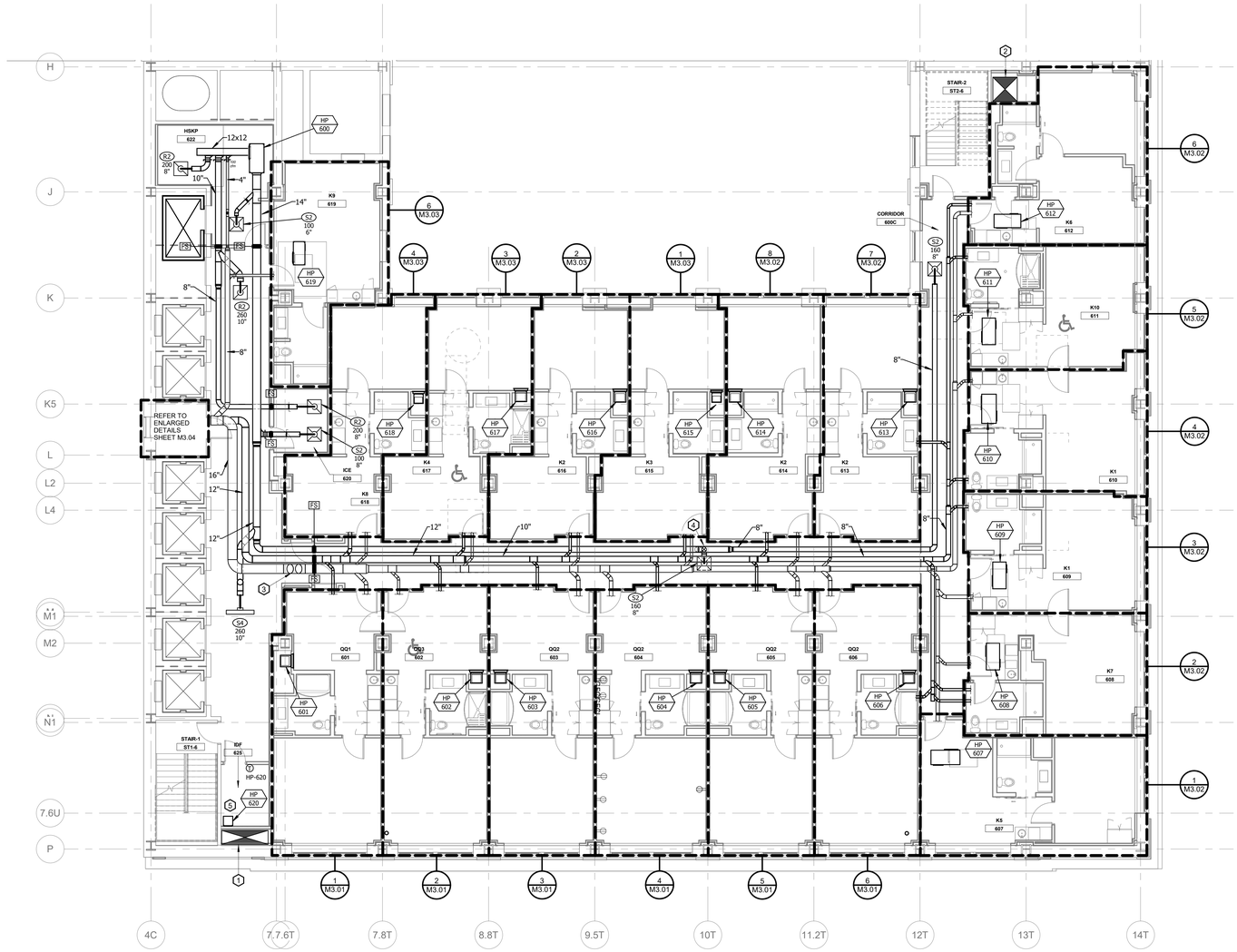

1 SIXTH FLOOR PLAN MECHANICAL

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-T5 FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1. 24x80 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER. SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE.
2. 42x42 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER,SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE. COORDINATE LOCATION WITH PLUMBING RISERS.
3. OFFSET DUCT DOWN.
4. TAP OFF BOTTOM OF SUPPLY DUCT.
5. FRONT SUPPLY AIR ABOVE AND FRONT RETURN AIR BELOW.

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Tower - Sixth Floor Plan Mechanical

M1.01-T6

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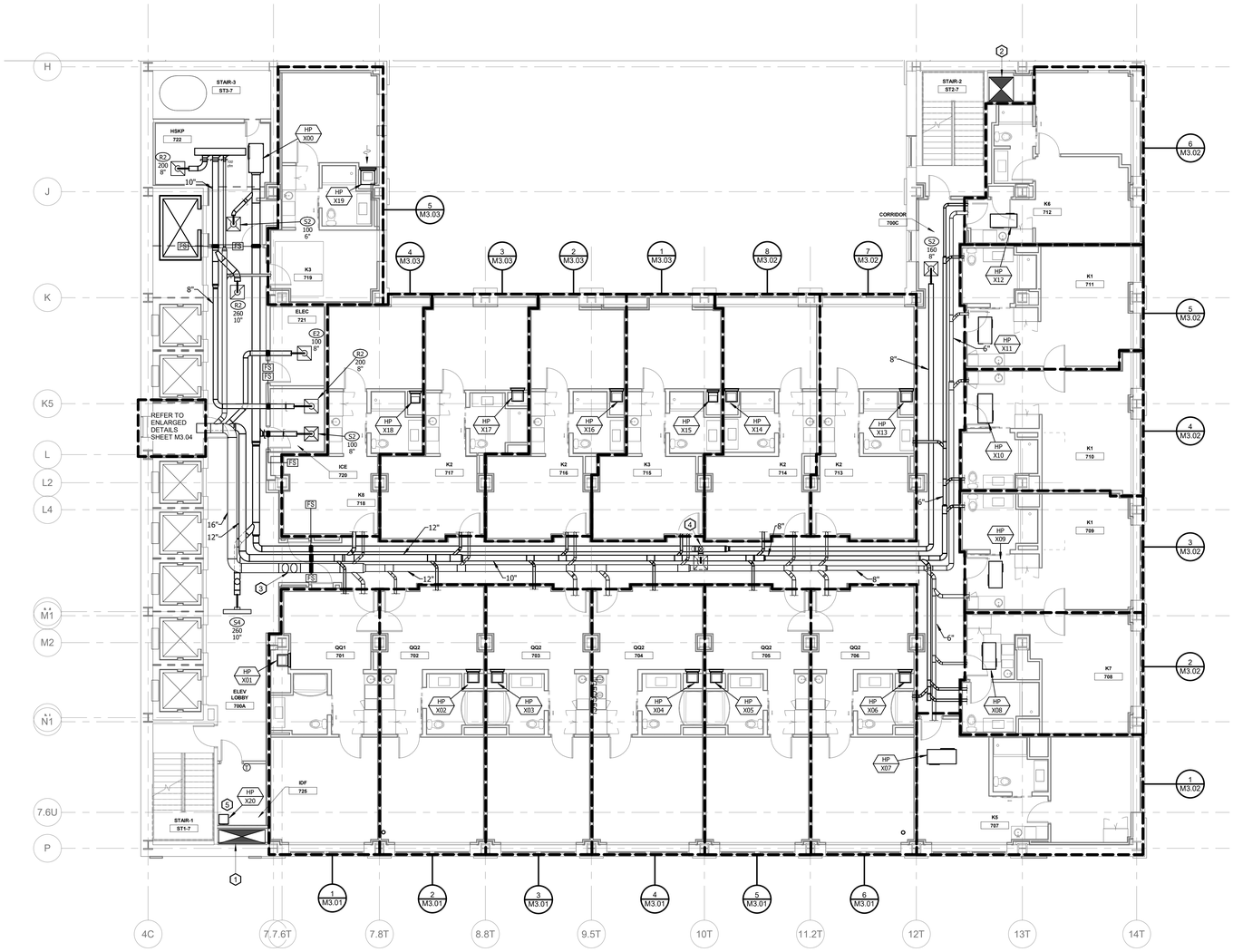

1 SEVENTH FLOOR PLAN MECHANICAL (TYPICAL FLOOR 10,13,16,19)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-T5 FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1. 24x80 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER. SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE.
2. 42x42 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER.SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE. COORDINATE LOCATION WITH PLUMBING RISERS.
3. OFFSET DUCT DOWN.
4. TAP OFF BOTTOM OF SUPPLY DUCT.
5. FRONT SUPPLY AIR ABOVE AND FRONT RETURN AIR BELOW.

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CASEY JOHN STEINER
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Tower - Seventh Floor Plan Mechanical

M1.01-T7

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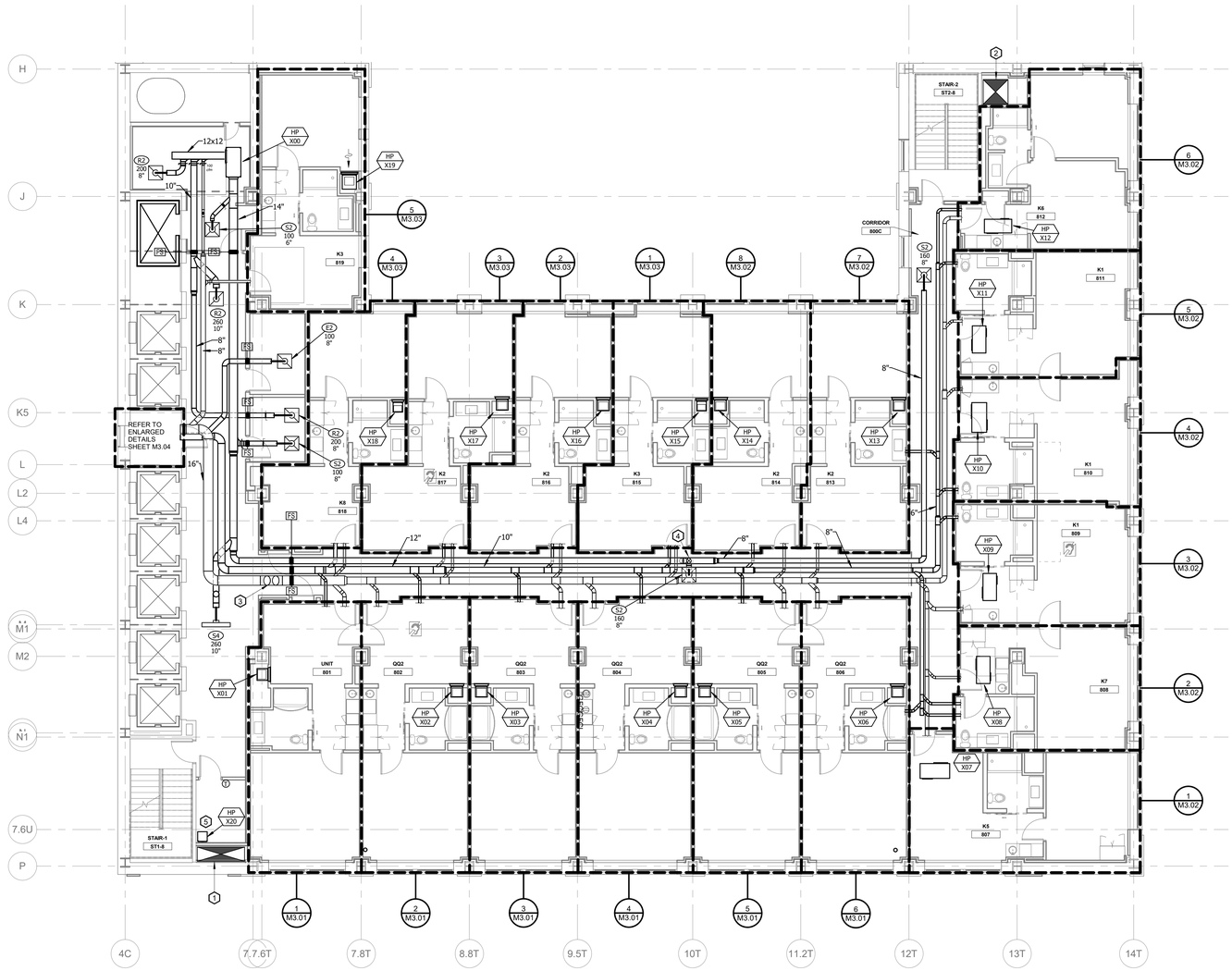

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1 EIGHTH FLOOR PLAN MECHANICAL (TYPICAL FLOOR 14,17)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-T5 FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1. 24x80 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER. SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE.
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PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Eighth Floor Plan
Mechanical

M1.01-T8

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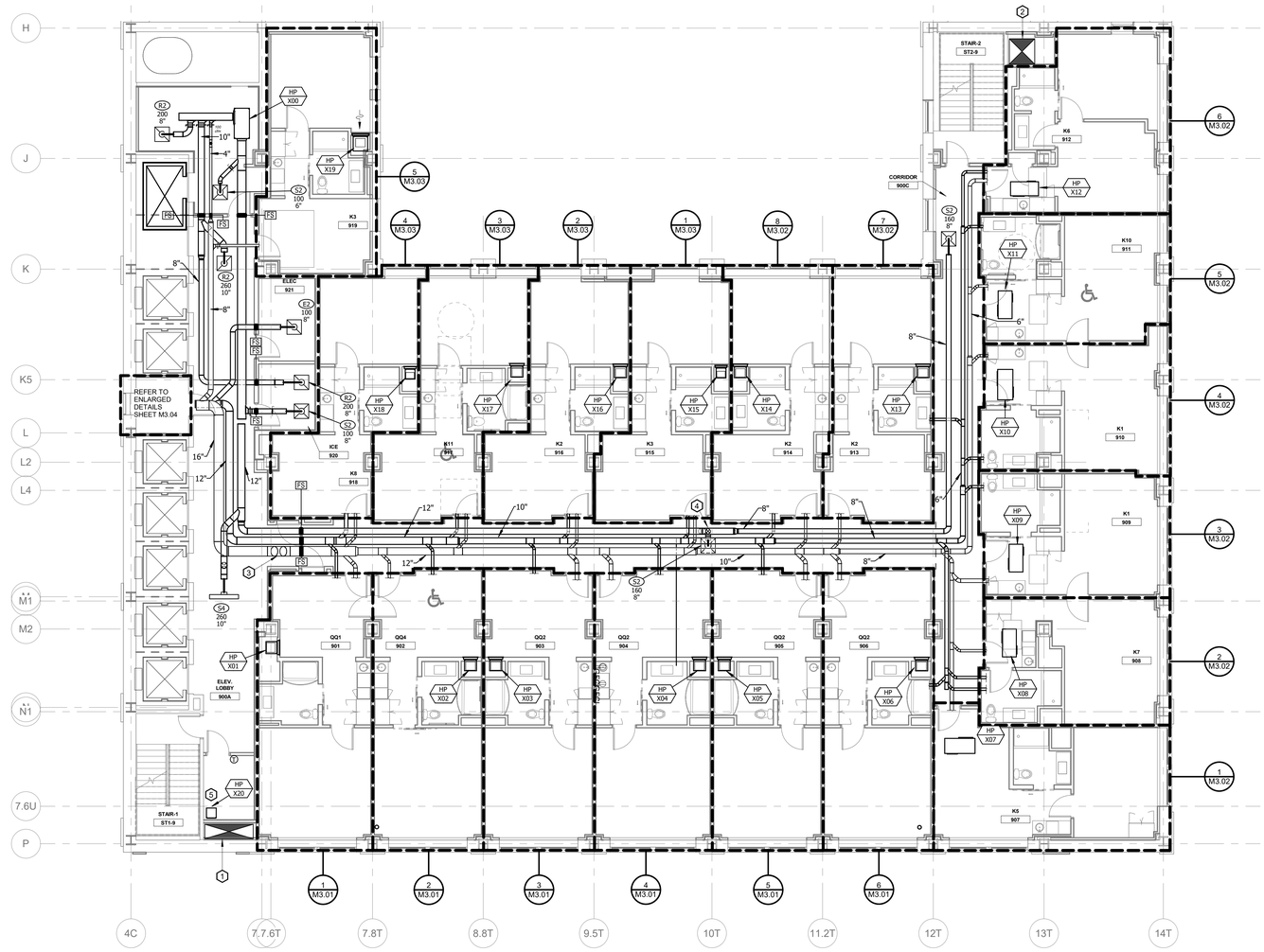

1 NINTH FLOOR PLAN MECHANICAL (TYPICAL FLOOR 12,15)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-T5 FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1. 24x80 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER. SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE.
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CASEY JOHN STEINER
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Ninth Floor Plan Mechanical

M1.01-T9

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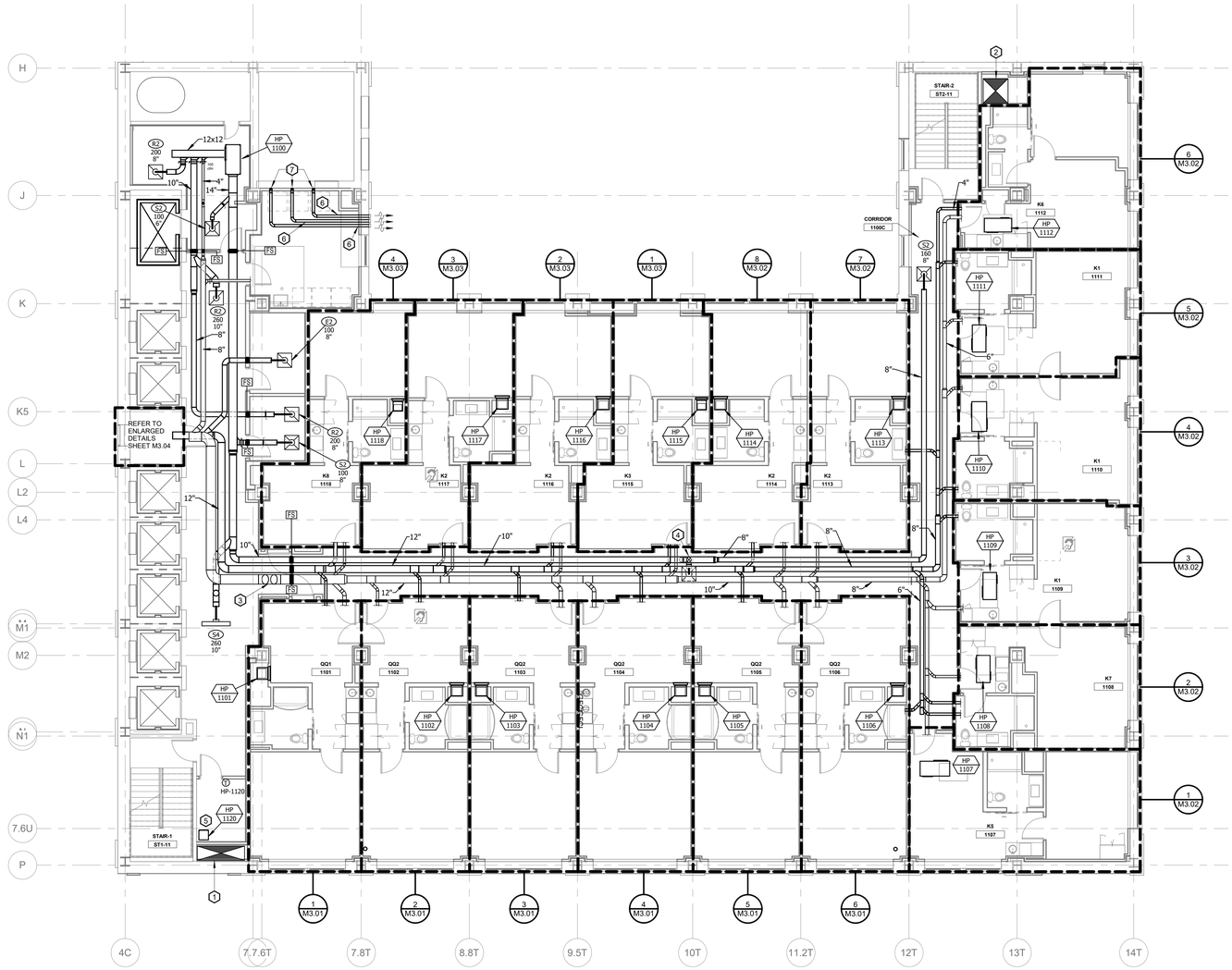

1 ELEVENTH FLOOR PLAN MECHANICAL

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-T5 FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1 24x80 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER. SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE.

2 42x42 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER.SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE. COORDINATE LOCATION WITH PLUMBING RISERS.

3 OFFSET DUCT DOWN.

4 TAP OFF BOTTOM OF SUPPLY DUCT.

5 FRONT SUPPLY AIR ABOVE AND FRONT RETURN AIR BELOW.

6 4" DRYER EXHAUST DUCT THRU SIDEWALL. PROVIDE DRYER MANUFACTURER WALL CAP.

7 PROVIDE DRYER BOX 6" AFF FOR EACH DRYER. BOX SHALL BE TYPICAL OF CONSTRUCTION SOLUTIONS, MODEL DBX1000M-4.

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

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Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Eleventh Floor Plan Mechanical

M1.01-T11

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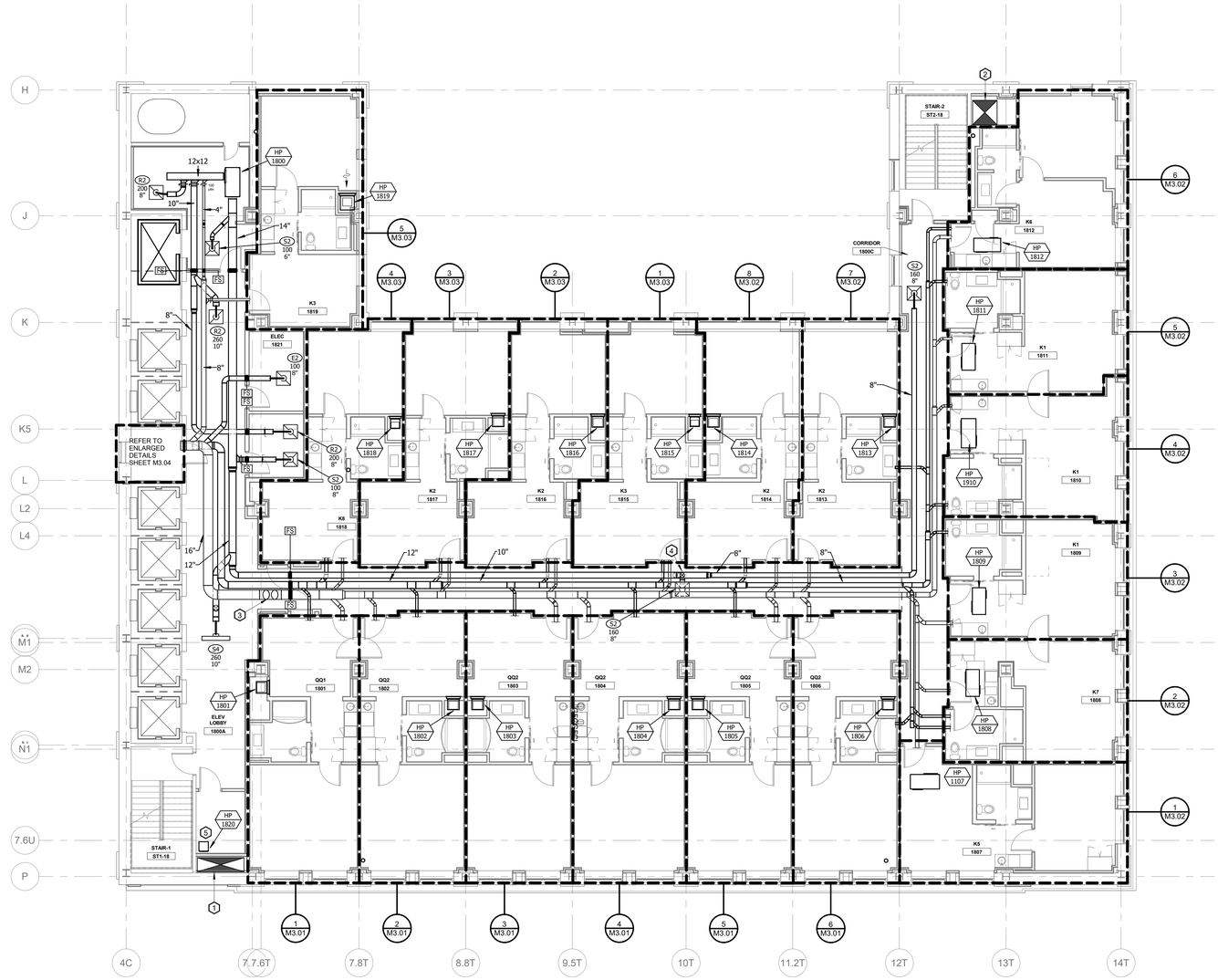

1 EIGHTEENTH FLOOR PLAN MECHANICAL

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-T5 FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1. 24x80 SMOKE CONTROL DUCT SHOWN AS PLACEHOLDER. SMOKE CONTROL SYSTEM AND DUCT RISER SIZES TO BE FINALIZED IN FUTURE FULL BUILDING PACKAGE.
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CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
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Issue Date: September 8, 2020

REVISION SCHEDULE		
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Eighteenth Floor Plan Mechanical

M1.01-T18

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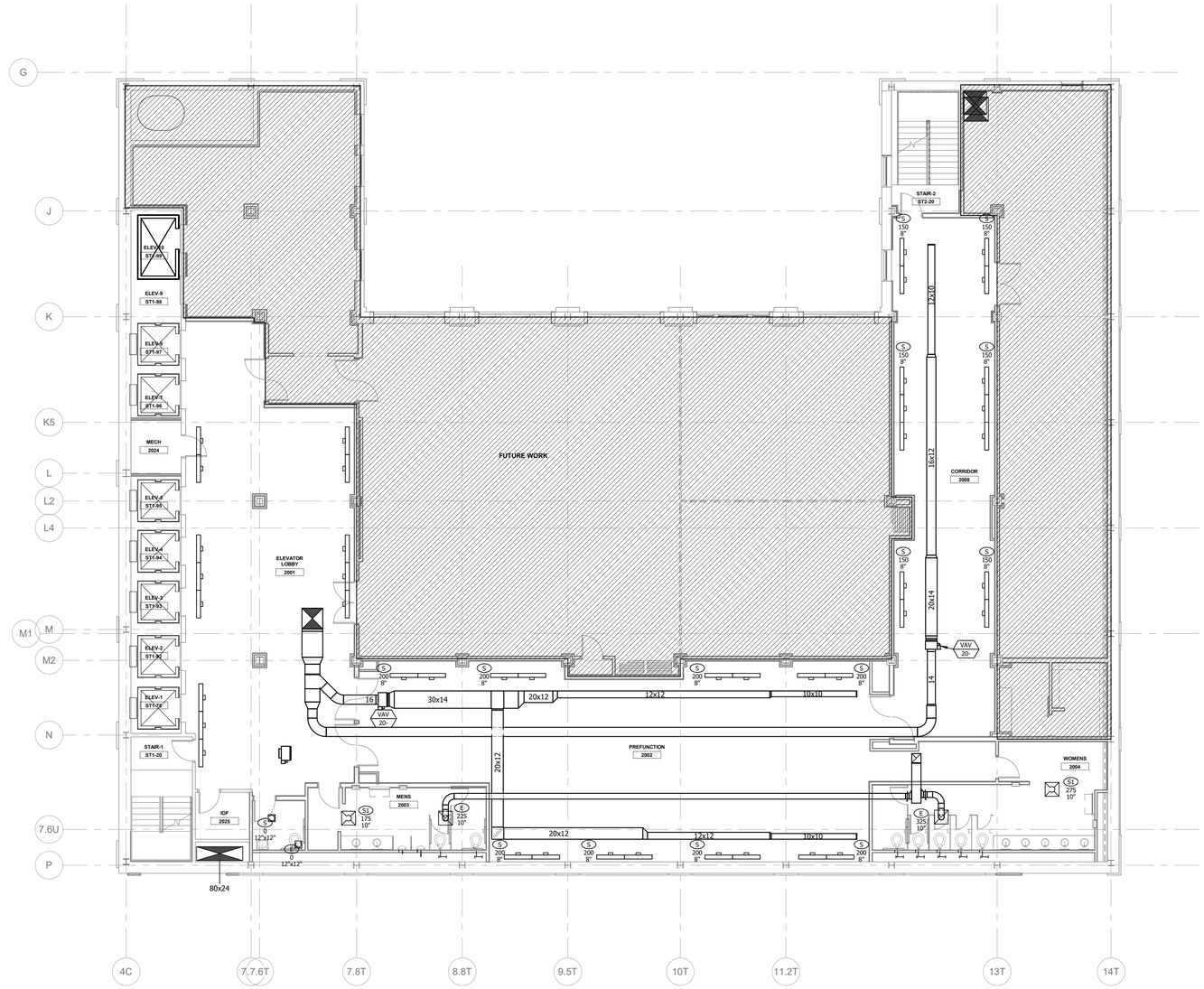

1 TOWER TWENTIETH FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

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9/8/2020

CERTIFICATION

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The Grand Reserve

925 Grand Boulevard
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Project No.: 18A023
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Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Tower - Twentieth Floor Mechanical Plan

M1.01-T20

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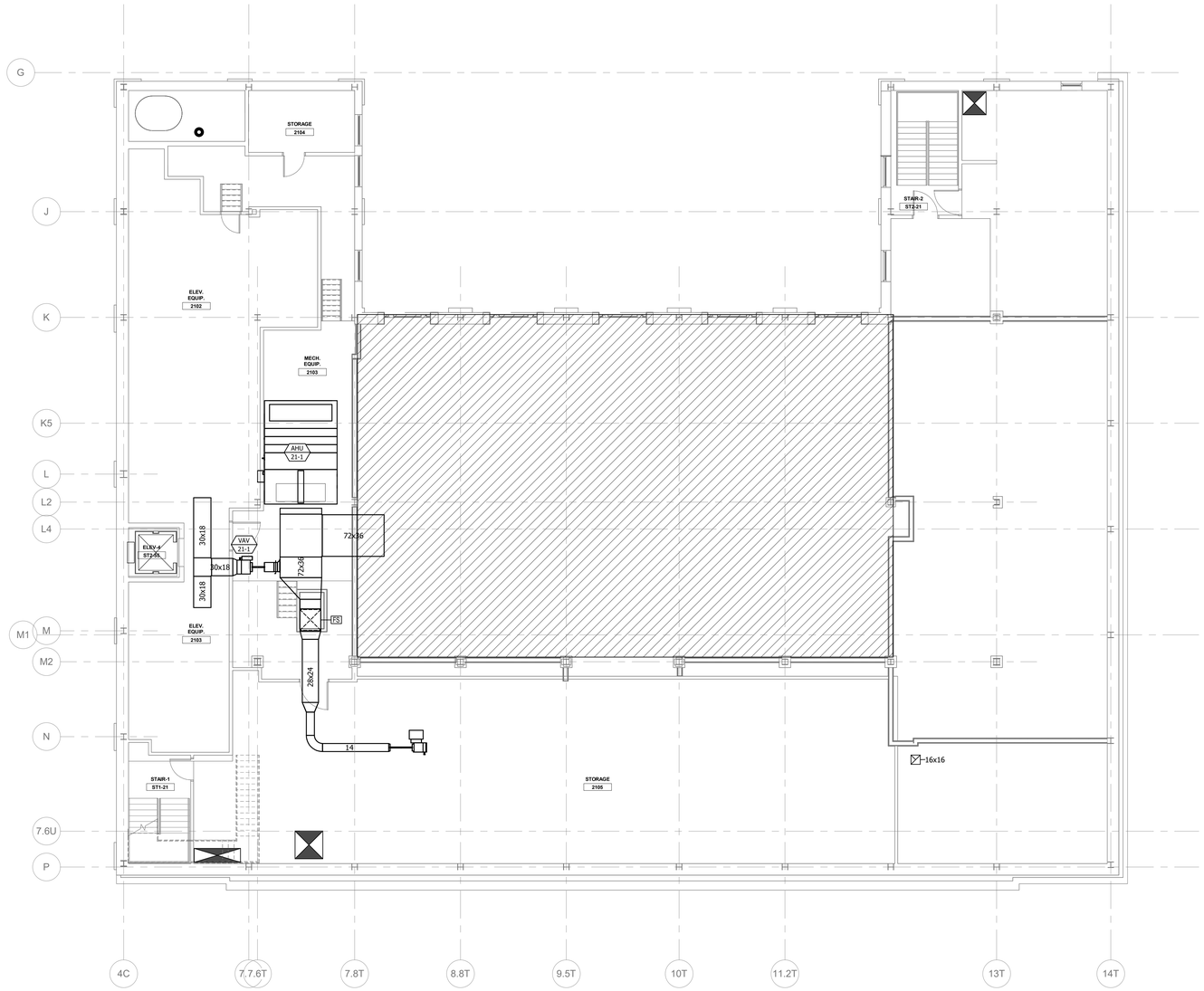

1 TOWER TWENTY FIRST FLOOR MECHANICAL PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

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Tower - Twenty First Floor Mechanical Plan

M1.01-T21

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GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

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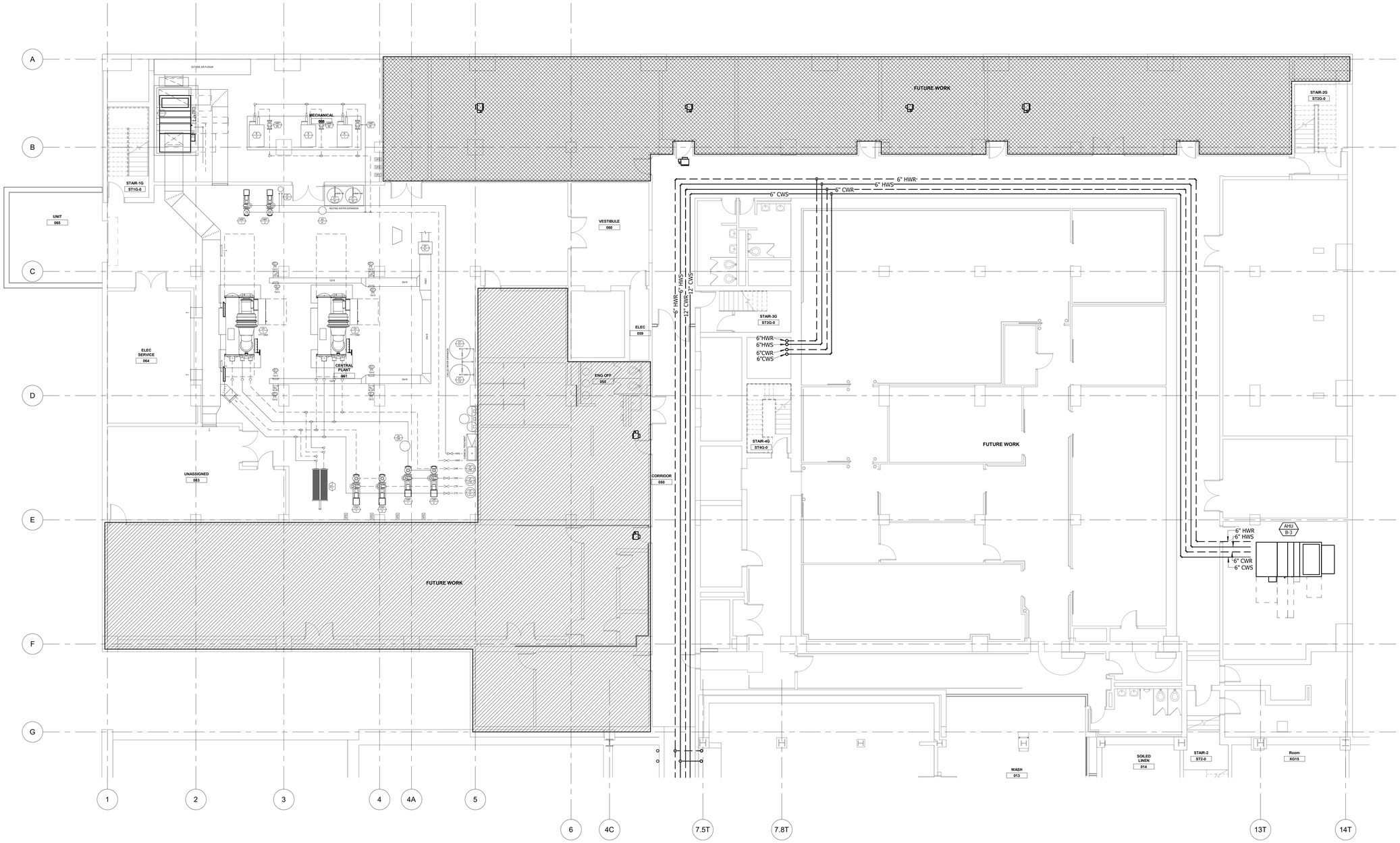

1 GARAGE BASEMENT FLOOR MECHANICAL PIPING PLAN

Scale: 1/8" = 1'-0"

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage Basement
Mechancial Piping Plan

M2.01-G

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GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

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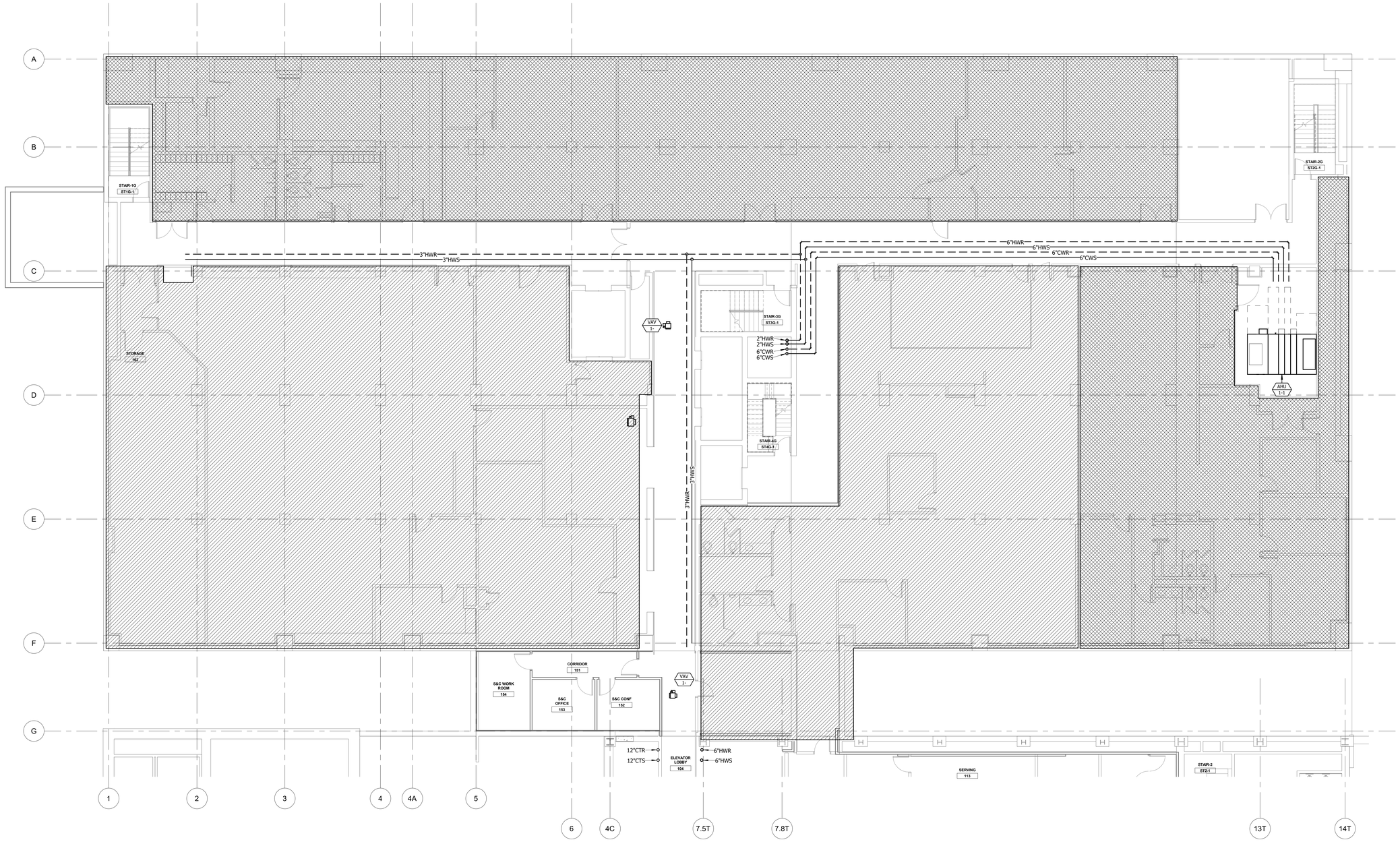

1 GARAGE GROUND FLOOR MECHANICAL PIPING PLAN

Scale: 1/8" = 1'-0"

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FOR CONSTRUCTION

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Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC
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Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage Ground Floor Mechancial Piping Plan

M2.01-G1

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GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

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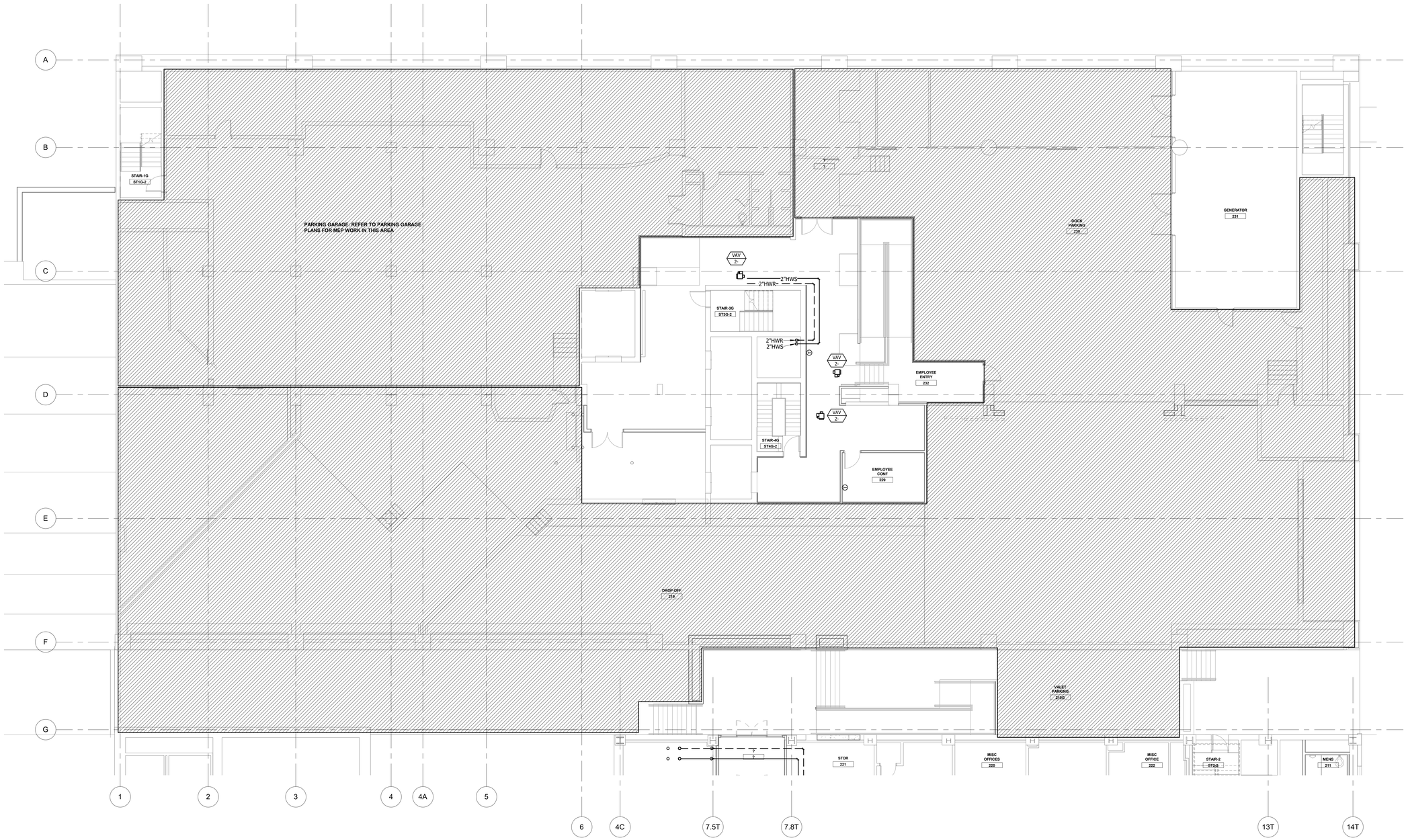

1 GARAGE DOCK FLOOR MECHANICAL PIPING PLAN

Scale: 1/8" = 1'-0"

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
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Project No.: 18A023
Drawn By: RC
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage Dock Floor
Mechancial Piping Plan

M2.01-G2

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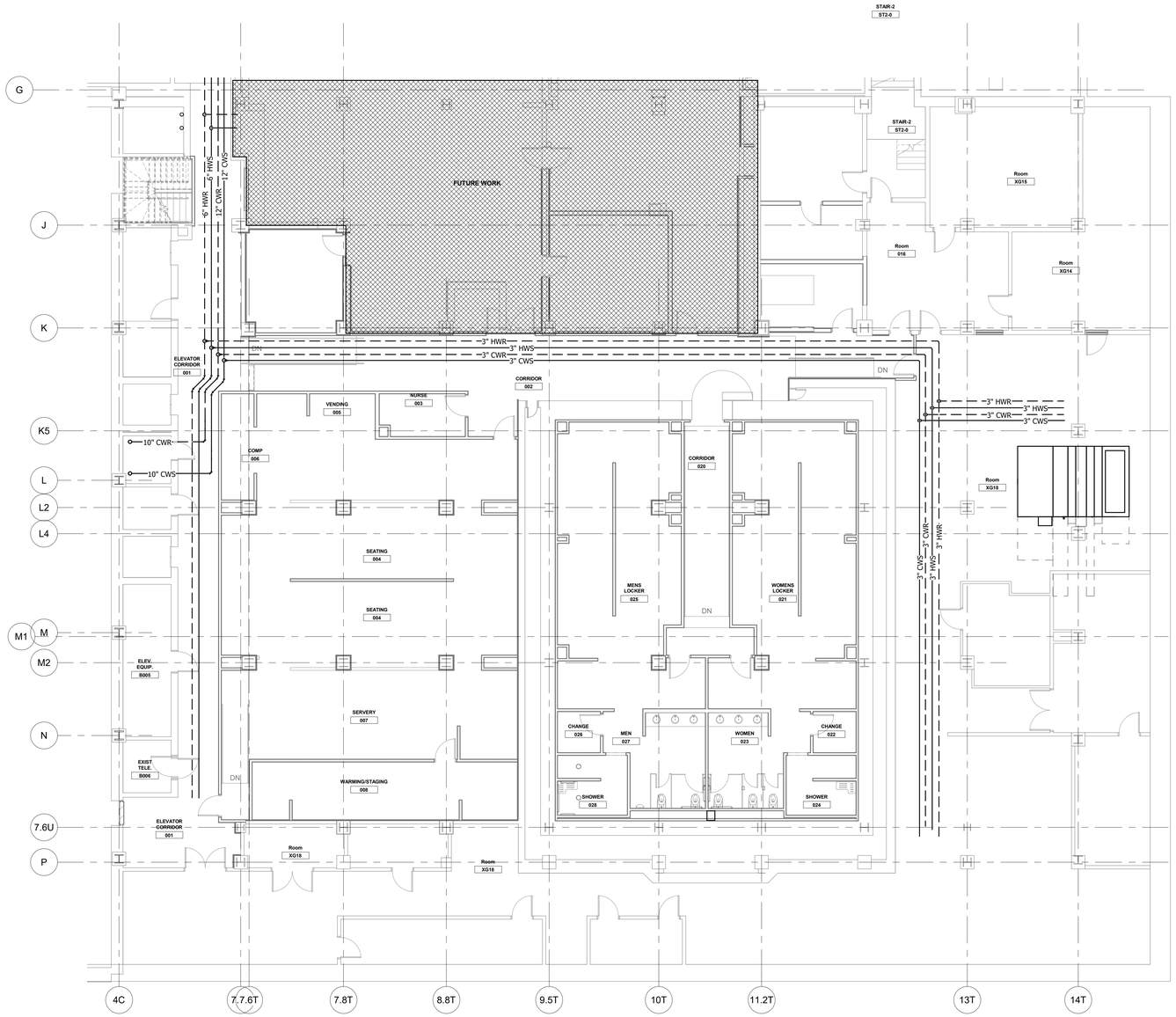

1 TOWER BASEMENT FLOOR MECHANICAL PIPING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

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Tower Basement Floor Mechanical Piping

M2.01-T

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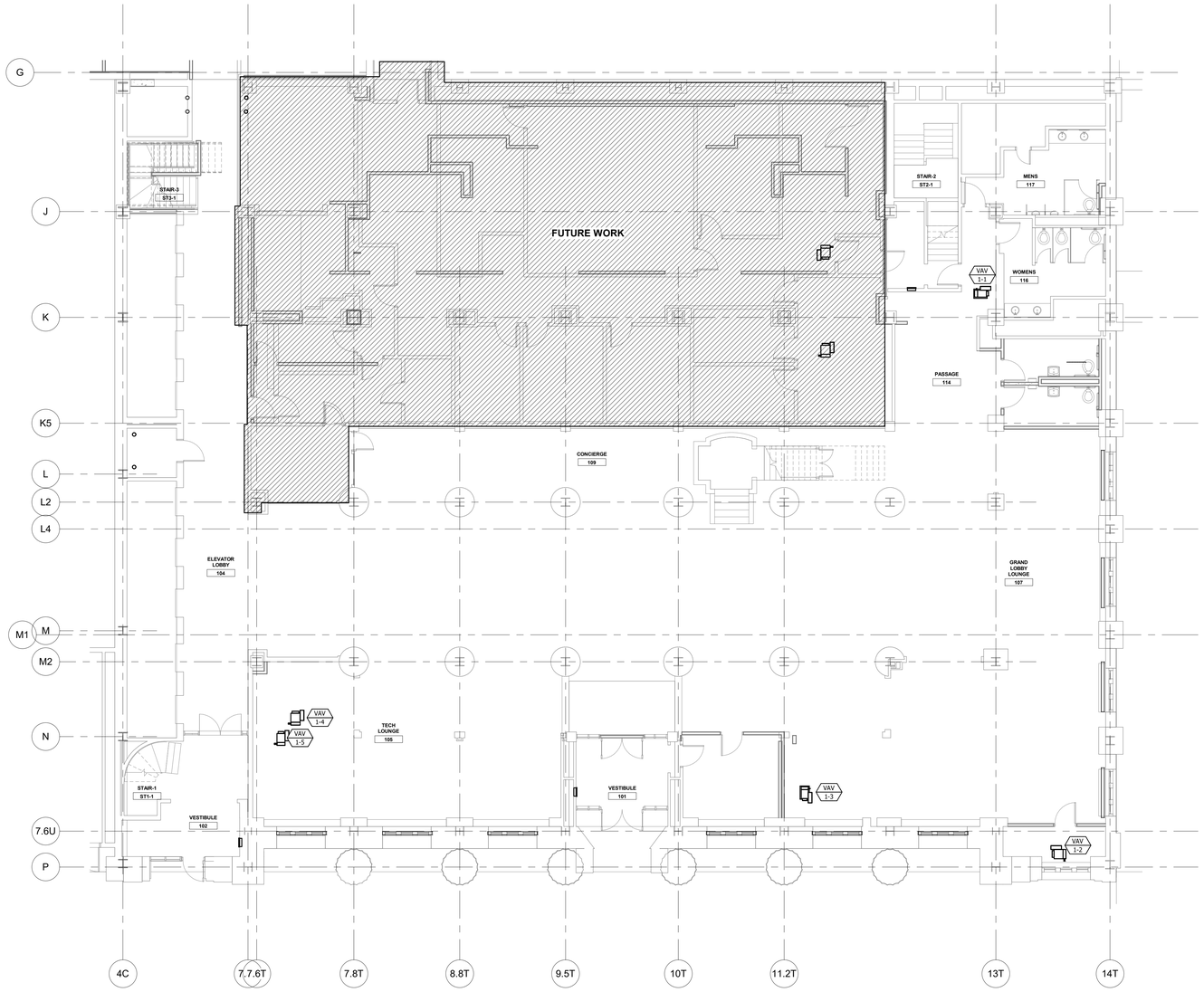

1 TOWER FIRST FLOOR MECHANICAL PIPING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

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Tower - First Floor
Mechancial Piping Plan

M2.01-T1

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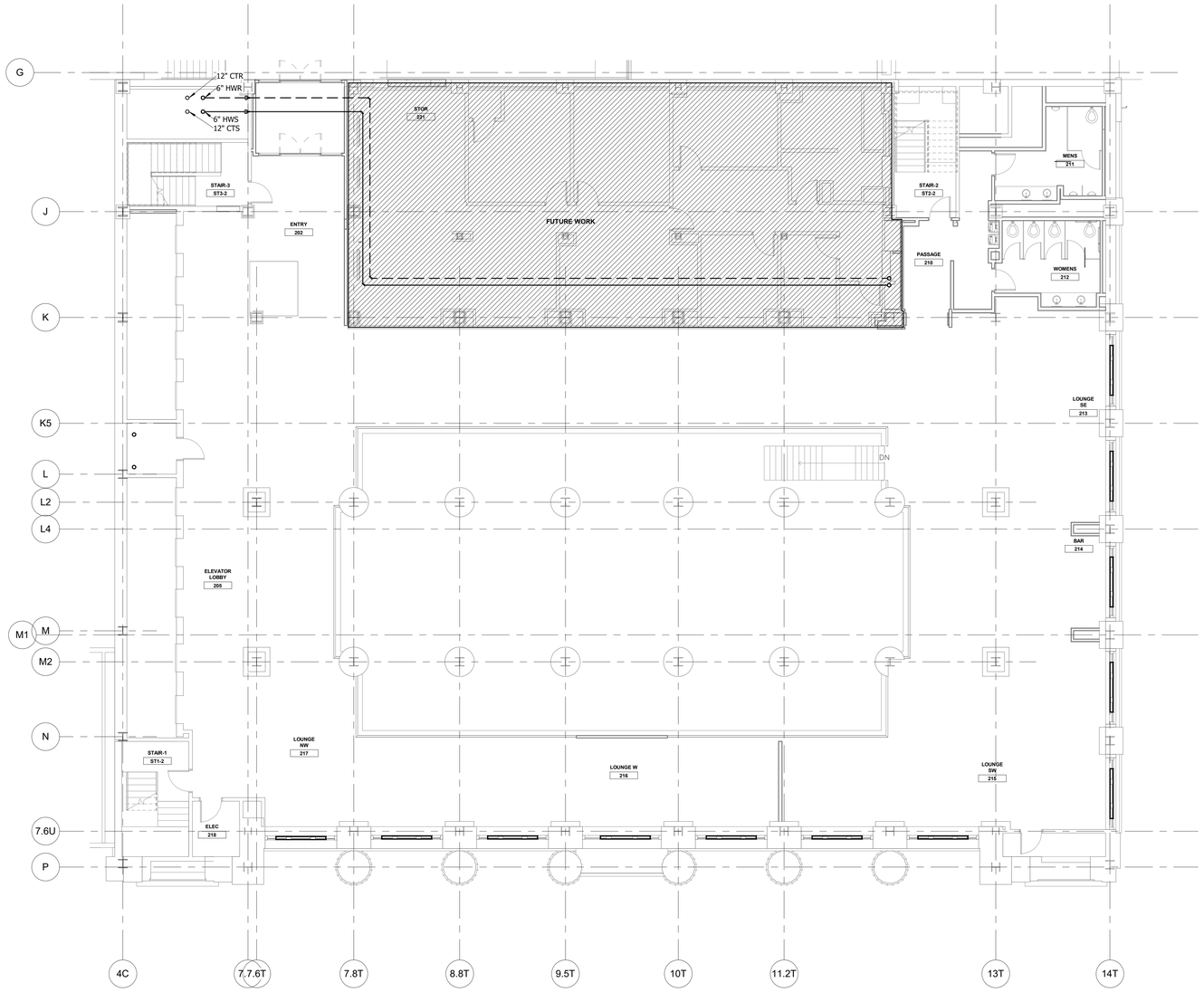

1 SECOND FLOOR MECHANICAL PIPING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

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Project No.: 18A023
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Issue Date: September 8, 2020

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Tower - Second Floor
Mechancial Piping Plan

M2.01-T2

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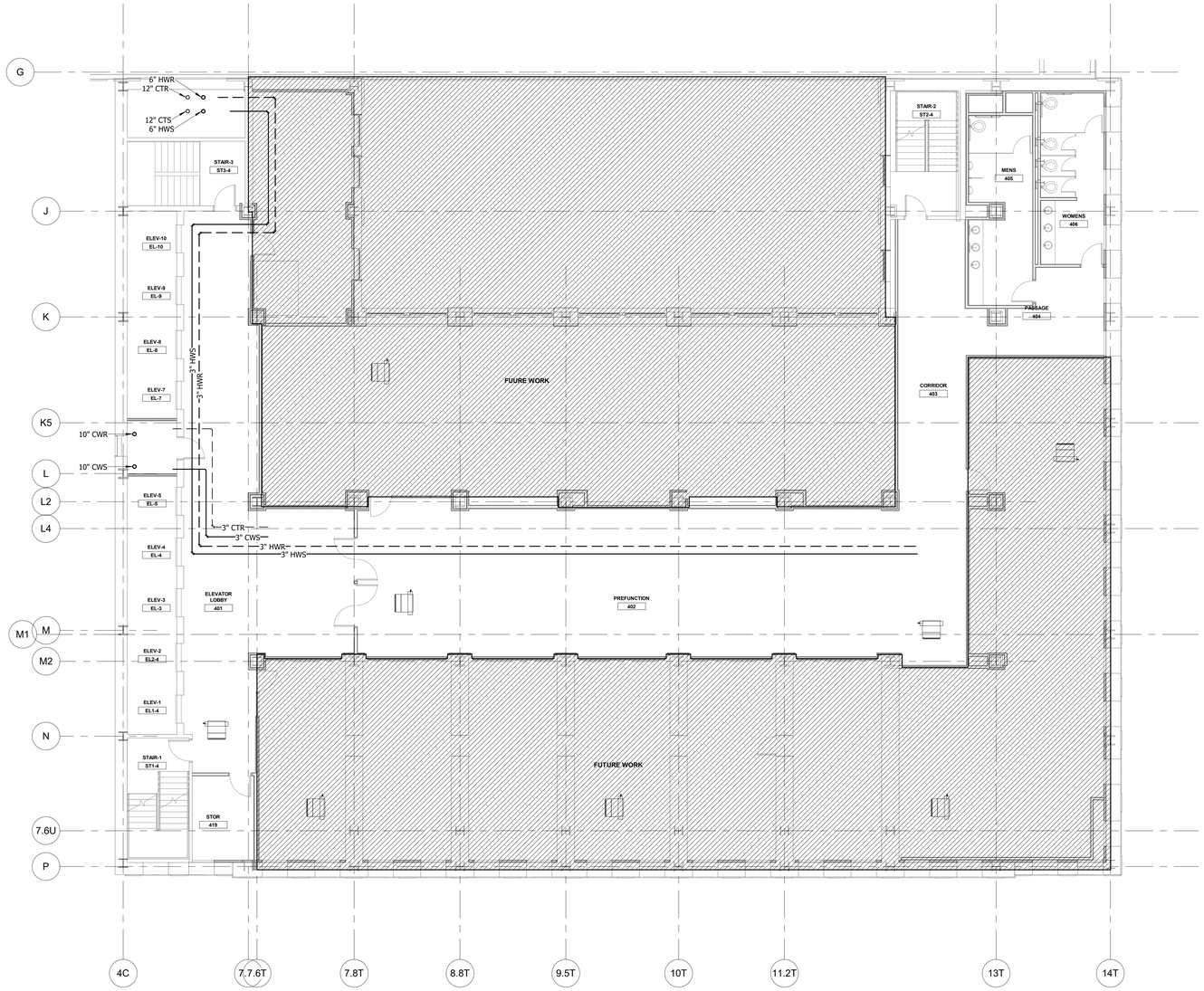

1 TOWER FOURTH FLOOR MECHANICAL PIPING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Tower - Fourth Floor
Mechancial Piping Plan

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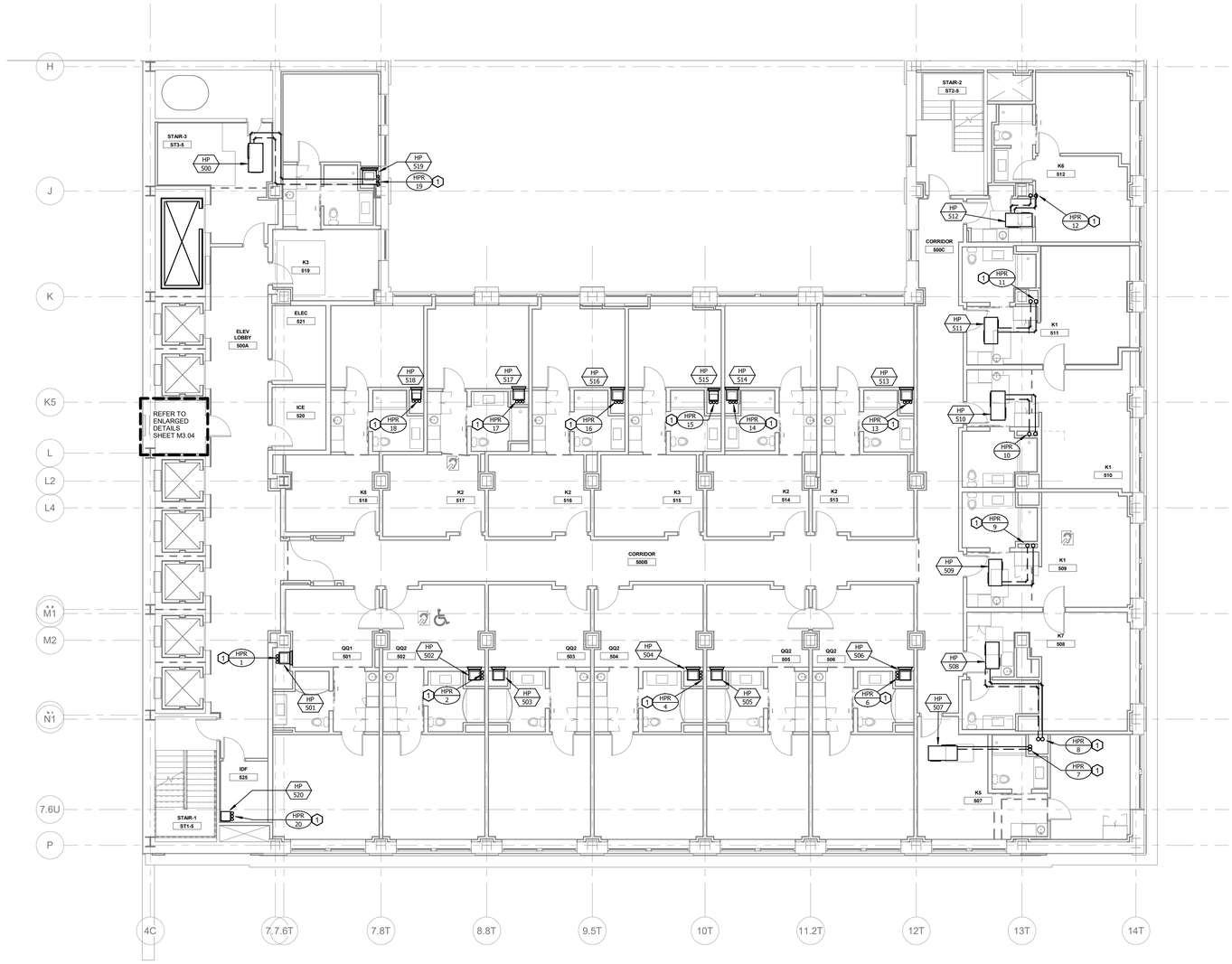

1 FIFTH FLOOR PLAN MECHANICAL PIPING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE PIPING SYSTEMS COMPLETE AND PER APPLICABLE CODES INCLUDING ALL NECESSARY COMPONENTS AND OFFSETS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR OTHER CONDITIONS.

B. COORDINATE THE INSTALLATION OF PIPING AND EQUIPMENT WITH THE WORK OF ALL OTHER TRADES.

C. BRANCH PIPING SERVING TERMINAL UNIT HEATING COILS SHALL BE 3/4" UNLESS OTHERWISE NOTED.

D. THE CONTRACTOR SHALL NOT LOCATE PIPING BELOW DUCT MOUNTED AIR TERMINAL UNITS, TERMINAL HEATING COILS, OR OTHER EQUIPMENT.

E. THE CONTRACTOR SHALL ARRANGE BRANCH PIPING TO TERMINAL UNIT COILS SO THAT IT DOES NOT INTERFERE WITH ACCESS TO THE TERMINAL UNIT OR CONTROLS.

F. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR SUPPORTS, ANCHORS, AND GUIDES. SUBMIT PROPOSED METHODS OF ANCHORING AND GUIDING TO THE STRUCTURAL ENGINEER FOR APPROVAL.

G. PIPING SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT OR PANELS. PROVIDE THE CODE REQUIRED WORKING CLEARANCE AROUND ALL ELECTRICAL EQUIPMENT AND PANELS.

PLAN NOTES:

1 REFER TO HVAC PIPING RISER DIAGRAM ON SHEET M5.01 FOR PIPE RISER SIZES.

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The Grand Reserve

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Tower - Fifth Floor Plan
Mechanical Piping
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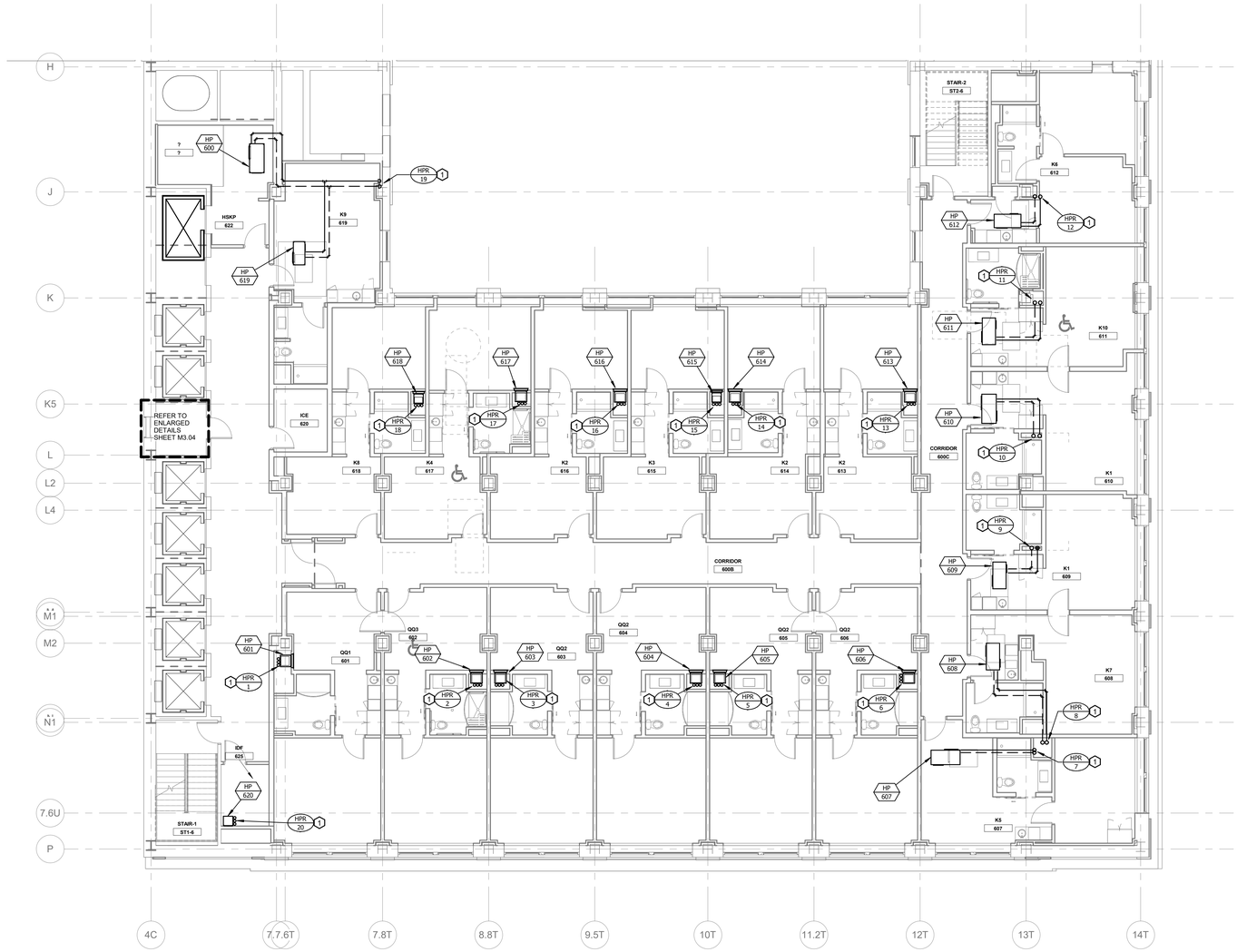

1 SIXTH FLOOR PLAN MECHANICAL PIPING

Scale: 1/8" = 1'-0"

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PLAN NOTES:

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Phone: (972) 707-0568
Website: www.matchlinedesign.com

STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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MO Certificate of Authority 01022

Tower - Sixth Floor Plan
Mechanical Piping

M2.01-T6

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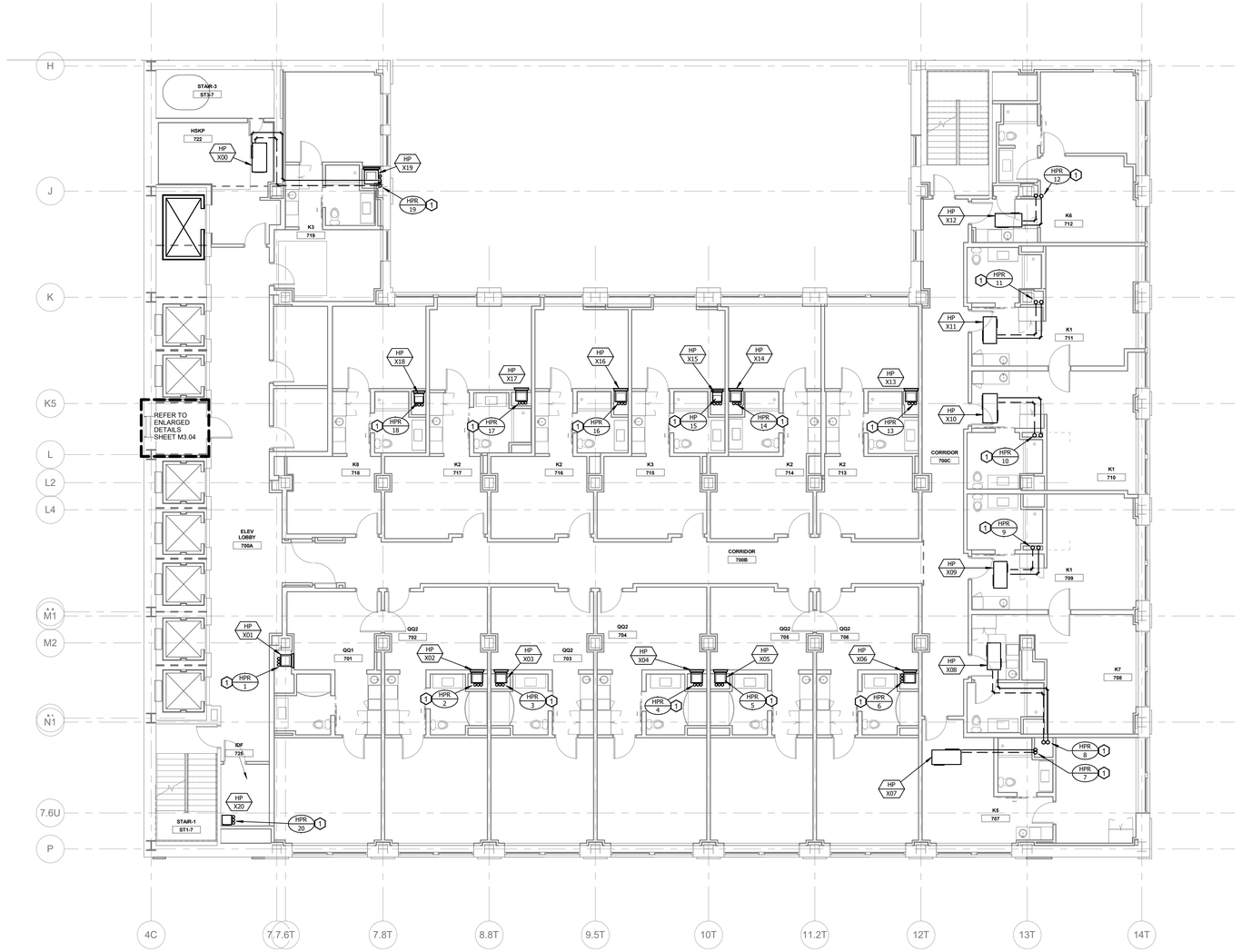

1 SEVENTH FLOOR PLAN MECHANICAL PIPING (TYPICAL FLOOR 10,13,16)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE PIPING SYSTEMS COMPLETE AND PER APPLICABLE CODES INCLUDING ALL NECESSARY COMPONENTS AND OFFSETS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR OTHER CONDITIONS.

B. COORDINATE THE INSTALLATION OF PIPING AND EQUIPMENT WITH THE WORK OF ALL OTHER TRADES.

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PLAN NOTES:

1 REFER TO HVAC PIPING RISER DIAGRAM ON SHEET M5.01 FOR PIPE RISER SIZES.

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Tower - Seventh Floor Plan
Mechanical Piping

M2.01-T7

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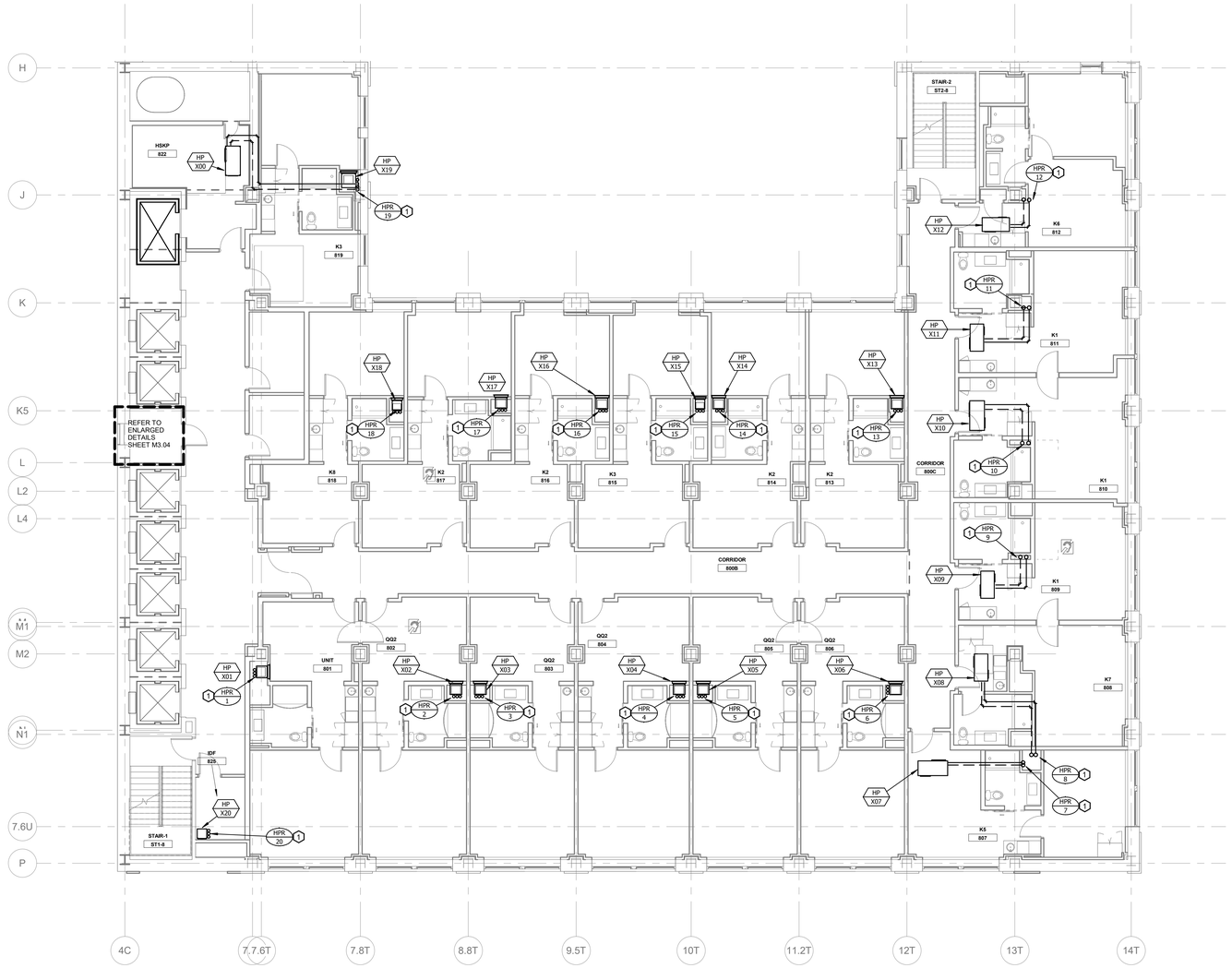

1 EIGHTH FLOOR PLAN MECHANICAL PIPING (TYPICAL FLOOR 14,17)

Scale: 1/8" = 1'-0"

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9/8/2020

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Tower - Eighth Floor Plan
Mechanical Piping

M2.01-T8

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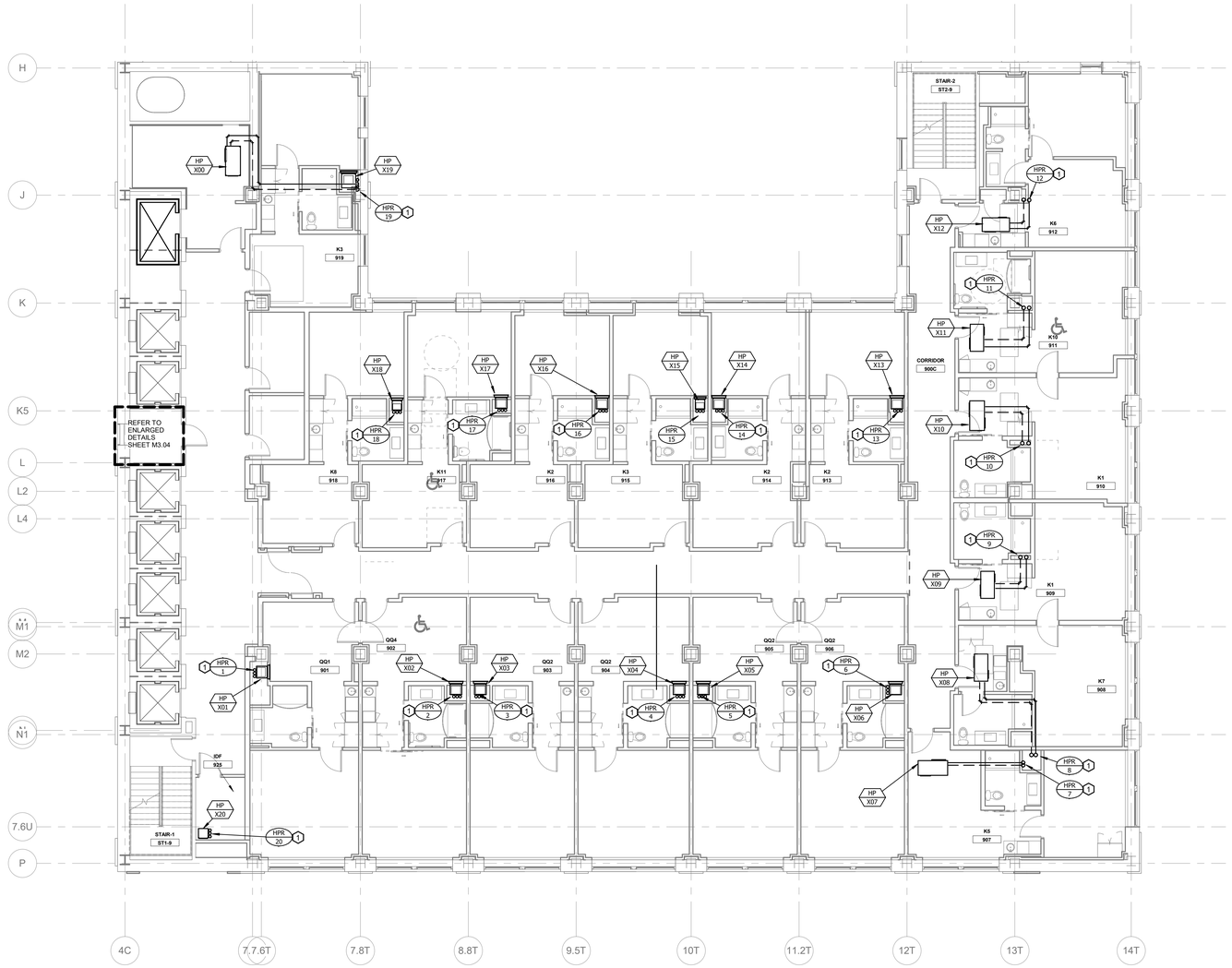

1 NINTH FLOOR PLAN MECHANICAL PIPING (TYPICAL FLOOR 12,15)

Scale: 1/8" = 1'-0"

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Tower - Ninth Floor Plan
Mechanical Piping

M2.01-T9

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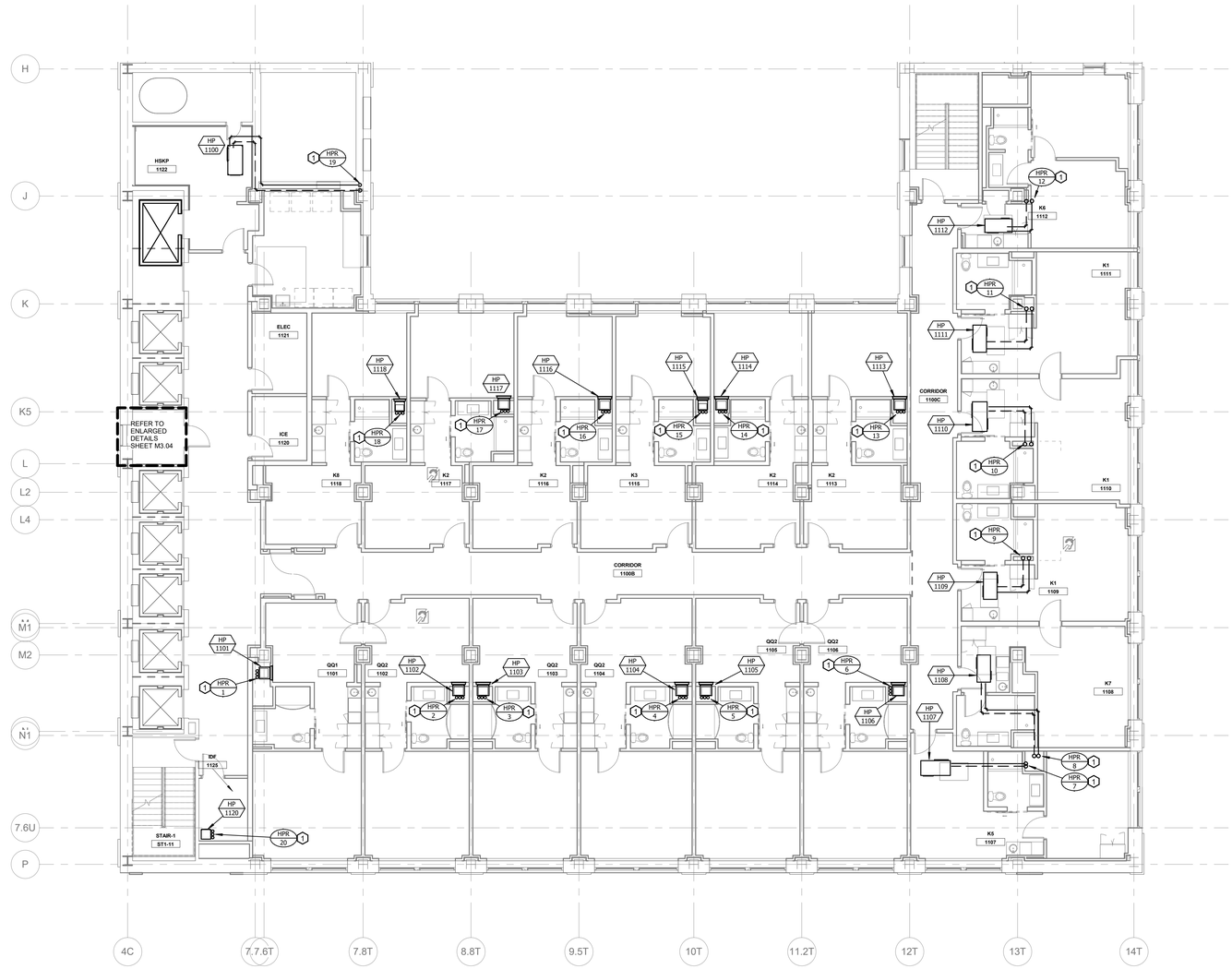

1 ELEVENTH FLOOR PLAN MECHANICAL PIPING

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Tower - Eleventh Floor Plan Mechanical Piping

M2.01-T11

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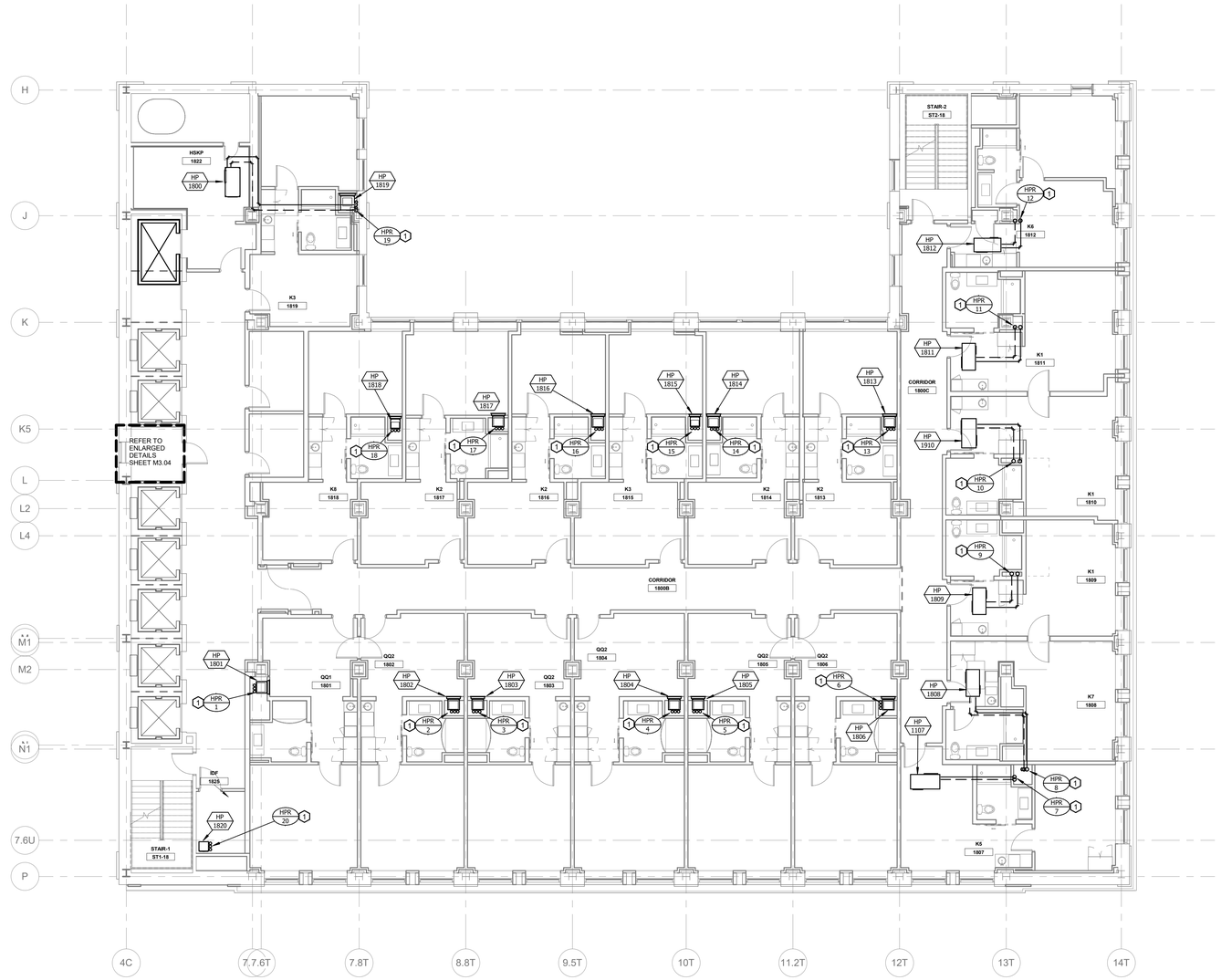

1 EIGHTEENTH FLOOR PLAN MECHANICAL PIPING

Scale: 1/8" = 1'-0"

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Tower - Eighteenth Floor
Plan Mechanical Piping

M2.01-T18

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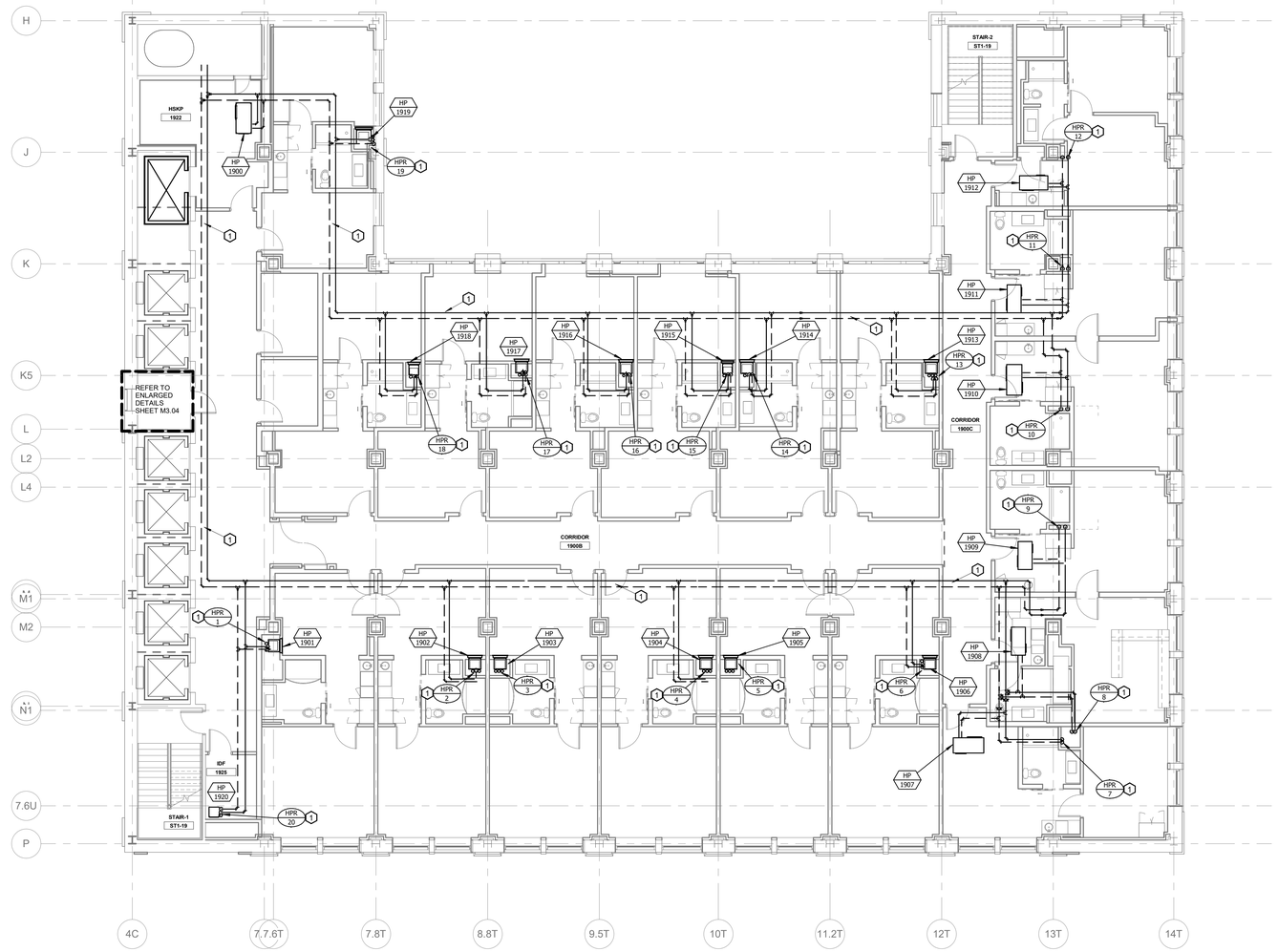

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Tower - Nineteenth Floor Plan Mechanical Piping

M2.01-T19

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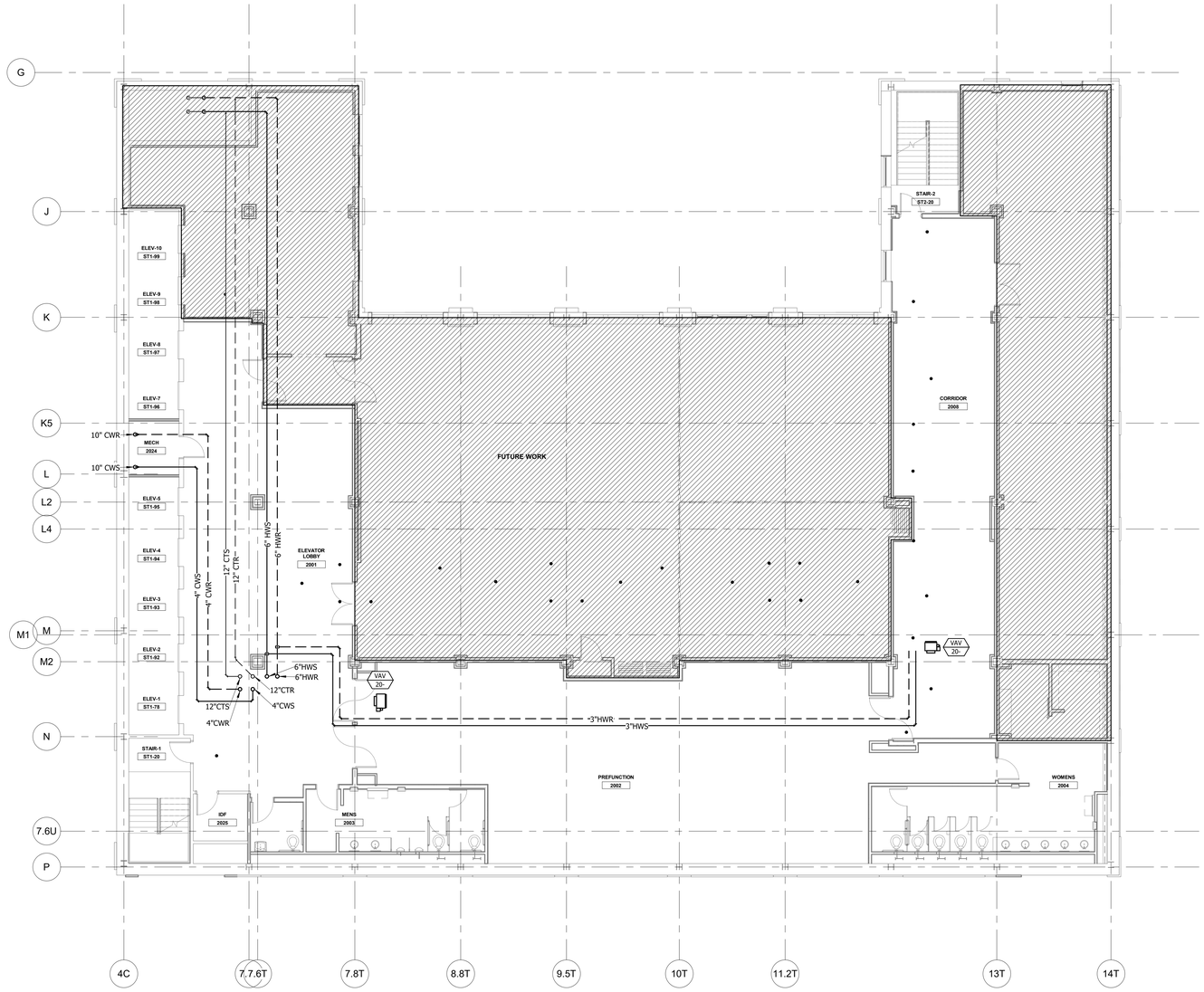

1 TOWER TWENTIETH FLOOR MECHANICAL PIPING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

DO NOT PIPE ABOVE IN THIS ROOM (REMOVE THIS TEXT UPON REVIEW)

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Landscape Architecture
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Interior Design

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Phone: (317) 635-5030
Website: www.bdmd.com

Delta Quad Holdings, LLC
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Construction Manager

9101 West 110th Street, Suite 150
Overland Park, Kansas 66210
Phone: (913) 642-6000
Website: www.website.com

Lawson Elser, Inc.
Structural Engineer

650 East Carmel Drive, Suite 150
Carmel, Indiana 46032
Phone: (317) 574-5409
Website: www.lawsonelser.com

Hoss & Brown Engineers, Inc.
MEP Engineer

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Phone: (913) 362-9090
Website: www.h-be.com

SK Design Group, Inc.
Civil Engineer

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Overland Park, KS 66211
Phone: (913) 451-1818
Website: www.skdesigngroup.net

Matchline Design Group, LLC
Interior Design

10300 North Central Expressway, Suite 335
Dallas, TX 75231
Phone: (972) 707-0568
Website: www.matchlinedesign.com

STATE OF MISSOURI
CASEY JOHN STEVENSON
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

H&B ENGINEERS
HOSS & BROWN
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 182063

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MO Certificate of Authority 01022

Tower - First Floor
Mechancial Piping Plan

M2.01-T20

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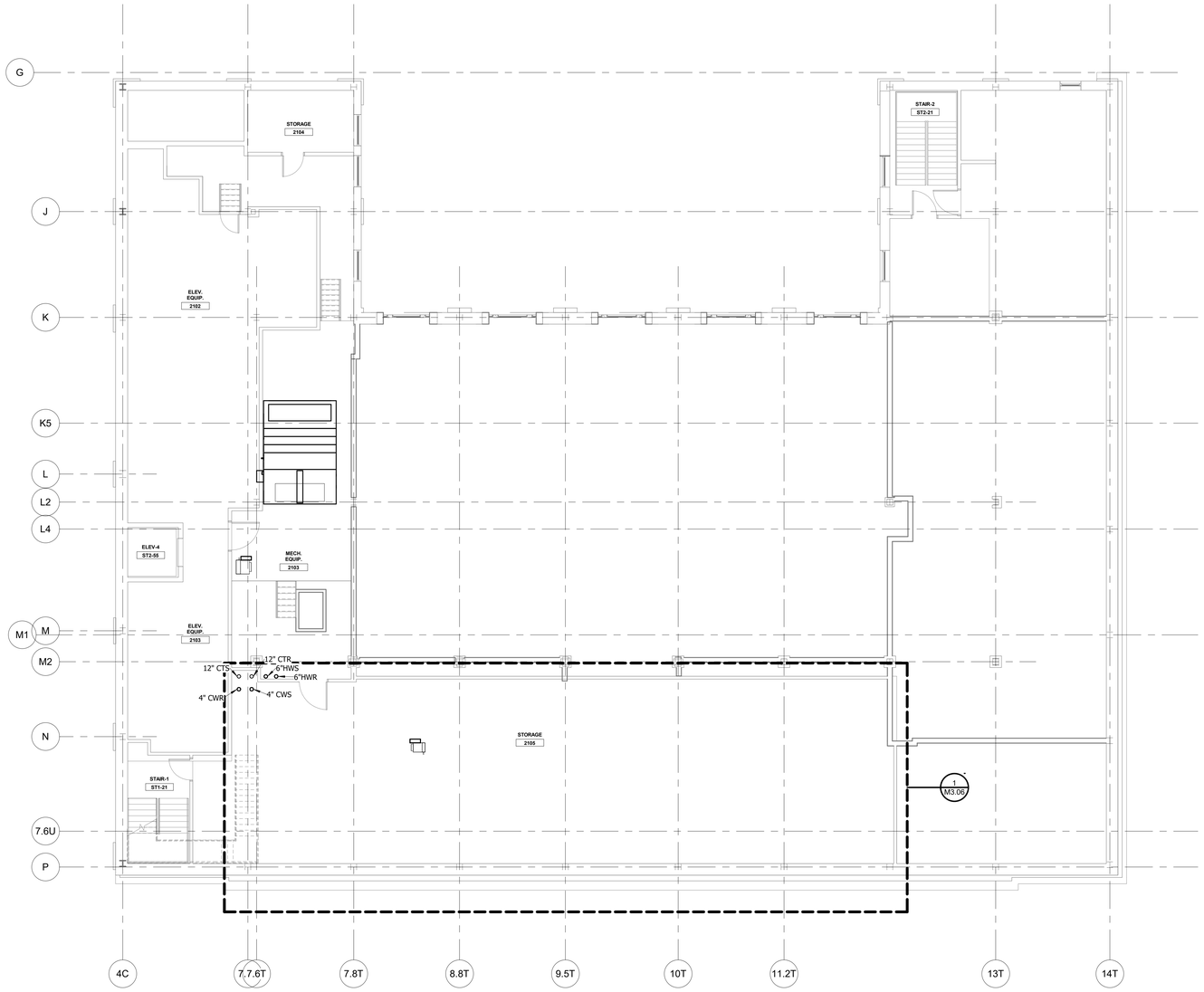

1 TOWER TWENTY FIRST FLOOR MECHANICAL PIPING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

(#) NOT FOR NOTE IN THIS PLAN (REMOVE THIS TEXT AFTER EDIT)

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H&B PROJECT NUMBER : 1820630

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Tower - First Floor
Mechancial Piping Plan

M2.01-T21

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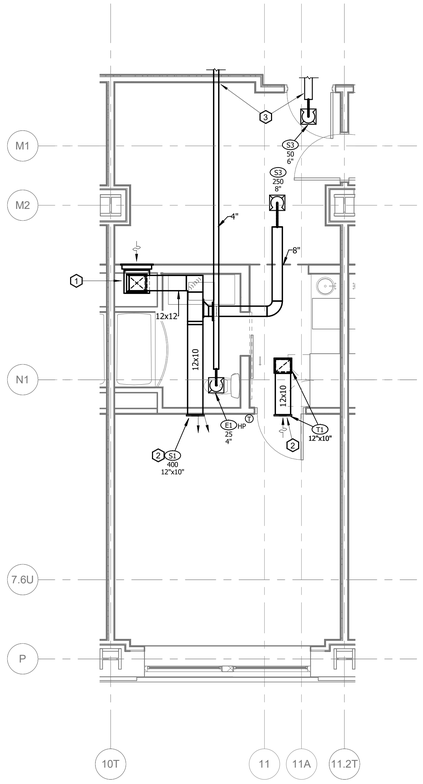
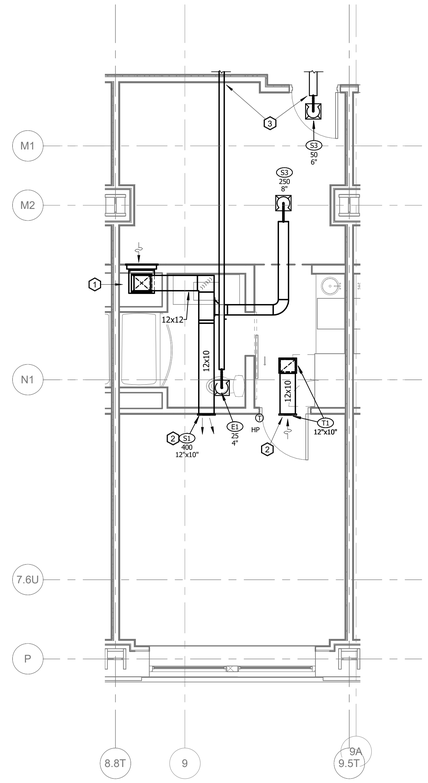


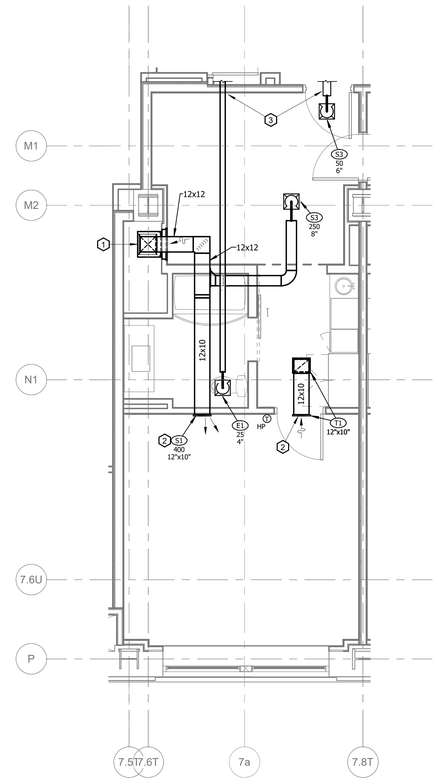
5 TYP. DOUBLE QUEEN 'E' - MECHANICAL

Scale: 1/4" = 1'-0"



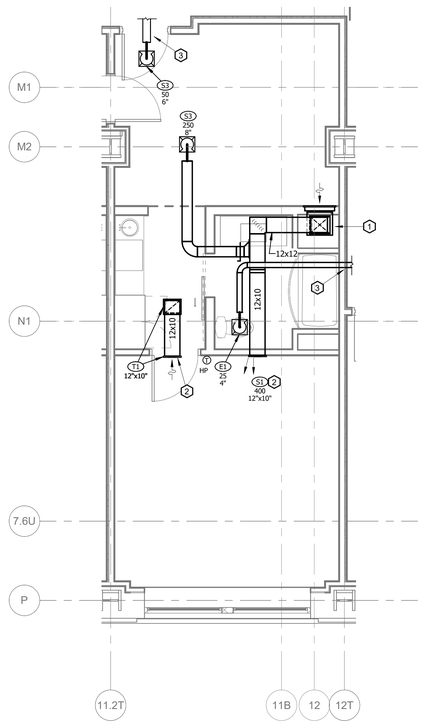
3 TYP. DOUBLE QUEEN 'C' - MECHANICAL

Scale: 1/4" = 1'-0"



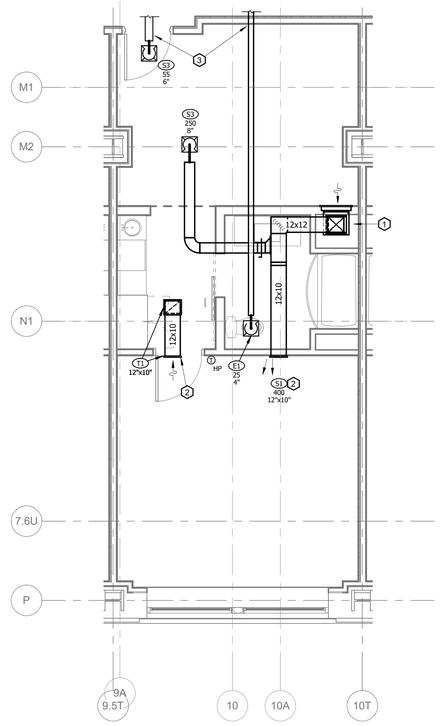
1 TYP. DOUBLE QUEEN 'A' - MECHANICAL

Scale: 1/4" = 1'-0"



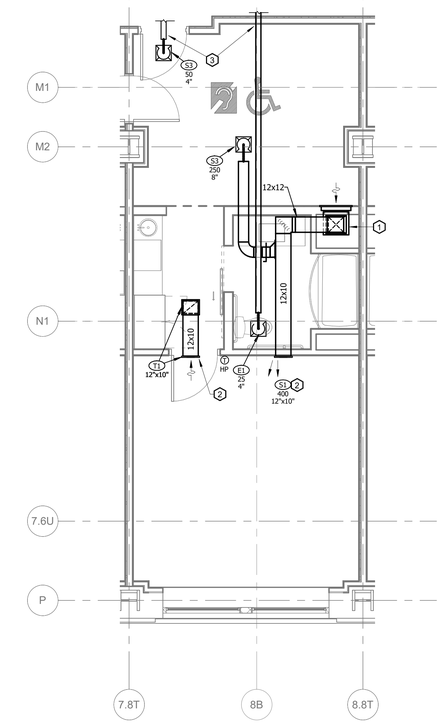
6 TYP. DOUBLE QUEEN 'F' - MECHANICAL

Scale: 1/4" = 1'-0"



4 TYP. DOUBLE QUEEN 'D' - MECHANICAL

Scale: 1/4" = 1'-0"



2 TYP. DOUBLE QUEEN 'B' ADA - MECHANICAL

Scale: 1/4" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-T5 FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1. VERTICAL WATER SOURCE HEAT PUMP. REFER TO OVERALL FLOOR PLANS FOR UNIT TAG PER ROOM. PROVIDE MANUFACTURER'S HINGED RETURN AIR DOOR.
2. MOUNT BOTTOM OF GRILLE 10'-0" AFF.
3. PROVIDE SOUND INSULATION AT PENETRATION OF DUCT THROUGH SOUND WALL. REFER TO DETAIL ON SHEET M4.01.

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
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HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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Enlarged Unit Plans
Mechanical

M3.01

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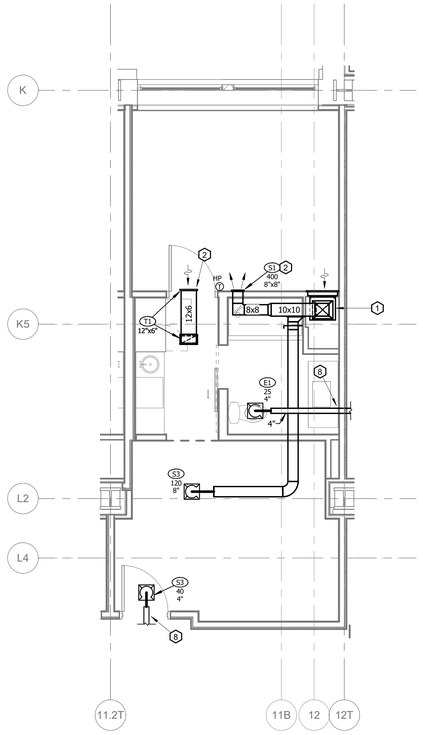
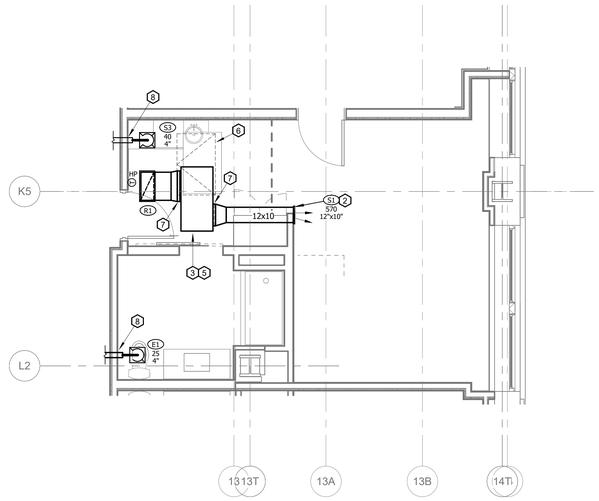


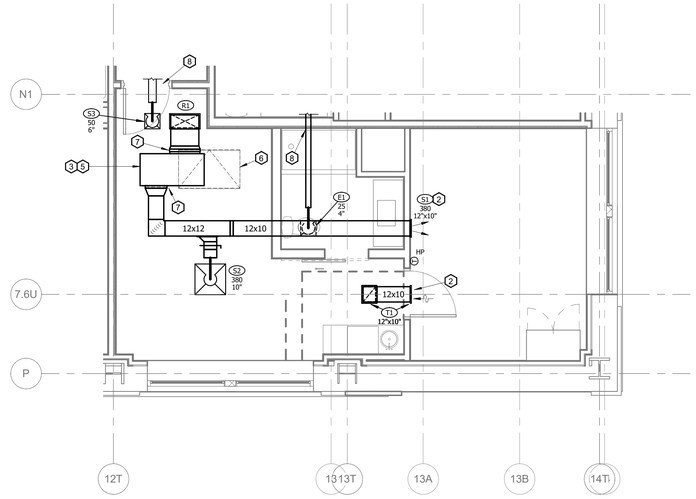
7 TYP. KING 'G' - MECHANICAL

Scale: 1/4" = 1'-0"



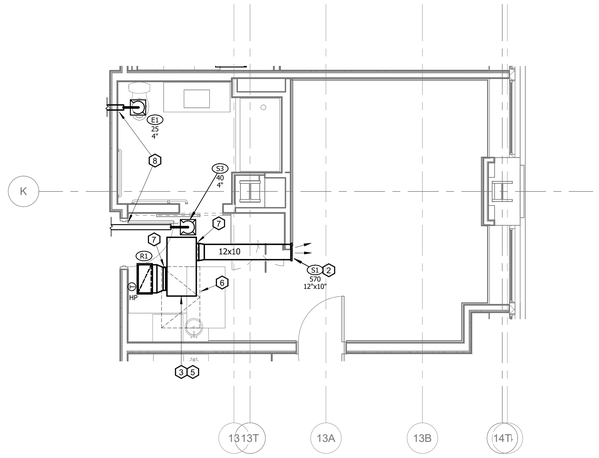
4 TYP. KING 'D' - MECHANICAL

Scale: 1/4" = 1'-0"



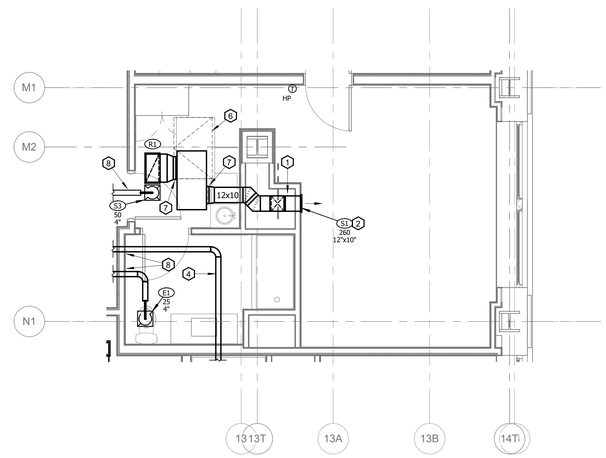
1 TYP. KING 'A' - MECHANICAL

Scale: 1/4" = 1'-0"



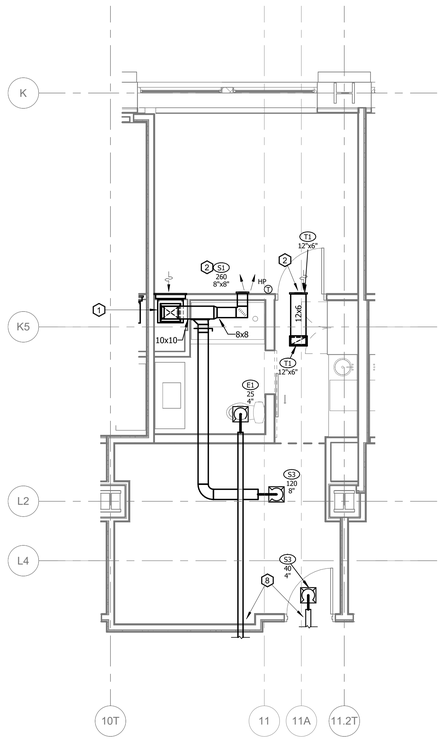
5 TYP. KING 'E' ADA - MECHANICAL

Scale: 1/4" = 1'-0"



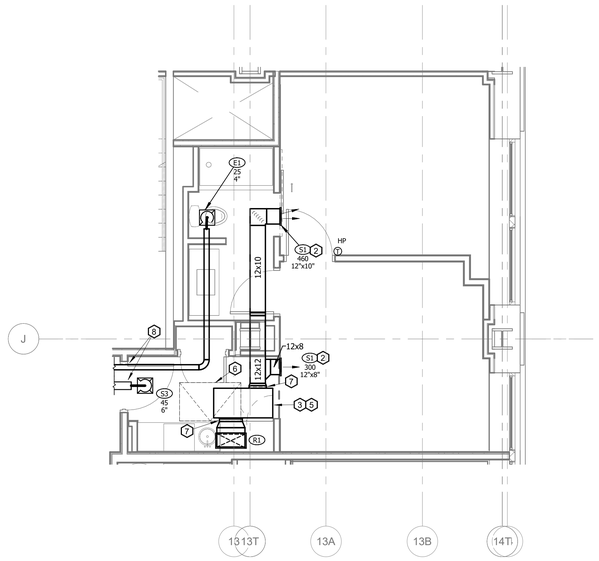
2 TYP. KING 'B' - MECHANICAL

Scale: 1/4" = 1'-0"



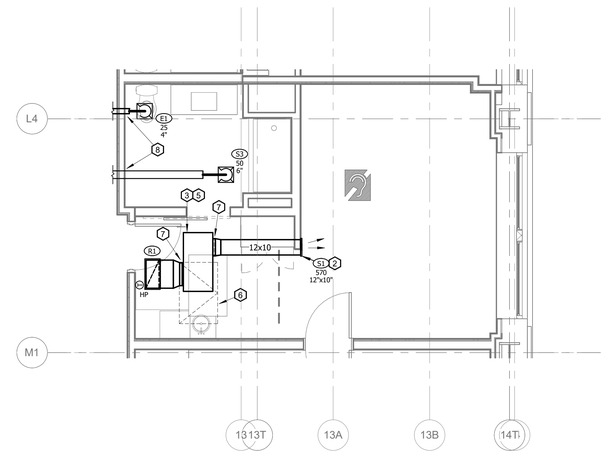
8 TYP. KING 'H' - MECHANICAL

Scale: 1/4" = 1'-0"



6 TYP. KING 'F' - MECHANICAL

Scale: 1/4" = 1'-0"



3 TYP. KING 'C' - MECHANICAL

Scale: 1/4" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-T5 FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1. VERTICAL WATER SOURCE HEAT PUMP. REFER TO OVERALL FLOOR PLANS FOR UNIT TAG PER ROOM. PROVIDE MANUFACTURER'S HINGED RETURN AIR DOOR.
2. MOUNT BOTTOM OF GRILLE 12"-0" AFF.
3. ROUTE WATER SOURCE HEAT PUMP CONDENSATE TO CONNECTION AT TAIL END OF NEAREST RESTROOM SINK.
4. EXHAUST FROM ADJACENT UNIT TO CORRIDOR.
5. HORIZONTAL WATER SOURCE HEAT PUMP. REFER TO OVERALL PLANS FOR UNIT TAG PER ROOM.
6. 30x48 ACCESS PANEL TO SERVICE HORIZONTAL HEAT PUMP IN CEILING. COORDINATE LOCATION WITH ACTUAL EQUIPMENT IN FIELD.
7. FLEX DUCT CONNECTION.
8. PROVIDE SOUND INSULATION AT PENETRATION OF DUCT THROUGH SOUND WALL. REFER TO DETAIL ON SHEET M4.01.

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CERTIFICATION

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HOSS & BROWN ENGINEERS
15902 Midland Drive
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913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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MO Certificate of Authority 01022

Enlarged Unit Plans
Mechanical

M3.02

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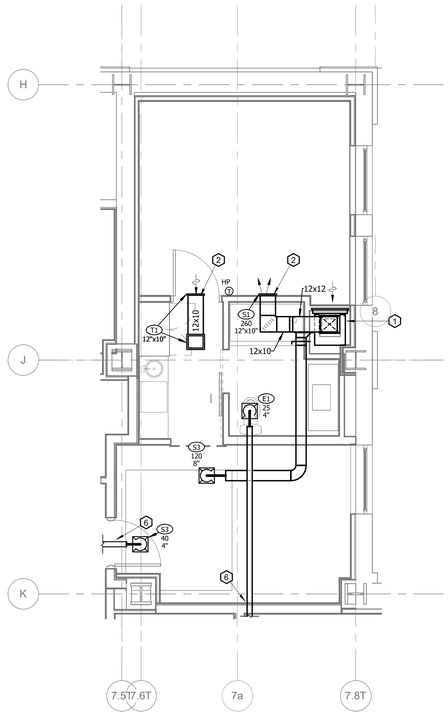
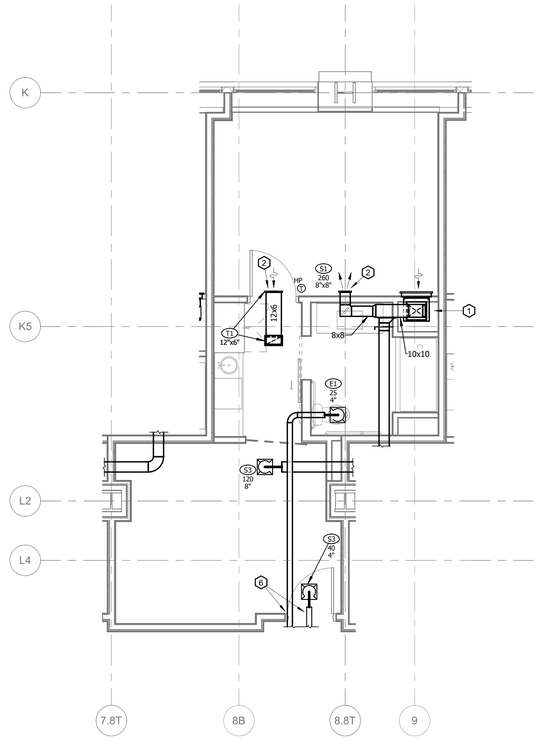


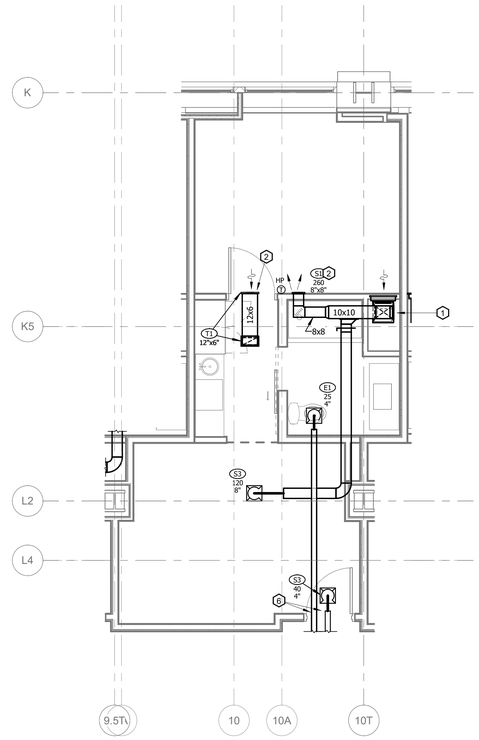
5 TYP. KING 'M' MECHANICAL

Scale: 1/4" = 1'-0"



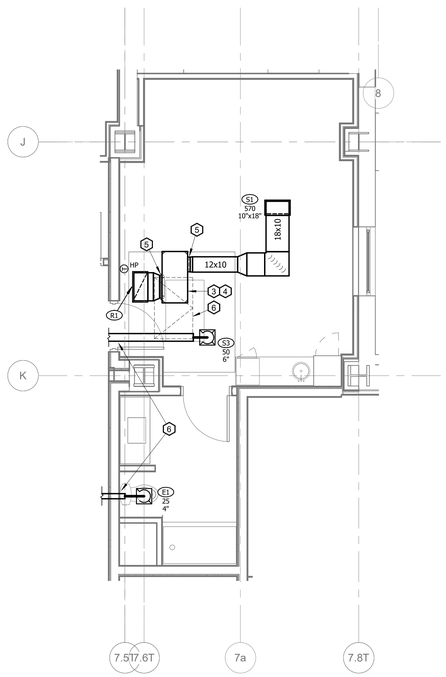
3 TYP. KING 'K' ADA MECHANICAL

Scale: 1/4" = 1'-0"



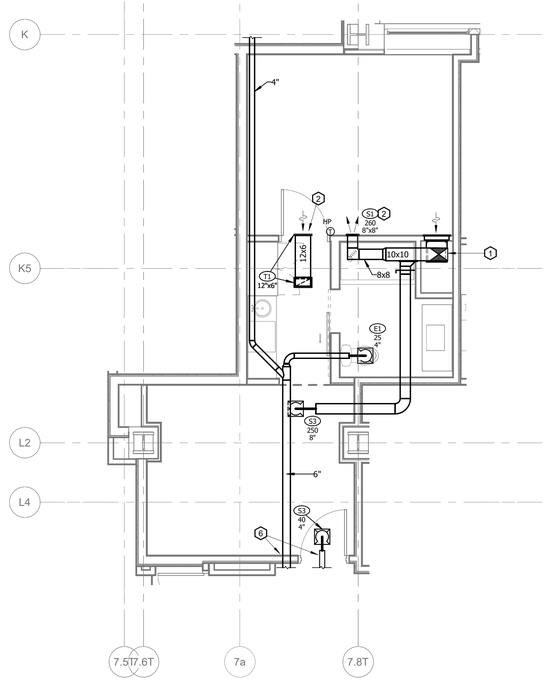
1 TYP. KING 'I' MECHANICAL

Scale: 1/4" = 1'-0"



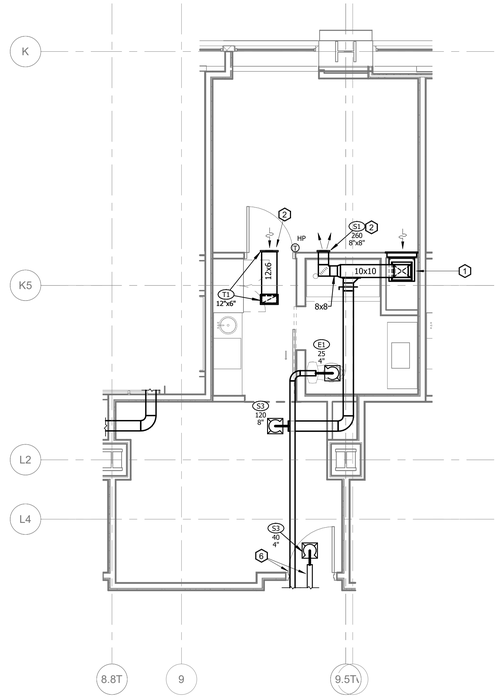
6 TYP. KING 'M1' MECHANICAL

Scale: 1/4" = 1'-0"



4 TYP. KING 'L' MECHANICAL

Scale: 1/4" = 1'-0"



2 TYP. KING 'J' MECHANICAL

Scale: 1/4" = 1'-0"

GENERAL NOTES:

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PLAN NOTES:

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2. MOUNT BOTTOM OF GRILLE 10'-0" AFF.
3. ROUTE WATER SOURCE HEAT PUMP CONDENSATE TO CONNECTION AT TAIL END OF NEAREST RESTROOM SINK.
4. HORIZONTAL WATER SOURCE HEAT PUMP. REFER TO OVERALL PLANS FOR UNIT TAG PER ROOM.
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Enlarged Unit Plans
Mechanical

M3.03

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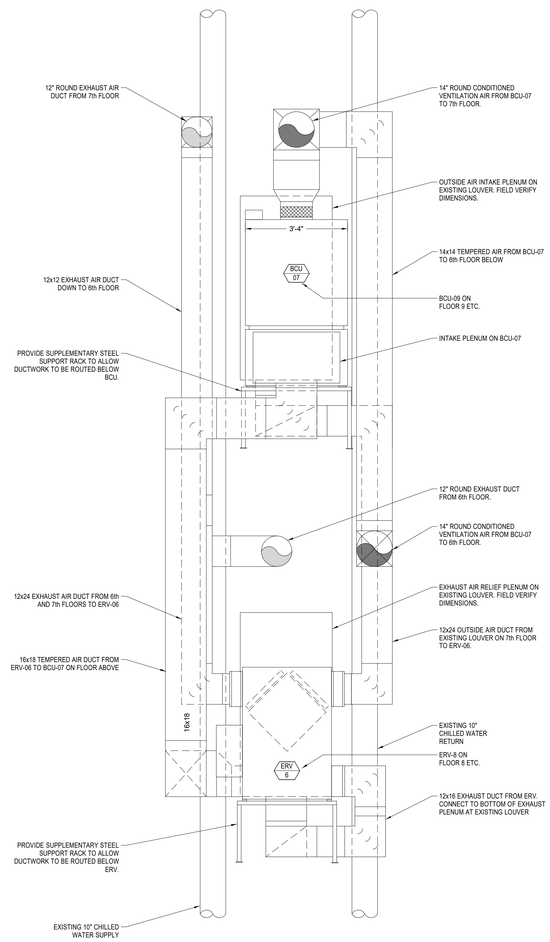
GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE PIPING SYSTEMS COMPLETE AND PER APPLICABLE CODES INCLUDING ALL NECESSARY COMPONENTS AND OFFSETS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR OTHER CONDITIONS.
B. COORDINATE THE INSTALLATION OF PIPING AND EQUIPMENT WITH THE WORK OF ALL OTHER TRADES.
C. THE CONTRACTOR SHALL NOT LOCATE PIPING BELOW DUCT MOUNTED EQUIPMENT.
D. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR SUPPORTS, ANCHORS, AND GUIDES. SUBMIT PROPOSED METHODS OF ANCHORING AND GUIDING TO THE STRUCTURAL ENGINEER FOR APPROVAL.
E. PIPING SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT OR PANELS. PROVIDE THE CODE REQUIRED WORKING CLEARANCE AROUND ALL ELECTRICAL EQUIPMENT AND PANELS.

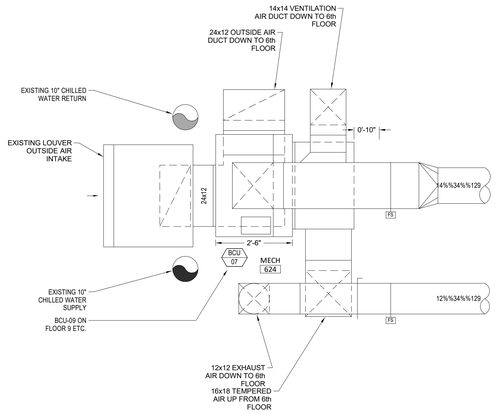
PLAN NOTES:

1. NOT USED



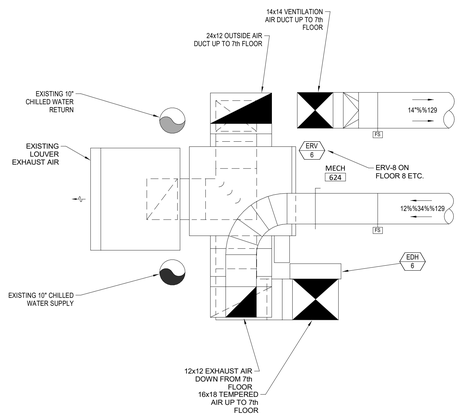
3 Section at Sixth Floor & Seventh Floor - Mechanical Closets

Scale: 1/2" = 1'-0" (TYPICAL FOR FLOORS 8/9, 10/11, 12/13, 14/15, 16/17, & 18/19)



2 Seventh Floor - Mechanical Closet

Scale: 1/8" = 1'-0" (TYPICAL FOR FLOORS 9, 11, 13, 15, 17, & 19)



1 Sixth Floor - Mechanical Closet

Scale: 1/8" = 1'-0" (TYPICAL FOR FLOORS 8, 10, 12, 14, 16, & 18)

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10300 North Central Expressway, Suite 335
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Website: www.matchlinedesign.com

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

H&B ENGINEERS
HOSS & BROWN
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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MO Certificate of Authority 01022

Enlarged Plans Mechanical Rooms

M3.04

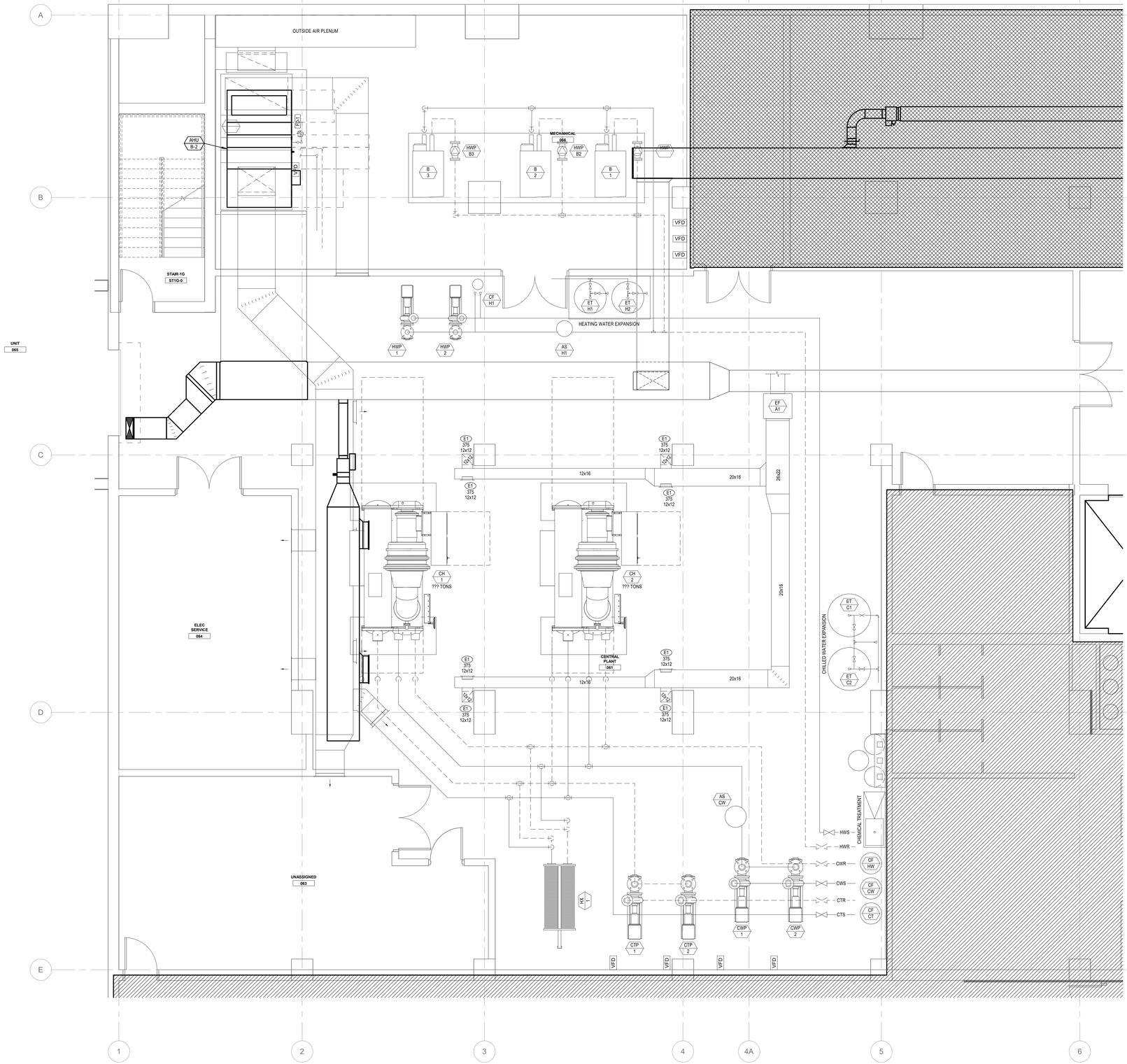
F:\1820630 - Grand Reserve Hotel\Revit\0-TOWER PACKAGE\Users\Bailey\1820630_The Grand Reserve M-E_BDECK_R17.rvt
9/8/2020 11:55:18 AM

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

1. DO NOT THE GENERAL NOTES AND DEMOLITION THE NOT APPLICABLE.



1 GARAGE BASEMENT FLOOR MECHANICAL PLAN

Scale: 1/4" = 1'-0"

FUTURE WORK

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Mechancial Enlarged Plan

M3.05

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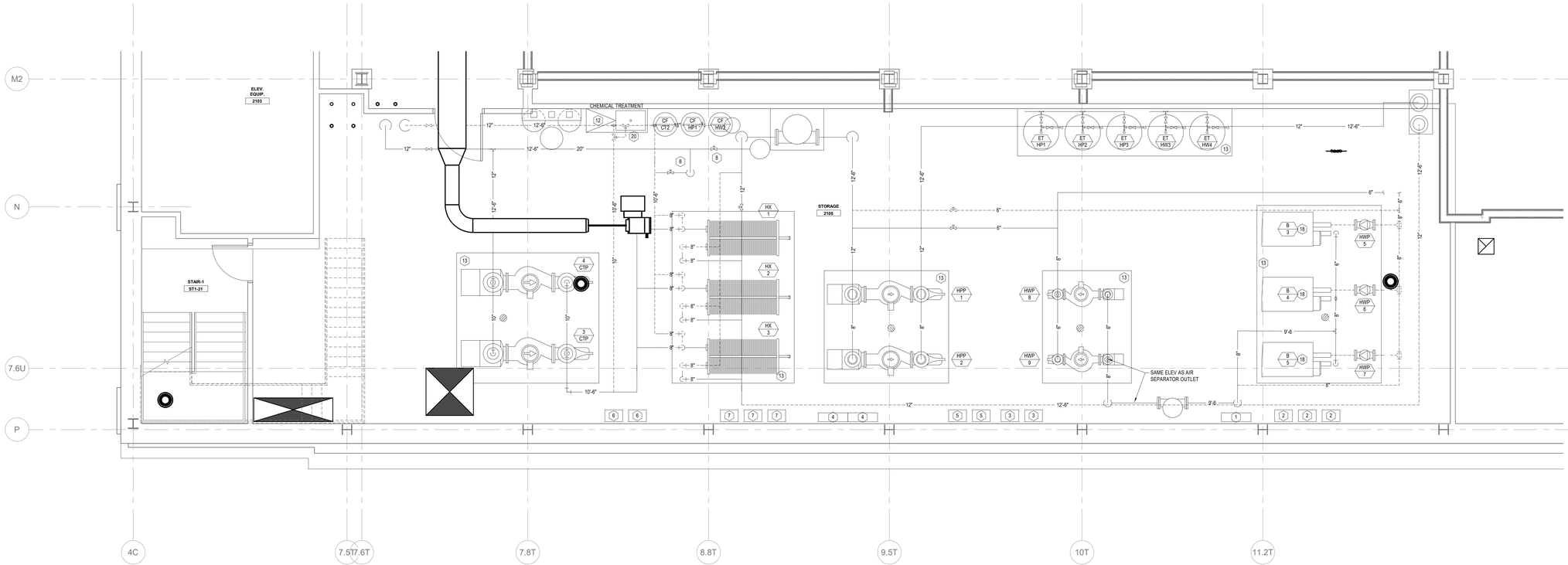
GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

DO NOT FOR NOTES IN THIS AREA UNLESS THE TEXT AFTER EXCUP.



1 TOWER TWENTY FIRST FLOOR MECHANICAL PLAN

Scale: 1/4" = 1'-0"

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NUMBER
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PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Mechanical Enlarged Plan

M3.06

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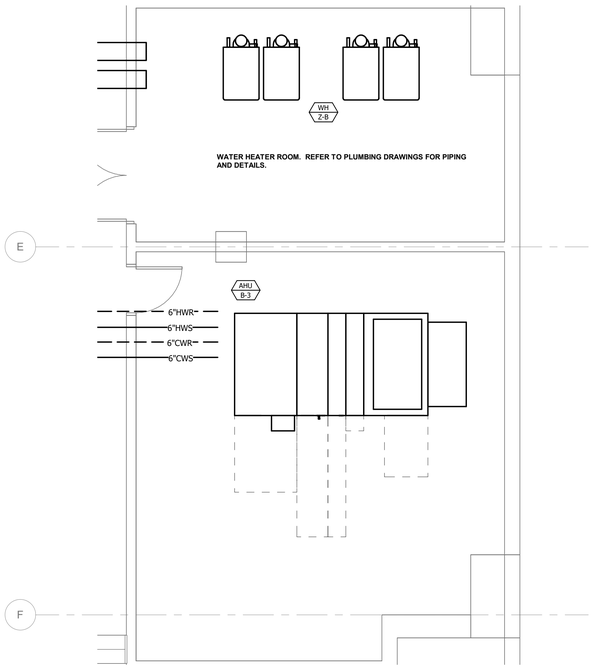
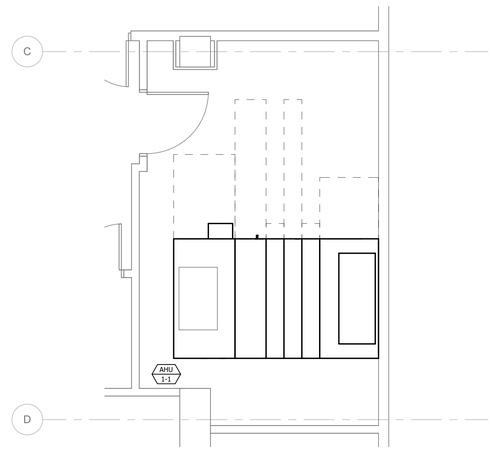
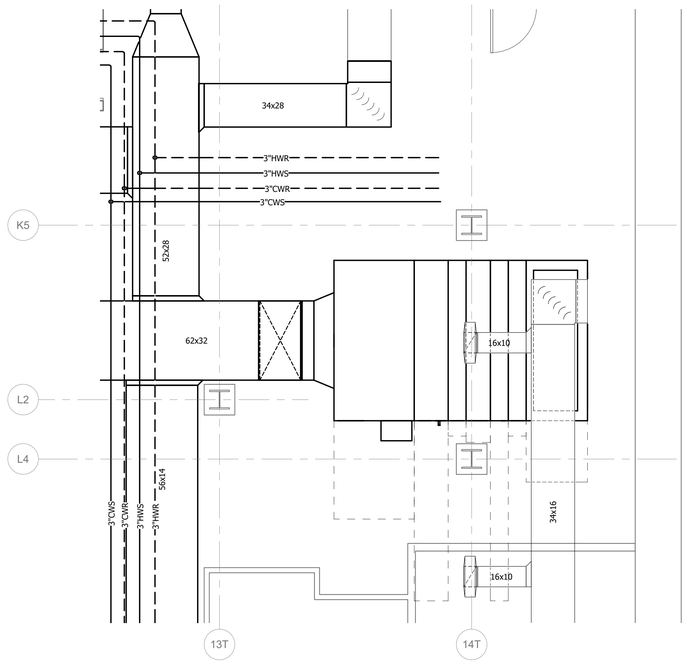


1 GARAGE BASEMENT FLOOR MECHANICAL ROOM ENLARGED PLAN
Scale: 1/4" = 1'-0"



2 GARAGE GROUND FLOOR MECHANICAL ENLARGED PLAN
Scale: 1/4" = 1'-0"



3 TOWER BASEMENT FLOOR MECHANICAL ROOM ENLARGED PLAN
Scale: 1/4" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET M1.01-G FOR MECHANICAL GENERAL NOTES.

PLAN NOTES:

DO NOT TYPE NOTES IN THIS BOX UNLESS THIS NOT OPEN DATA

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Mechanical Enlarged Plan

M3.07

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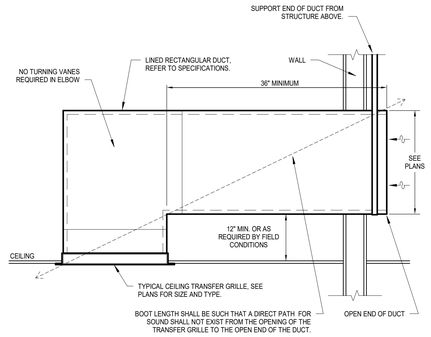
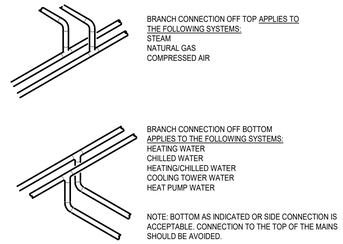


7 TRANSFER DUCT SOUND BOOT

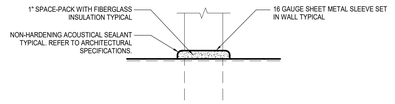
Scale: Not to Scale



NOTES:
1. REFER TO SPECIFICATIONS FOR VENTING OF SYSTEMS WHEN CONNECTIONS CAN NOT BE MADE AS SHOWN ABOVE.

3 PIPING BRANCH CONNECTION

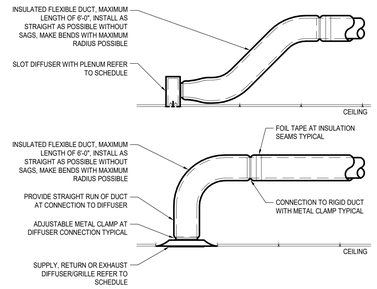
Scale: Not to Scale



NOTES:
1. WHERE FIRE DAMPERS ARE REQUIRED, INSTALL PER MANUFACTURER'S UL APPROVED DETAIL.
2. PROVIDE AT ALL PENETRATIONS TO WALLS OF TYPE MJ, MK, ME, & MB AS INDICATED ON ARCHITECTURAL PLANS.

6 DUCT PENETRATION AT SOUND WALL

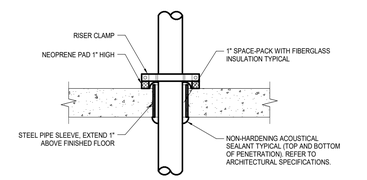
Scale: Not to Scale



NOTES:
1. DUCT AND DIFFUSER SIZES SHALL BE AS INDICATED ON THE PLANS.
2. SUPPORT DUCTWORK PER SPECIFICATIONS.
3. COORDINATE CEILING TYPES WITH ARCHITECURAL PLANS.

2 DIFFUSER CONNECTION

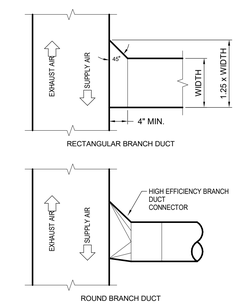
Scale: Not to Scale



NOTES:
1. WHERE FLOOR IS FIRE RATED, INSTALL FIRE RATED SEALANT PER MANUFACTURER'S UL APPROVED DETAIL.
2. PROVIDE AT ALL PENETRATIONS TO WALL OF TYPE MJ, MK, ME, & MB AS INDICATED ON ARCHITECTURAL PLANS.

5 SOUND PIPE PENETRATION FLOOR

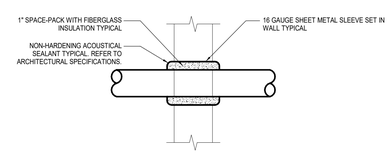
Scale: Not to Scale



NOTES:
1. SUPPLY, RETURN AND EXHAUST FITTINGS ARE SIMILAR, ONLY DIRECTION OF AIRFLOW CHANGES.
2. REFER TO FLOOR PLANS FOR BRANCH LOCATIONS REQUIRING BALANCING DAMPERS.

1 DUCT BRANCH CONNECTION

Scale: Not to Scale



NOTES:
1. WHERE WALL IS FIRE RATED, INSTALL FIRE RATED SEALANT PER MANUFACTURER'S UL APPROVED DETAIL.
2. PROVIDE AT ALL PENETRATIONS TO WALLS OF TYPE MJ, MK, ME, & MB AS INDICATED ON ARCHITECTURAL PLANS.

4 SOUND PIPE PENETRATION WALL

Scale: Not to Scale

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H&B PROJECT NUMBER : 1820630

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Mechanical Details

M4.01

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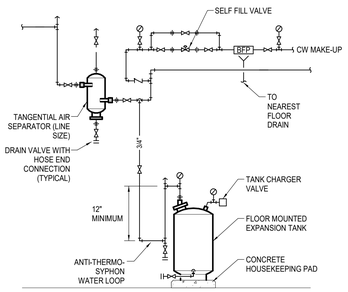
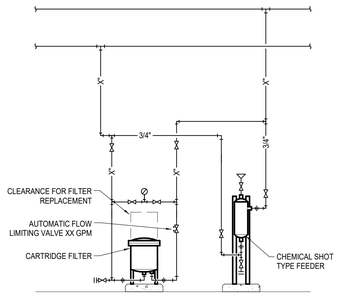


NOTES:
1. REFER TO PLANS FOR LOCATION OF EQUIPMENT AND PIPE SIZES.

1 AIR SEPERATOR & FLOOR EXPANSION TANK PIPING

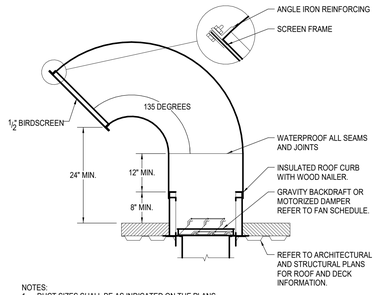
Scale: Not to Scale



NOTES:
1. REFER TO PLANS FOR LOCATION OF EQUIPMENT AND PIPE SIZES.

2 CHEM SHOT FEEDER & FILTER PIPING

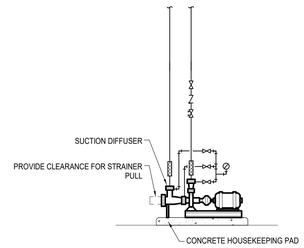
Scale: Not to Scale



NOTES:
1. DUCT SIZES SHALL BE AS INDICATED ON THE PLANS.
2. PROVIDE ROOF CURB OF SUFFICIENT HEIGHT TO PROVIDE A MINIMUM 8" CLEARANCE FROM THE TOP OF THE CURB TO THE FINISHED ROOF.
3. BOTTOM OF ROOF CURB SHALL MATCH THE SLOPE OF THE ROOF SO THAT THE TOP OF ROOF CURB IS LEVEL.
4. PROVIDE ROOFING AND FLASHING PER ARCHITECTURAL AND/OR ROOF MANUFACTURER'S REQUIREMENTS.

3 VENT RECTANGULAR GOOSENECK

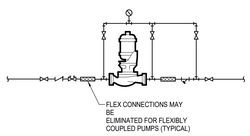
Scale: Not to Scale



NOTES:
1. NOT USED.

4 PUMP END-SUCTION PIPING

Scale: Not to Scale



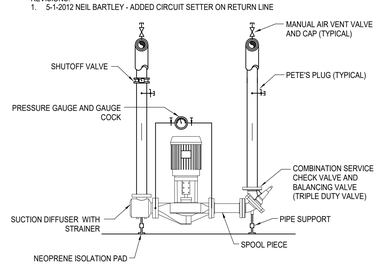
NOTES:
1. NOT USED.

5 PUMP IN-LINE PIPING

Scale: Not to Scale

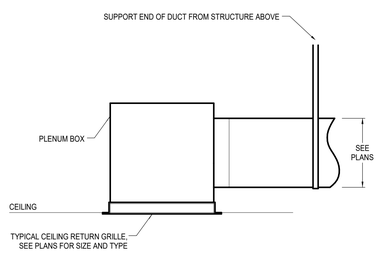
DESIGN NOTES:
1. PIPING AND SYMBOLS ARE SCALED BY A FACTOR OF 1.5
2. THIS DETAIL REPRESENTS A MODULATING CONTROL VALVE. IF A TWO-POSITION IS USED YOU WILL NEED TO REPLACE THE ISOLATION VALVE ON THE RETURN LINE WITH A BALANCING VALVE.

REVISIONS:
1. 5-1-2012 NEIL BARTLEY - ADDED CIRCUIT SETTER ON RETURN LINE



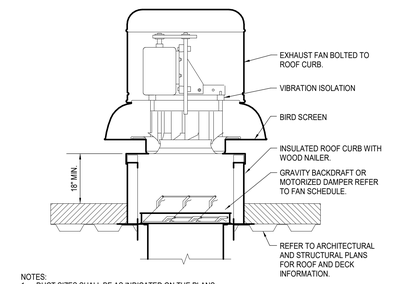
6 VERTICAL IN-LINE PUMP DETAIL

Scale: Not to Scale



7 CEILING EXHAUST GRILLE PLENUM BOX DETAIL

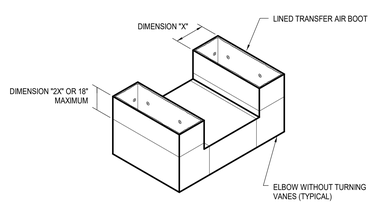
Scale: Not to Scale



NOTES:
1. DUCT SIZES SHALL BE AS INDICATED ON THE PLANS.
2. PROVIDE ROOF CURB OF SUFFICIENT HEIGHT TO PROVIDE A MINIMUM 18" CLEARANCE FROM THE TOP OF THE CURB TO THE FINISHED ROOF.
3. DOWNBLAST FAN SHOWN, UPBLAST FAN IS SIMILAR.
4. BOTTOM OF ROOF CURB SHALL MATCH THE SLOPE OF THE ROOF SO THAT THE TOP OF ROOF CURB IS LEVEL. ATTACH FAN TO CURB PER MANUFACTURER'S RECOMMENDATIONS.
5. PROVIDE ROOFING AND FLASHING PER ARCHITECTURAL AND/OR ROOF MANUFACTURER'S REQUIREMENTS.

8 FAN EXHAUST ROOF

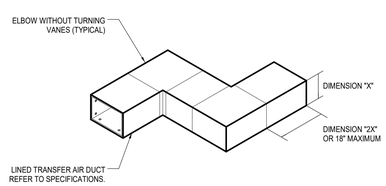
Scale: Not to Scale



NOTES:
1. DUCT SIZES SHALL BE AS INDICATED ON FLOOR PLANS.
2. REFER TO ARCHITECTURAL AND MECHANICAL FLOOR PLANS FOR PENETRATIONS TO FIRE RATED ASSEMBLIES. PROVIDE FIRE AND/OR FIRE/SMOKE DAMPERS WHERE REQUIRED AND INSTALL PER MANUFACTURER'S UL APPROVED DETAILS.

9 DUCT TRANSFER-U DUCT

Scale: Not to Scale



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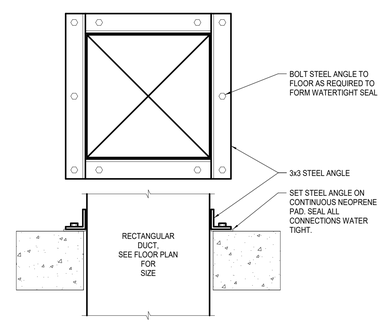
2. REFER TO ARCHITECTURAL AND MECHANICAL FLOOR PLANS FOR PENETRATIONS TO FIRE RATED ASSEMBLIES. PROVIDE FIRE AND/OR FIRE/SMOKE DAMPERS WHERE REQUIRED AND INSTALL PER MANUFACTURER'S UL APPROVED DETAILS.

10 DUCT TRANSFER-Z DUCT

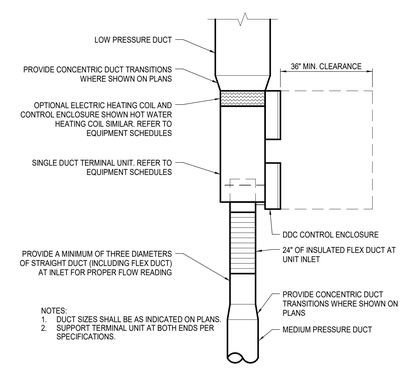
Scale: Not to Scale



NOTES:
1. REFER TO ARCHITECTURAL AND MECHANICAL FLOOR PLANS FOR PENETRATIONS TO FIRE RATED ASSEMBLIES. PROVIDE FIRE AND/OR FIRE/SMOKE DAMPERS WHERE REQUIRED AND INSTALL PER MANUFACTURER'S UL APPRVED DETAILS.

11 MECHANICAL ROOM DUCT FLOOR PENETRATION

Scale: Not to Scale



NOTES:
1. DUCT SIZES SHALL BE AS INDICATED ON PLANS.
2. SUPPORT TERMINAL UNIT AT BOTH ENDS PER SPECIFICATIONS.

12 TERMINAL UNIT SINGLE DUCT

Scale: Not to Scale

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Mechanical Details

M4.02

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913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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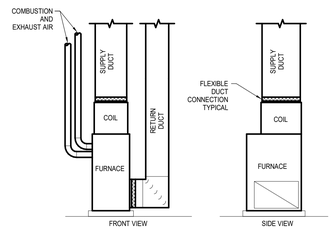
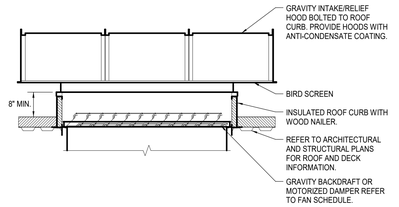


NOTES:
1. COORDINATE CONNECTION SIZES WITH PLANS.
2. SUPPORT DUCT WORK INDEPENDENT OF EQUIPMENT. FLEXIBLE CONNECTIONS SHALL BE STRAIGHT AND NOT COMPRESSED.

1 FURNACE CONNECTION DETAIL

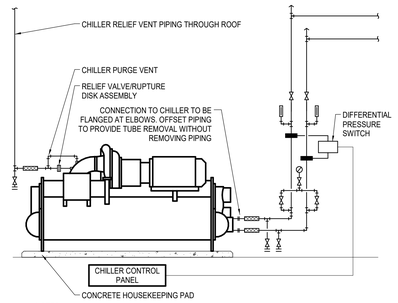
Scale: Not to Scale



NOTES:
1. DUCT SIZES SHALL BE AS INDICATED ON THE PLANS.
2. HOODS SHALL BE HINGED TO PROVIDE ACCESS TO THE DAMPERS AND OPERATORS.
3. PROVIDE ROOF CURB OF SUFFICIENT HEIGHT TO PROVIDE A MINIMUM 8" CLEARANCE FROM THE TOP OF THE CURB TO THE FINISHED ROOF.
4. GRAVITY DAMPER SHOWN, MOTORIZED DAMPER IS SIMILAR.
5. BOTTOM OF ROOF CURB SHALL MATCH THE SLOPE OF THE ROOF SO THAT THE TOP OF ROOF CURB IS LEVEL. ATTACH FAN TO CURB PER MANUFACTURER'S RECOMMENDATIONS.
6. PROVIDE ROOFING AND FLASHING PER ARCHITECTURAL AND/OR ROOF MANUFACTURER'S REQUIREMENTS.

2 HOOD ROOF INTAKE RELIEF

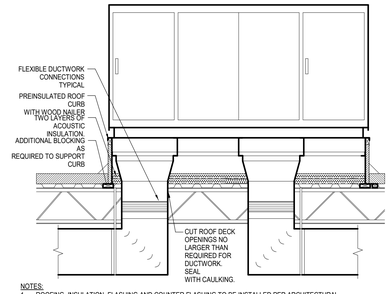
Scale: Not to Scale



NOTES:
1. REFER TO PLANS FOR LOCATION OF EQUIPMENT AND PIPE SIZES.
2. THE DIFFERENTIAL PRESSURE SWITCH IS PROVIDED BY THE CHILLER MANUFACTURER. THE CONTRACTOR SHALL FIELD MOUNT AND WIRE THE SWITCH PER THE MANUFACTURER'S RECOMMENDATIONS.
3. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES ON ALL SIDES OF THE CHILLER.

3 CHILLER CENTRIFUGAL PIPING

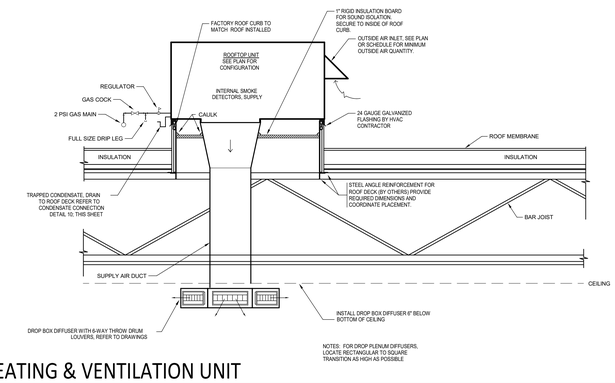
Scale: Not to Scale



NOTES:
1. ROOFING, INSULATION, FLASHING AND COUNTER FLASHING TO BE INSTALLED PER ARCHITECTURAL PLANS, DETAILS AND SPECIFICATIONS.
2. BLOCKING AND SUPPORT SHALL BE INSTALLED PER THE STRUCTURAL PLANS, DETAILS AND SPECIFICATIONS.
3. CONTRACTOR TO PROVIDE GASKETING AT THE PERIMETER OF THE CURB AND AT ALL SUPPLY AND RETURN DUCT CHANNELS.
4. ACOUSTIC INSULATION SHALL BE INSTALLED OVER THE ENTIRE CURB BASE WITHOUT GAPS. PROVIDE OWENS CORNING SELECTSOUND 2" THICK ACOUSTIC BLANKET OR EQUAL.
5. CURB SHALL BE INSTALLED LEVEL. REFER TO ARCHITECTURAL PLANS FOR ROOF SLOPE.

4 ROOF CURB RTU

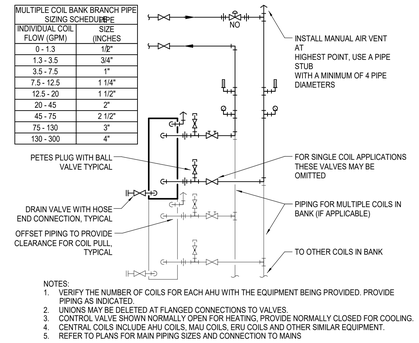
Scale: Not to Scale



5 OUTDOOR HEATING & VENTILATION UNIT

Scale: Not to Scale

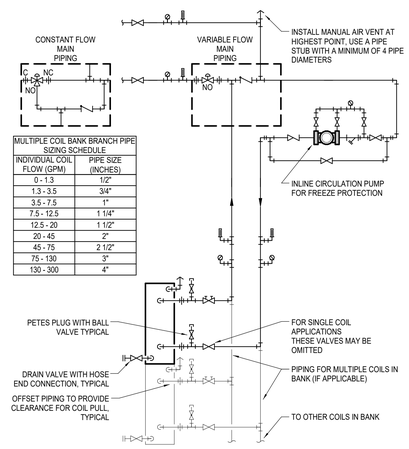
MULTIPLE COIL BANK BRANCH PIPE SIZING SCHEDULE	
INDIVIDUAL COIL FLOW (GPM)	PIPE SIZE (INCHES)
0 - 1.3	1/2"
1.3 - 3.5	3/4"
3.5 - 7.5	1"
7.5 - 12.5	1 1/4"
12.5 - 20	1 1/2"
20 - 45	2"
45 - 75	2 1/2"
75 - 130	3"
130 - 300	4"



NOTES:
1. VERIFY THE NUMBER OF COILS FOR EACH AHU WITH THE EQUIPMENT BEING PROVIDED. PROVIDE PIPING AS INDICATED.
2. UNIONS MAY BE DELETED AT FLANGED CONNECTIONS TO VALVES.
3. CONTROL VALVE SHOWN NORMALLY OPEN FOR HEATING. PROVIDE NORMALLY CLOSED FOR COOLING.
4. CENTRAL COILS INCLUDE AHU COILS, MAU COILS, ERU COILS AND OTHER SIMILAR EQUIPMENT.
5. REFER TO PLANS FOR MAIN PIPING SIZES AND CONNECTION TO MAINS

6 COIL AHU HEAT/COOL 2 WAY VALVE

Scale: Not to Scale



MULTIPLE COIL BANK BRANCH PIPE SIZING SCHEDULE	
INDIVIDUAL COIL FLOW (GPM)	PIPE SIZE (INCHES)
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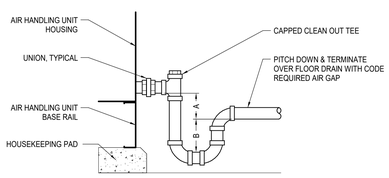
1.3 - 3.5	3/4"
3.5 - 7.5	1"
7.5 - 12.5	1 1/4"
12.5 - 20	1 1/2"
20 - 45	2"
45 - 75	2 1/2"
75 - 130	3"
130 - 300	4"

NOTES:
1. VERIFY THE NUMBER OF COILS FOR EACH AHU WITH THE EQUIPMENT BEING PROVIDED. PROVIDE PIPING AS INDICATED.
2. UNIONS MAY BE DELETED AT FLANGED CONNECTIONS TO VALVES.
3. CENTRAL COILS INCLUDE AHU COILS, MAU COILS, ERU COILS AND OTHER SIMILAR EQUIPMENT.
4. REFER TO PLANS FOR MAIN PIPING SIZES AND CONNECTION TO MAINS

7 COIL CENTRAL HEAT CIRCUILATION PUMP

Scale: Not to Scale



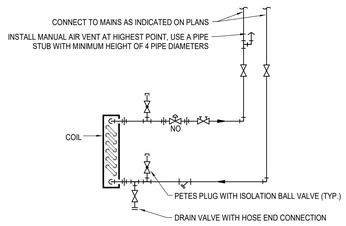
DRAW THROUGH UNIT
DIMENSION "A" = 2" MINIMUM
DIMENSION "B" = 4" MINIMUM OR STATIC PRESSURE (WHICHEVER IS GREATER)

BLOW THROUGH UNIT
DIMENSION "A" = 1" MINIMUM
DIMENSION "B" = 6" MINIMUM OR STATIC PRESSURE PLUS 2" (WHICHEVER IS GREATER)

NOTES:
1. CONTRACTOR SHALL VERIFY PRESSURES EXPECTED AT THE COIL WITH THE ACTUAL EQUIPMENT BEING PROVIDED.
2. PROVIDE ADDITIONAL SUPPLEMENTARY STRUCTURAL STEEL UNDER BASE RAIL AS REQUIRED TO ELEVATE THE UNIT FOR DRAIN TRAP INSTALLATION AND AIR GAP AT FLOOR DRAIN IF REQUIRED.
3. DRAIN LINE SIZE SHALL BE UNIT CONNECTION SIZE MINIMUM.

8 COIL DRAIN PAN TRAP PIPING

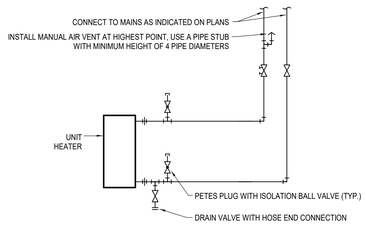
Scale: Not to Scale



NOTES:
1. IF COIL HAS VENT AND/OR DRAIN CONNECTIONS, THEY ARE TO BE USED IN LIEU OF INSTALLING IN PIPING AS INDICATED.
2. TERMINAL COILS INCLUDE TERMINAL UNIT COILS, DUCT MOUNTED COILS, UNIT HEATERS, CABINET UNIT HEATERS AND OTHER SIMILAR EQUIPMENT.
3. CONTROL VALVE SHOWN NORMALLY OPEN FOR HEATING, PROVIDE NORMALLY CLOSED VALVE FOR COOLING.
4. REFER TO PLANS FOR PIPE SIZES.

9 COIL TERMINAL HEAT/COOL 2-WAY VALVE

Scale: Not to Scale



NOTES:
1. IF COIL HAS VENT AND/OR DRAIN CONNECTIONS, THEY ARE TO BE USED IN LIEU OF INSTALLING IN PIPING AS INDICATED.
2. REFER TO PLANS FOR PIPE SIZES.

10 M - 23 82 39 - UNIT HEATER PIPING

Scale: Not to Scale

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 182063

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Mechanical Details

M4.03

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1 HVAC Piping Risers

Scale: Not to Scale

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE PIPING SYSTEMS COMPLETE AND PER APPLICABLE CODES INCLUDING ALL NECESSARY COMPONENTS AND OFFSETS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR OTHER CONDITIONS.
B. COORDINATE THE INSTALLATION OF PIPING AND EQUIPMENT WITH THE WORK OF ALL OTHER TRADES.
C. THE CONTRACTOR SHALL NOT LOCATE PIPING BELOW DUCT MOUNTED EQUIPMENT.
D. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR SUPPORTS, ANCHORS, AND GUICES. SUBMIT PROPOSED METHODS OF ANCHORING AND GUIDING TO THE STRUCTURAL ENGINEER FOR APPROVAL.
E. PIPING SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT OR PANELS. PROVIDE THE CODE REQUIRED WORKING CLEARANCE AROUND ALL ELECTRICAL EQUIPMENT AND PANELS.

6 PLAN NOTES:

1. REFER TO 4TH FLOOR PLUMBING PLANS FOR CONTINUATION OF CONDENSATE DRAIN PIPING.
2. REFER TO 19TH FLOOR HVAC PIPING PLAN FOR CONTINUATION OF HPS&R MAINS.

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CASEY JOHN STEPHENS
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9/8/2020

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FOR CONSTRUCTION

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925 Grand Boulevard
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Project No.: 18A023
Drawn By: RC
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HVAC Piping Risers

M5.01

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H&B PROJECT NUMBER : 1820630

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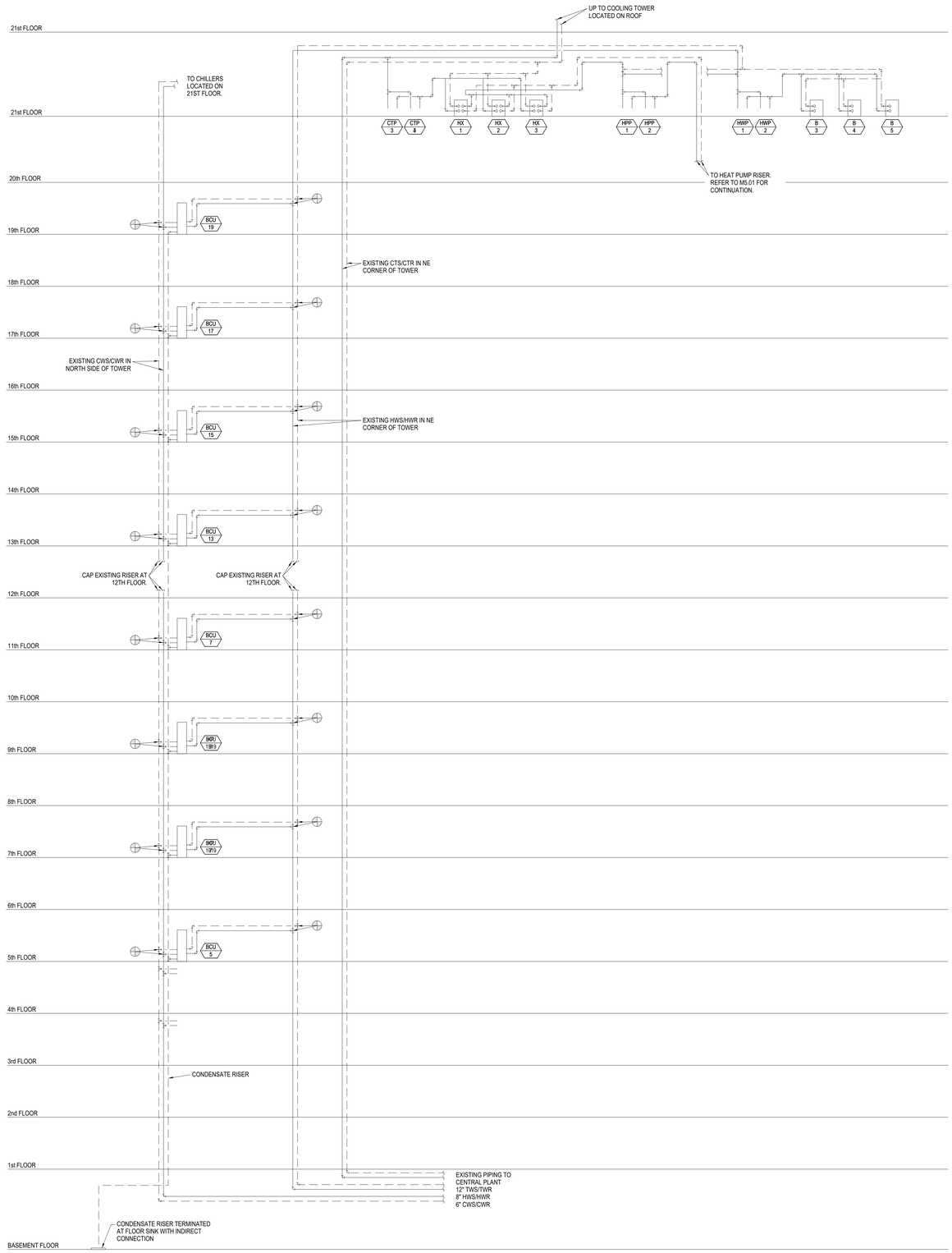

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PLAN NOTES:

1.

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CASEY JOHN STEPHENS
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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Shawnee, Kansas 66217
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H&B PROJECT NUMBER : 1820630

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Mechanical Risers and Diagrams

M5.02

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WATER SOURCE HEAT PUMP SCHEDULE

NOTES:

1. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE LEFT SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES....
2. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE RIGHT SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES.
3. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE BACK SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES.

GENERAL NOTES (APPLY TO ALL BELOW):

A. PROVIDE UNIT WITH FACTORY MOUNTED AND WIRED DISCONNECT FOR SINGLE-POINT ELECTRICAL CONNECTION.
B. PROVIDE MINNIMUM EFFICIENCY OF MERV 8 FILTERS. DO NOT OPERATE HEAT PUMPS DURING CONSTRUCTION.
C. PROVIDE VERTICAL UNITS WITH TOP SUPPLY AND RETURN AIR HINGED ACOUSTICAL DOOR (FLUSH WITH WALL).
D. PROVIDE ECM FAN MOTORS.
E. PROVIDE ALL UNITS WITH FACTORY INSTALLED FLOW CONTROL VALVE, STRAINER AND 2-POSITION CONTROL VALVE, HOSE KITS AND BALL ISOLATION VALVES.
F. COOLING PERFORMANCE SHALL BE BASED ON 74F ENTERING AIR TEMPERATURE AND 90F ENTERING WATER TEMPERATURE.
G. HEATING PERFORMANCE SHALL BE BASED ON 70F ENTERING AIR TEMPERATURE AND 55F ENTERING WATER TEMPERATURE.
H. REFER TO PLANS FOR CONFIGURATION OF HORIZONTAL HEAT PUMPS.
I. PROVIDE A SECONDARY DRAIN PAN FOR ALL HORIZONTAL UNITS INSTALLED ABOVE A CEILING. ROUTE 3/4" CONDENSATE LINE INDEPENDENT OF PRIMARY DRIAN. REFER TO PLANS.
J. PROVIDE ALL UNITS WITH THE MANUFACTURER'S DELUX SOUND ATTENUATION PACKAGE.
K. PROVIDE UNIT WITH HONEYWELL INNCOM E7 HOSPITALITY THERMOSTAT.

			SUPPLY FAN		COOLING					HEATING				WATER					
MARK	MANUFACTURER	MODEL	CFM	ESP	EAT DB/WB	LAT DB/WB	SENS (BTUH)	TOTAL (BTUH)	EER	EAT DB	LAT DB	BTUH	COP	GPM	WPD (FT)	V/PH	MCA	MOCP	NOTES
HP-1100	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-1101	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1102	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1103	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1104	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1105	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1106	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-1107	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-1108	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1109	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1110	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-1111	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1112	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-1113	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1114	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1115	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-1116	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1117	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1118	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	1
HP-1120	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2
HP-1200	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-1201	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1202	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1203	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1204	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1205	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1206	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-1207	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-1208	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1209	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1210	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-1211	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1212	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-1213	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1214	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1215	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-1216	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1217	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1218	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1219	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-1220	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2

WATER SOURCE HEAT PUMP SCHEDULE

NOTES:

1. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE LEFT SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES....
2. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE RIGHT SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES.
3. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE BACK SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES.

GENERAL NOTES (APPLY TO ALL BELOW):

A. PROVIDE UNIT WITH FACTORY MOUNTED AND WIRED DISCONNECT FOR SINGLE-POINT ELECTRICAL CONNECTION.
B. PROVIDE MINNIMUM EFFICIENCY OF MERV 8 FILTERS. DO NOT OPERATE HEAT PUMPS DURING CONSTRUCTION.
C. PROVIDE VERTICAL UNITS WITH TOP SUPPLY AND RETURN AIR HINGED ACOUSTICAL DOOR (FLUSH WITH WALL).
D. PROVIDE ECM FAN MOTORS.
E. PROVIDE ALL UNITS WITH FACTORY INSTALLED FLOW CONTROL VALVE, STRAINER AND 2-POSITION CONTROL VALVE, HOSE KITS AND BALL ISOLATION VALVES.
F. COOLING PERFORMANCE SHALL BE BASED ON 74F ENTERING AIR TEMPERATURE AND 90F ENTERING WATER TEMPERATURE.
G. HEATING PERFORMANCE SHALL BE BASED ON 70F ENTERING AIR TEMPERATURE AND 55F ENTERING WATER TEMPERATURE.
H. REFER TO PLANS FOR CONFIGURATION OF HORIZONTAL HEAT PUMPS.
I. PROVIDE A SECONDARY DRAIN PAN FOR ALL HORIZONTAL UNITS INSTALLED ABOVE A CEILING. ROUTE 3/4" CONDENSATE LINE INDEPENDENT OF PRIMARY DRIAN. REFER TO PLANS.
J. PROVIDE ALL UNITS WITH THE MANUFACTURER'S DELUX SOUND ATTENUATION PACKAGE.
K. PROVIDE UNIT WITH HONEYWELL INNCOM E7 HOSPITALITY THERMOSTAT.

			SUPPLY FAN		COOLING					HEATING				WATER					
MARK	MANUFACTURER	MODEL	CFM	ESP	EAT DB/WB	LAT DB/WB	SENS (BTUH)	TOTAL (BTUH)	EER	EAT DB	LAT DB	BTUH	COP	GPM	WPD (FT)	V/PH	MCA	MOCP	NOTES
HP-500	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-501	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-502	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-503	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-504	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-505	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-506	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-507	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-508	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-509	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-510	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-511	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-512	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-513	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-514	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-515	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-516	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-517	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-518	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-519	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-520	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	3
HP-600	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-601	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-602	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-603	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-604	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-605	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-606	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-607	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-608	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-609	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-610	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-611	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-612	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-613	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-614	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-615	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-616	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-617	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-618	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-619	TRANE	EXH012	570	0	73.1/61.0	51.7/50.1	14,230	11,630	13.5	71.60	99.10	12,140	4.66	3.00	12.15	208/1	8.48	15	
HP-620	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2
HP-700	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-701	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-702	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-703	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-704	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-705	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-706	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-707	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-708	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-709	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-710	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-711	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-712	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-713	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-714	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-715	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-716	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-717	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-718	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-719	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-720	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2
HP-800	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-801	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-802	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-803	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-804	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-805	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-806	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-807	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-808	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-809	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-810	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-811	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-812	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-813	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-814	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-815	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-816	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-817	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-818	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-819	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-820	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2
HP-900	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-901	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-902	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-903	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-904	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-905	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-906	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-907	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-908	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-909	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-910	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-911	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-912	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-913	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-914	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-915	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-916	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-917	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-918	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-919	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-920	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2
HP-1000	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-1001	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1002	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1003	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1004	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1005	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1006	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-1007	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-1008	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1009	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1010	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-1011	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1012	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-1013	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1014	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1015	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-1016	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1017	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1018	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1019	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-1020	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2

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STATE OF MISSOURI
CASEY JOHN STEINER
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS
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H&B PROJECT NUMBER : 1820630

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MO Certificate of Authority 01022

Mechanical Schedules

M6.01

WATER SOURCE HEAT PUMP SCHEDULE (CONT'D)

NOTES:

1. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE LEFT SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES....
2. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE RIGHT SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES.
3. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE BACK SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES.

GENERAL NOTES (APPLY TO ALL BELOW):

A. PROVIDE UNIT WITH FACTORY MOUNTED AND WIRED DISCONNECT FOR SINGLE-POINT ELECTRICAL CONNECTION.
B. PROVIDE MINNIMUM EFFICIENCY OF MERV 8 FILTERS. DO NOT OPERATE HEAT PUMPS DURING CONSTRUCTION.
C. PROVIDE VERTICAL UNITS WITH TOP SUPPLY AND RETURN AIR HINGED ACOUSTICAL DOOR (FLUSH WITH WALL).
D. PROVIDE ECM FAN MOTORS.
E. PROVIDE ALL UNITS WITH FACTORY INSTALLED FLOW CONTROL VALVE, STRAINER AND 2-POSITION CONTROL VALVE, HOSE KITS AND BALL ISOLATION VALVES.
F. COOLING PERFORMANCE SHALL BE BASED ON 74F ENTERING AIR TEMPERATURE AND 90F ENTERING WATER TEMPERATURE.
G. HEATING PERFORMANCE SHALL BE BASED ON 70F ENTERING AIR TEMPERATURE AND 55F ENTERING WATER TEMPERATURE.
H. REFER TO PLANS FOR CONFIGURATION OF HORIZONTAL HEAT PUMPS.
I. PROVIDE A SECONDARY DRAIN PAN FOR ALL HORIZONTAL UNITS INSTALLED ABOVE A CEILING. ROUTE 3/4" CONDENSATE LINE INDEPENDENT OF PRIMARY DRIAN. REFER TO PLANS.
J. PROVIDE ALL UNITS WITH THE MANUFACTURER'S DELUX SOUND ATTENUATION PACKAGE.

			SUPPLY FAN		COOLING					HEATING				WATER					
MARK	MANUFACTURER	MODEL	CFM	ESP	EAT DB/WB	LAT DB/WB	SENS (BTUH)	TOTAL (BTUH)	EER	EAT DB	LAT DB	BTUH	COP	GPM	WPD (FT)	V/PH	MCA	MOCP	NOTES
HP-1900	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-1901	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1902	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1903	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1904	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1905	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1906	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-1907	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-1908	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1909	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1910	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-1911	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1912	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-1913	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1914	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1915	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-1916	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1917	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1918	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1919	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-1920	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2

WATER SOURCE HEAT PUMP SCHEDULE (CONT'D)

NOTES:

1. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE LEFT SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES....
2. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE RIGHT SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES.
3. PROVIDE HEAT PUMP WITH TYPE L COPPER PIPING RISERS (SUPPLY, RETURN AND CONDENSATE). RISERS SHALL BE ON THE BACK SIDE OF THE UNIT. REFER TO RISER DIAGRAMS FOR PIPE SIZES.

GENERAL NOTES (APPLY TO ALL BELOW):

A. PROVIDE UNIT WITH FACTORY MOUNTED AND WIRED DISCONNECT FOR SINGLE-POINT ELECTRICAL CONNECTION.
B. PROVIDE MINNIMUM EFFICIENCY OF MERV 8 FILTERS. DO NOT OPERATE HEAT PUMPS DURING CONSTRUCTION.
C. PROVIDE VERTICAL UNITS WITH TOP SUPPLY AND RETURN AIR HINGED ACOUSTICAL DOOR (FLUSH WITH WALL).
D. PROVIDE ECM FAN MOTORS.
E. PROVIDE ALL UNITS WITH FACTORY INSTALLED FLOW CONTROL VALVE, STRAINER AND 2-POSITION CONTROL VALVE, HOSE KITS AND BALL ISOLATION VALVES.
F. COOLING PERFORMANCE SHALL BE BASED ON 74F ENTERING AIR TEMPERATURE AND 90F ENTERING WATER TEMPERATURE.
G. HEATING PERFORMANCE SHALL BE BASED ON 70F ENTERING AIR TEMPERATURE AND 55F ENTERING WATER TEMPERATURE.
H. REFER TO PLANS FOR CONFIGURATION OF HORIZONTAL HEAT PUMPS.
I. PROVIDE A SECONDARY DRAIN PAN FOR ALL HORIZONTAL UNITS INSTALLED ABOVE A CEILING. ROUTE 3/4" CONDENSATE LINE INDEPENDENT OF PRIMARY DRIAN. REFER TO PLANS.
J. PROVIDE ALL UNITS WITH THE MANUFACTURER'S DELUX SOUND ATTENUATION PACKAGE.

			SUPPLY FAN		COOLING					HEATING				WATER					
MARK	MANUFACTURER	MODEL	CFM	ESP	EAT DB/WB	LAT DB/WB	SENS (BTUH)	TOTAL (BTUH)	EER	EAT DB	LAT DB	BTUH	COP	GPM	WPD (FT)	V/PH	MCA	MOCP	NOTES
HP-1300	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-1301	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1302	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1303	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1304	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1305	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1306	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-1307	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-1308	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1309	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1310	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-1311	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1312	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-1313	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1314	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1315	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-1316	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1317	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1318	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1319	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-1320	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2
HP-1400	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-1401	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1402	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1403	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1404	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1405	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1406	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-1407	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-1408	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1409	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1410	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-1411	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1412	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-1413	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1414	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1415	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-1416	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1417	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1418	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1419	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-1420	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2
HP-1500	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-1501	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1502	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1503	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1504	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1505	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1506	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-1507	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-1508	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1509	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1510	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-1511	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1512	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-1513	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1514	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1515	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-1516	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1517	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1518	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1519	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-1520	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2
HP-1600	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-1601	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1602	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1603	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1604	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1605	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1606	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-1607	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-1608	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1609	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1610	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-1611	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1612	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-1613	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1614	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1615	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-1616	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1617	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1618	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1619	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-1620	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2
HP-1700	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-1701	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1702	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1703	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1704	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1705	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1706	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-1707	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-1708	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1709	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1710	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-1711	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1712	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-1713	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1714	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1715	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-1716	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1717	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1718	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1719	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-1720	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2
HP-1800	TRANE	EXHF036	1140	0.5	73.1/58.3	51.2/47.7	27,290	31,500	17	71.60	103.50	39,830	5.40	9.00	21.46	208/1	21.63	35	
HP-1801	TRANE	GET018	712	0	73.1/60	53.2/60	15,520	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1802	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1803	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1804	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1805	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1806	TRANE	GET018	712	0	73.1/60.1	53.2/51.1	15,470	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	2
HP-1807	TRANE	EXHF030	950	0.5	73.1/60.5	51.4/49.9	22,530	27,570	16.4	71.60	102.60	32,240	5.30	7.50	21.1	208/1	20.82	30	
HP-1808	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1809	TRANE	EXHF018	627	0.5	73.1/59.5	51.3/49.5	14,950	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1810	TRANE	EXHF030	855	0.5	73/59.3	49.5/47.2	22,040	27,220	16.4	71.80	105.90	31,880	5.30	7.5	21.1	208/1	20.82	30	
HP-1811	TRANE	EXHF018	627	0.5	73/59.4	51.2/49.3	14,940	16,950	15.7	71.80	102.20	20,870	4.80	4.50	8.75	208/1	13.50	20	
HP-1812	TRANE	EXHF024	760	0.5	73.1/60.8	53.3/50.8	16,440	21,120	16	71.60	102.80	25,950	4.80	6.00	13.89	208/1	19.10	30	
HP-1813	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1814	TRANE	GET018	648	0	73.1/59.4	52.0/49.4	14,910	17,450	13.9	71.80	99.70	15,640	4.60	4.50	15.06	208/1	12.60	20	3
HP-1815	TRANE	GET012	442	0	73.0/59.6	51.2/49.8	10,570	11,720	13.5	71.90	97.20	9,780	4.66	3.00	12.15	208/1	12.15	15	3
HP-1816	TRANE	GET018	712	0	73.1/59.3	52.7/50.2	15,840	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1817	TRANE	GET018	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1818	TRANE	GET012	712	0	73.1/59.4	52.7/50.2	15,800	17,630	13.9	71.80	97.20	15,760	4.60	4.50	15.06	208/1	12.60	20	3
HP-1819	TRANE	GET024	746	0	73.4/61.2	52.5/50.2	17,008	22,780	15.6	70.40	99.70	23,950	4.80	6.00	12.64	208/1	17.83	30	1
HP-1820	TRANE	GET009	374	0	70.0/56.7	50.9/47.7	7,800	8,680	13.2	67.40	91.60	9,910	4.47	2.25	5.81	208/1	5.18	15	2

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CASEY JOHN STEINER
NUMBER PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Mechanical Schedules

M6.02

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BLOWER COIL SCHEDULE

NOTES:

1. BCU-5 WILL PROVIDE VENTILATION AIR TO THE FOURTH AND FIFTH FLOORS. FINAL EQUIPMENT DESIGN TO BE PROVIDED WITH DESIGN OF THE FOURTH FLOOR.

GENERAL NOTES: (APPLY TO ALL BELOW)

A. PROVIDE UNIT WITH FACTORY MOUNTED AND WIRED DISCONNECT FOR SINGLE-POINT ELECTRICAL CONNECTION.
B. PROVIDE UNIT WITH ECM MOTOR WITH FACTORY MOUNTED LED TACHOMETER FOR MANUAL SPEED ADJUSTMENT DURING TEST AND BALANCE.
C. ELECTRICAL CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN THE MAIN SUPPLY DUCT AND INTERLOCK WITH UNIT PER CODE FOR UNITS THAT EXCEED 2,000 CFM.
D. MAXIMUM BHP FOR FANS SHALL NOT EXCEED 90% OF THE MOTOR NAMEPLATE RATING AT OPERATING CONDITIONS.
E. FANS SHALL BE PROVIDED WITH INTERNAL VIBRATION ISOLATION.
F. AIR VELOCITY ACROSS THE COOLING COIL SHALL NOT EXCEED 500 FPM.
G. CHILLED WATER COOLING COILS SHALL BE SELECTED FOR 45F ENTERING WATER TEMPERATURE AND 55F LEAVING WATER TEMPERATURE.
H. HOT WATER HEATING COILS SHALL BE SELECTED FOR 180F ENTERING WATER TEMPERTURE AND 160F LEAVING WATER TEMPERATURE.
I. UNIT SHALL BE DRAW-THROUGH CONFIGURATION WITH COOLING COIL UPSTREAM OF HEATING COIL (REHEAT CONFIGURATION FOR DEHUMIDIFICATION CYCLE).
J. PROVIDE A CONDENSATE DRAIN WITH A TRAP DEPTH 2" DEEPER THAN THE EXPECTED STATIC PRESSURE AT THE DRAIN LOCATION IN THE UNIT.
K. PROVIDE WITH CONDENSATE OVERFLOW DETECTION CONFORMING WITH UL508 TO SHUT OFF THE EQUIPMENT IN THE EVENT THAT THE PRIMARY DRAIN IS BLOCKED.

			SUPPLY FAN			CHILLED WATER COOLING COIL					HEATING WATER HEATING COIL									
MARK	MANUFACTURER	MODEL	CFM	TYPE	ESP	EAT DB	LAT DB	ROWS	GPM	WPD (FT WC)	EAT DB	LAT DB	ROWS	GPM	WPD (FT WC)	FACE AREA	V/PH	FLA	MOCP	NOTES
BCU-5	TRANE	BCVD	3500	BELT	1"	85/70		6												1
BCU-7	TRANE	BCVD	2,000	BELT	1"	85.0/70.0	53.1/52.9	6	21.4	16.00	38.2	77.4	1	8.5	1.1	3.9	208/3	6.6	6.6	
BCU-9	TRANE	BCVD	2,000	BELT	1"	85.0/70.0	53.1/52.9	6	21.4	16.00	38.2	77.4	1	8.5	1.1	3.9	208/3	6.6	6.6	
BCU-11	TRANE	BCVD	2,000	BELT	1"	85.0/70.0	53.1/52.9	6	21.4	16.00	38.2	77.4	1	8.5	1.1	3.9	208/3	6.6	6.6	
BCU-13	TRANE	BCVD	2,000	BELT	1"	85.0/70.0	53.1/52.9	6	21.4	16.00	38.2	77.4	1	8.5	1.1	3.9	208/3	6.6	6.6	
BCU-15	TRANE	BCVD	2,000	BELT	1"	85.0/70.0	53.1/52.9	6	21.4	16.00	38.2	77.4	1	8.5	1.1	3.9	208/3	6.6	6.6	
BCU-17	TRANE	BCVD	2,000	BELT	1"	85.0/70.0	53.1/52.9	6	21.4	16.00	38.2	77.4	1	8.5	1.1	3.9	208/3	6.6	6.6	
BCU-19	TRANE	BCVD	2,000	BELT	1"	85.0/70.0	53.1/52.9	6	21.4	16.00	38.2	77.4	1	8.5	1.1	3.9	208/3	6.6	6.6	

ENERGY RECOVERY UNIT SCHEDULE

NOTES:

1. ERV-04 WILL PROVIDE VENTILATION AIR TO THE FOURTH AND FIFTH FLOORS. FINAL EQUIPMENT DESIGN TO BE PROVIDED WITH DESIGN OF THE FOURTH FLOOR.

GENERAL NOTES (APPLY TO ALL BELOW):

A. PROVIDE FACTORY MOUNTED AND WIRED MOTOR STARTERS AND DISCONNECT FOR SINGLE POINT ELECTRICAL CONNECTION.
B. PROVIDE TEFC PREMIUM EFFICIENCY MOTORS WITH FACTORY MOUNTED AND WIRED VFD'S ON SUPPLY AND EXHAUST FANS. FOR MANUAL SPEED ADJUSTMENT DURING TEST AND BALANCE.
C. PROVIDE TEFC PREMIUM EFFICIENCY MOTORS.
D. ELECTRICAL CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN THE MAIN SUPPLY DUCTS AND INTERLOCK PER CODE.
E. PROVIDE MINIMUM FILTER EFFICIENCY OF MERV 8.
F. PROVIDE CLASS 1 LOW LEAKAGE MOTORIZED ISOLATION DAMPERS ON THE OUTSIDE AIR AND EXHAUST AIR.
G. MAXIMUM BHP FOR FANS SHALL NOT EXCEED 90% OF THE MOTOR NAMEPLATE RATING AT OPERATING CONDITIONS.
H. PROVIDE DOUBLE WALL CONSTRUCTION AND FACTORY PAINT FINISH.

			SUPPLY FAN				EXHAUST FAN				ENERGY RECOVERY									
MARK	MANUFACTURER	MODEL	CFM	DRIVE	ESP	HP	CFM	DRIVE	ESP	HP	SUMMER EXHAUST	SUMMER OA		WINTER EXHAUST	WINTER OA		ELECTRICAL			NOTES
											EAT DB/WB	EAT DB/WB	LAT DB/WB	EAT DB/WB	EAT DB/WB	LAT DB/WB	V/PH	MCA	MOCP	
ERV-04	RENEWAIRE		3500		0.5				1.0								208/3			1
ERV-06	RENEWAIRE	HE2XINV	2,000	DIRECT	0.5	2.0	1,200	DIRECT	1.0	2.0	75.0/62.6	85.7/78.5	80.3/73.8	70.0/54.4	-10/-3	30.5/30.2	208/3	16	20	
ERV-08	RENEWAIRE	HE2XINV	2,000	DIRECT	0.5	2.0	1,200	DIRECT	1.0	2.0	75.0/62.6	85.7/78.5	80.3/73.8	70.0/54.4	-10/-3	30.5/30.2	208/3	16	20	
ERV-10	RENEWAIRE	HE2XINV	2,000	DIRECT	0.5	2.0	1,200	DIRECT	1.0	2.0	75.0/62.6	85.7/78.5	80.3/73.8	70.0/54.4	-10/-3	30.5/30.2	208/3	16	20	
ERV-12	RENEWAIRE	HE2XINV	2,000	DIRECT	0.5	2.0	1,200	DIRECT	1.0	2.0	75.0/62.6	85.7/78.5	80.3/73.8	70.0/54.4	-10/-3	30.5/30.2	208/3	16	20	
ERV-14	RENEWAIRE	HE2XINV	2,000	DIRECT	0.5	2.0	1,200	DIRECT	1.0	2.0	75.0/62.6	85.7/78.5	80.3/73.8	70.0/54.4	-10/-3	30.5/30.2	208/3	16	20	
ERV-16	RENEWAIRE	HE2XINV	2,000	DIRECT	0.5	2.0	1,200	DIRECT	1.0	2.0	75.0/62.6	85.7/78.5	80.3/73.8	70.0/54.4	-10/-3	30.5/30.2	208/3	16	20	
ERV-18	RENEWAIRE	HE2XINV	2,000	DIRECT	0.5	2.0	1,200	DIRECT	1.0	2.0	75.0/62.6	85.7/78.5	80.3/73.8	70.0/54.4	-10/-3	30.5/30.2	208/3	16	20	

ELECTRIC DUCT HEATER SCHEDULE

NOTES:

1. EDH-04 WILL HEAT VENTILATION AIR TO THE FOURTH AND FIFTH FLOORS. FINAL EQUIPMENT DESIGN TO BE PROVIDED WITH DESIGN OF THE FOURTH FLOOR.

GENERAL NOTES (APPLY TO ALL BELOW):

A. ELECTRIC HEAT KW SHOWN IS ACTUAL HEAT OUTPUT AT THE VOLTAGE SHOWN.
B. HEATER SHALL BE INSTALLED IN THE VERTICAL DUCT WITH UPWARD AIRFLOW.
C. PROVIDE FACTORY MOUNTED/WIRED OVER TEMPERATURE LIMIT SWITCH, AIRFLOW SWITCH, DISCONNECT SWITCH AND CONTROL TRANSFORMER.
D. PROVIDE MANUFACTURER'S DUCT MOUNTED THERMOSTAT AND SCR CONTROL.

				HEATING COIL					
MARK	MANUFACTURER	MODEL	CFM	EAT	KW	STEPS	DUCT SIZE	V/PH	NOTES
EDH-04	RENEWAIRE	EK							1
EDH-06	RENEWAIRE	EK	2,000	30.5	5.0	SCR	18x16	208/3	
EDH-08	RENEWAIRE	EK	2,000	30.5	5.0	SCR	18x16	208/3	
EDH-10	RENEWAIRE	EK	2,000	30.5	5.0	SCR	18x16	208/3	
EDH-12	RENEWAIRE	EK	2,000	30.5	5.0	SCR	18x16	208/3	
EDH-14	RENEWAIRE	EK	2,000	30.5	5.0	SCR	18x16	208/3	
EDH-16	RENEWAIRE	EK	2,000	30.5	5.0	SCR	18x16	208/3	
EDH-18	RENEWAIRE	EK	2,000	30.5	5.0	SCR	18x16	208/3	

GRILLE, REGISTER, & DIFFUSER SCHEDULE

NOTES:

1. PROVIDE 3 -1" SLOT.
2. PROVIDE TYPE 3 BORDER WITH PLASTER FRAME FOR INSTALLATION IN GYPSUM BOARD ARCHITECTURAL CEILINGS.

GENERAL NOTES (APPLY TO ALL BELOW):

A. PROVIDE MOUNTING FRAME TO MATCH CEILING TYPE. VERIFY WITH ARCHTECT'S PLANS PRIOR TO ORDERING.
B. MAXIMUM NC OF 30 FOR ALL GRILLES, REGISTERS, AND DIFFUSERS.
C. WHERE NOT NOTED, DIFFUSER NECK SIZE SHALL BE THE SAME AS THE BRANCH DUCT SIZE.
D. UNLESS NOTED OTHERWISE, COLOR SHALL BE STANDARD WHITE.
E. FOUR-WAY THROW PATTERN FOR SQUARE DIFFUSERS UNLESS NOTED OTHERWISE.

MARK	MANUFACTURER	MODEL	SERVICE	FACE SIZE	NECK SIZE	DAMPER	NOTES
E1	TITUS	OMNI	EXHAUST	12x12	"SEE PLAN"	YES	2
E2	TITUS	OMNI	EXHAUST	24x24	"SEE PLAN"	-	
R1	TITUS	PAR	RETURN	24x12	22x10	-	2
R2	TITUS	OMNI	RETURN	24x24	"SEE PLAN"	-	
S1	TITUS	300RS	SUPPLY	SEE PLANS	-	-	
S2	TITUS	OMNI	SUPPLY	24x24	SEE PLANS	-	
S3	TITUS	OMNI	SUPPLY	12x12	SEE PLANS	YES	2
S4	TITUS	TBD-30	SUPPLY	48"	SEE PLANS	NO	1
T1	TITUS	355RL	TRANSFER	SEE PLANS	-	-	

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Mechanical Schedules

M6.03

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AIR HANDLING UNIT SCHEDULE

MARK	MANUFACTURER	MODEL	MIN. O/A CFM	SUPPLY FAN CFM	TYPE	DRIVE	ESP	TSP	HP	RPM	CHILLED WATER COOLING COIL EAT DB/WB	LAT DB/WB	ROWS	FPF	GPM	WPD (FT WC)	APD (IN WC)	FACE AREA	HOT WATER HEATING COIL EAT DB	LAT DB	ROWS	FPF	GPM	WPD (FT WC)	APD (IN WC)	V/PH	MCA	MOCP	NOTES
AHU-B-1	TRANE	CSAA057	8,000	35,000	PLENUM	DIRECT	4.0	6.22	30	1800	80.4/66.7	55.24/54.5	6	105	262	9.13	0.918	56.5	20	67.6	1	80	62.06	3.08	0.014	460/3,115/1,115,1	100,3.3,8	175,15,15	1,2,3,4,5,6,7
AHU-B-2	TRANE	CSAA014	1,500	8,000	PLENUM	DIRECT	3.0	5.28	7.5	1800	78.8/65.5	55.3/54.5	4	144	53.23	12.8	0.707	13.65	20	67.03	1	80	10.21	0.46	0.016	460/3	26.25	45	1,2,3,4,5
AHU-B-3	TRANE	CSAA021	2,800	11,000	PLENUM	DIRECT	3.0	5.01	7.5	1800	80.2/66.5	55.57/54.5	6	91	80.81	9.08	0.694	20.45	20	64.68	1	80	16.97	0.89	0.016	460/3	26.25	45	1,2,3,4,5
AHU-1-1	TRANE	CSAA030	3,100	15,000	FC	DIRECT	3.0	4.86	10	1800	79.2/65.8	55.4/54.16	6	84	105.69	12.38	0.59	29.61	20	65.54	1	80	22.24	1.46	0.016	460/3,115/1,115,1	33.75,3.26,10	60,15,15	1,2,3,4,5,6,7
AHU 21-1	TRANE	CSAA050	3,500	25,000	FC	DIRECT	3.0	4.99	20	1800	77.8/54.8	55.27/54.5	6	99	154.48	3.05	0.612	48.26	20	66.13	1	80	40.04	3.99	0.016	460/3,115/1,115,1	65,3.26,10	110,15,15	1,2,3,4,5,6,7

NOTES:

1. ESP DOES NOT INCLUDE DIRTY FILTER PRESSURE DROP. ADD 0.5" TO INTERNAL PRESSURE DROP FOR DIRTY FILTERS FOR VARIABLE AIR VOLUME UNITS.
2. PROVIDE UNIT WITH FACTORY MOUNTED AND WIRED DISCONNECT.
2. PROVIDE UNIT WITH FACTORY MOUNTED AND WIRED VFD.
4. HOT WATER HEATING COIL SHALL BE INTEGRAL FACE-AND-BYPASS.
5. PROVIDE DRY BULB ECONOMIZER SET AT 58F.
6. PROVIDE UNIT WITH INTEGRAL MAINTENANCE LIGHTS AND SWITCH.
7. PROVIDE UNIT WITH INTEGRAL MAINTENANCE RECEPTACLE.

GENERAL NOTES (APPLY TO ALL ABOVE):

A. PROVIDE MINIMUM EFFICIENCY OF MERV 6 FOR FILTERS DURING CONSTRUCTION AND CHANGE MONTHLY AFTER UNIT START-UP. FINAL FILTER CHANGE AT OWNER OCCUPANCY SHALL BE MERV 7 [MERV 13 FOR LEED PROJECTS].
B. ELECTRICAL CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN THE MAIN RETURN DUCT AND INTERLOCK WITH UNIT PER CODE.
C. PROVIDE SEALED, WET LOCATION LIGHT FIXTURE WITHIN EACH ACCESSIBLE SECTION.
D. MAXIMUM BHP FOR FANS SHALL NOT EXCEED 90% OF THE MOTOR NAMEPLATE RATING AT OPERATING CONDITIONS.
E. AIR VELOCITY ACROSS THE COOLING COIL SHALL NOT EXCEED 500 FPM.
F. DX COOLING COIL SHALL BE SELECTED BASED ON 44F SATURATED SUCTION TEMPERATURE.
G. CHILLED WATER COOLING COILS SHALL BE SELECTED FOR 44F ENTERING WATER TEMPERATURE. AND 56F LEAVING WATER TEMPERATURE.
H. HOT WATER HEATING COILS SHALL BE SELECTED FOR 180F ENTERING WATER TEMPERATURE. AND 160F LEAVING WATER TEMPERATURE.
J. REFER TO AIR HANDLING UNIT COMPONENT SCHEDULE FOR UNIT CONFIGURATION.
J. REFER TO DRAWINGS FOR UNIT CONFIGURATION.
K. FUEL SOURCE FOR GAS HEATER IS NATURAL GAS [PROPANE].
L. ELECTRIC HEAT KW SHOWN IS ACTUAL OUTPUT AT THE VOLTAGE SHOWN.
M. PROVIDE FACTORY MOUNTED AND WIRED CONVENIENCE RECEPTACLE FOR ROOF-MOUNTED UNIT.
N. PROVIDE A CONDENSATE DRAIN WITH A TRAP DEPTH 2" DEEPER THAN THE EXPECTED STATIC PRESSURE AT THE DRAIN LOCATION IN THE UNIT.
P. FOR FLOOR-MOUNTED INTERIOR UNITS, PROVIDE A HOUSEKEEPING PAD OF ADEQUATE HEIGHT FOR CONDENSATE DRAIN TRAP.

SMOKE CONTROL FAN SCHEDULE

MARK	MANUFACTURER	MODEL	CFM	S.P.	DRIVE	BHP	HP	RPM	V/PH	NOTES
SCF-1	COOK	490 THD	38,433	1.0	BELT	16.2	20	588	460/3	1-8
SCF-2	COOK	445 THD	31,974	1.0	BELT	13.6	20	652	460/3	1-8

NOTES:

1. PROVIDE WITH FACTORY INSTALLED AND WIRED DISCONNECT.
2. PROVIDE TALL ROOF CURB, HEIGHT AS REQUIRED TO PROVIDE 18" CLEARANCE ABOVE FINISHED ROOF OR CURB ADATPER.
3. PROVIDE WITH BACKDRAFT DAMPER.
4. PROVIDE WITH MANUFACTURER'S ALUMINUM GRILLE.
5. PROVIDE WITH INLET PLENUM AND LOUVER FOR REQUIRED AIR FLOW.
6. PROVIDE MOTORIZED DAMPER, FACTORY MOUNTED AND WINED FOR A SINGLE- POINT ELECTRICAL CONNECTION.
7. PROVIDE WITH MANUFACTURER'S VFD RATED MOTOR.
8. PROVIDE SPRING FLOOR ISOLATORS.

FAN SCHEDULE

MARK	MANUFACTURER	MODEL	CFM	S.P.	DRIVE	BHP	HP	RPM	dBA	V/PH	NOTES
EF4-1			2,500	0.75	DIRECT					120/1	1,2,3,4,5,6,7
EF21-1			550	0.50	DIRECT					120/1	1,2,3,4,5,6,7

NOTES:

1. PROVIDE WITH FACTORY INSTALLED AND WIRED DISCONNECT.
2. PROVIDE TALL ROOF CURB, HEIGHT AS REQUIRED TO PROVIDE 18" CLEARANCE ABOVE FINISHED ROOF.
3. PROVIDE WITH BACKDRAFT DAMPER.
4. PROVIDE WITH MANUFACTURER'S ALUMINUM GRILLE.
5. PROVIDE WITH MANUFACTURER'S ROOF JACK.
6. PROVIDE MOTORIZED DAMPER, FACTORY MOUNTED AND WINED FOR A SINGLE- POINT ELECTRICAL CONNECTION.
7. PROVIDE BIRD SCREEN.

GRILLE, REGISTER, & DIFFUSER SCHEDULE

MARK	MANUFACTURER	MODEL	SERVICE	FACE SIZE	NECK SIZE	DAMPER	NOTES
S1	TITUS	OMNI	SUPPLY	24x24	"SEE PLAN"	NO	
S2	TITUS	300RS	SUPPLY	"SEE PLAN"	"SEE PLAN"	NO	
S3	TITUS	ML-39	SUPPLY	48"	"SEE PLAN"	NO	1
R1	TITUS	355RL-3	RETURN	24x24	22x22	NO	
R2	TITUS	PAR	RETURN	24x24	22x22	NO	
E1	TITUS	355RL-3	EXHAUST	24x24	22x22	NO	
E2	TITUS	PAR	RETURN	24x24	22x22	NO	

NOTES:

1. PROVIDE # - #" SLOTS AND MANUFACTURER'S INSULATED PLENUM.
2. MOUNT BOTTOM OF GRILLE AT 0'-0" ABOVE FINISHED FLOOR.
3. PROVIDE RETURN GRILLE WITH NOISE REDUCING RETURN AIR CANOPY. PRICE MODEL RAC OR AIR SYSTEM COMPONENTS MODEL T-RAC.
4. PROVIDE DIFFUSER FRAME WITH MITERED END FLANGE.
5. DIFFUSER FACE RADIUS SHALL MATCH THE ARCHITECTURAL SOFFIT RADIUS

GENERAL NOTES (APPLY TO ALL ABOVE):

A. PROVIDE MOUNTING FRAME TO MATCH CEILING TYPE. VERIFY WITH ARCHITECT'S PLANS PRIOR TO ORDERING.
B. MAXIMUM NC OF 30 FOR ALL GRILLES, REGISTERS, AND DIFFUSERS.
C. REFER TO DIFFUSER TAGS ON PLANS FOR NECK SIZE AND AIRFLOW.
D. UNLESS NOTED OTHERWISE, COLOR SHALL BE STANDARD WHITE.
E. FOUR-WAY THROW PATTERN FOR SQUARE DIFFUSERS UNLESS NOTED OTHERWISE.

MECHANICAL PIPING FIXTURE SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	MODEL	TRIM	CONNECTIONS CW	HW	W	V	NOTES
ET-1	EXPANSION TANK	AMTROL	THERM-X-TROL ST-12	MECHANICAL PIPING			--	--	
		TACO	PAX						
AS-1	AIR SEPARATOR	AMTROL		MECHANICAL PIPING			--	--	
		TACO							

NOTES:

1.

GENERAL NOTES:

A.

BOILER SCHEDULE

MARK	MANUFACTURER	MODEL	MBH INPUT	MBH OUTPUT	FLOW GPM	EWT DEG. F	LWT DEG. F	RATING PSI	WATER VOLUME	V/PH	MCA	MOCP	NOTES
B-1	AERCO	BENCHMARK	2,000	1,740	116	140	110	100	40	120/1	16	20	1
B-2	AERCO	BENCHMARK	2,000	1,740	116	140	110	100	40	120/1	16	20	1
B-3	AERCO	BENCHMARK	2,000	1,470	116	140	110	100	40	120/1	16	20	1
B-4	AERCO	BENCHMARK	1,500	1,305	87	140	110	100	44	120/1	16	20	1
B-5	AERCO	BENCHMARK	1,500	1,305	87	140	110	100	44	120/1	16	20	1
B-6	AERCO	BENCHMARK	1,500	1,305	87	140	110	100	44	120/1	16	20	1

NOTES:

1. PROVIDE WITH CONDENSTATE NEUTRALIZATION KIT

GENERAL NOTES (APPLY TO ALL ABOVE):

A. PROVIDE LOW WATER CUTOFF WITH MANUAL RESET.
B. PROVIDE ASME RELIEF VALVE.
C. FUEL SOURCE IS NATURAL GAS.
D. MINIMUM TURNDOWN RATIO SHALL BE 20:1
E. PROVIDE WITH EDGE CONTROLLERS
F. PROVIDE WITH AERCO CONTROL SYSTEM (ACS) FOR EACH BOILER PLANT COMPLETE WITH BACnet SYSTEM INTEGRATION

CHILLER SCHEDULE

MARK	MANUFACTURER	MODEL	EVAPORATOR DATA GPM	PASS	CONDENSER DATA GPM	PASS	NPLV	IPLV	V/PH	MCA	MOCP	NOTES
CH-1	TRANE	CVHE	700		1,050				480/3			1,2
CH-2	TRANE	CVHE	700		1,050				480/3			1,2
CH-3	TRANE	RTWD	200		300				480/3			1,2
CH-4	TRANE	RTWD	200		300				480/3			1,2

NOTES:

1. EVAPORATOR SHALL BE SELECTED BASED ON 56° F EWT, 44° F LWT.
2. CONDENSER SHALL BE SELECTED BASED ON 85° F EWT, 95° F LWT.

GENERAL NOTES (APPLY TO ALL ABOVE):

A. MAXIMUM PRESSURE DROP THROUGH THE EVAPORATOR SHALL BE 25 FEET W.C. AT FULL FLOW.
B. MAXIMUM PRESSURE DROP THROUGH THE CONDENSER SHALL BE 25 FEET W.C. AT FULL FLOW.
C. FOULING FACTOR FOR THE EVAPORATOR AND CONDENSER SHALL BE 0.00025.

COOLING TOWER SCHEDULE

MARK	MANUFACTURER	MODEL	WB	GPM	EWT	LWT	HP	V/PH	NOTES
CT-1	MARLEY/SPX	NC	78	1,200	95	85		480/3	1
CT-2	MARLEY/SPX	NC	78	1,200	95	85		480/3	1
CT-3	MARLEY/SPX	NC	78	1,200	95	85		480/3	1

NOTES:

1. PROVIDE ___KW BASIN HEATER CAPABLE OF MAINTAINING 40F BASIN WITH -20F AMBIENT, 15 MPH WIND.

TERMINAL UNIT SCHEDULE

MARK	MANUFACTURER	MODEL	INLET	MAX CFM	MIN CFM	HEATING MBH	HEATING GPM	V/PH	NOTES
VAV B-	TITUS	DESV			0	0.0	0.0		#
VAV B-	TITUS	DESV			0	0.0	0.0		#
VAV B-	TITUS	DESV			0	0.0	0.0		#
VAV B-	TITUS	DESV			0	0.0	0.0		#
VAV B-	TITUS	DESV			0	0.0	0.0		#
VAV B-	TITUS	DESV			0	0.0	0.0		#
VAV B-	TITUS	DESV			0	0.0	0.0		#
VAV B-	TITUS	DESV			0	0.0	0.0		#
VAV B-	TITUS	DESV			0	0.0	0.0		#
VAV B-	TITUS	DESV			0	0.0	0.0		#
VAV B-	TITUS	DESV			0	0.0	0.0		#
					0	0.0	0.0		#
VAV 1-	TITUS	DESV			0	0.0	0.0		#
VAV 1-	TITUS	DESV			0	0.0	0.0		#
VAV 1-	TITUS	DESV			0	0.0	0.0		#
VAV 1-	TITUS	DESV			0	0.0	0.0		#
VAV 1-	TITUS	DESV			0	0.0	0.0		#
VAV 1-	TITUS	DESV			0	0.0	0.0		#
VAV 1-	TITUS	DESV			0	0.0	0.0		#
VAV 2-	TITUS	DESV							
VAV 2-	TITUS	DESV							
VAV 2-	TITUS	DESV							
VAV 2-	TITUS	DESV							
VAV 2-	TITUS	DESV							
VAV 2-	TITUS	DESV							
VAV 2-	TITUS	DESV							
					0	0.0	0.0		#

NOTES:

1. PROVIDE 3-WAY HYDRONIC CONTROL VALVE.

GENERAL NOTES (APPLY TO ALL ABOVE):

A. MINIMUM PRIMARY AIR SHALL BE 0 CFM DURING UNOCCUPIED PERIODS.
B. PROVIDE 2-WAY HYDRONIC CONTROL VALVE UNLESS NOTED OTHERWISE.
C. HYDRONIC HEATING COILS SHALL BE TWO ROWS MINIMUM WITH A MAXIMUM COIL WATER PRESSURE DROP OF 5' W.C.

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
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Scale: See Drawing
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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Mechanical Schedules

M6.04

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HVAC PIPE INSULATION

INSULATION	DESCRIPTION
TYPE 1	FIBER GLASS RIGID MOLDED INSULATION - JOHNS-MANVILLE MICRO-LOK, ASJ JACKET, K-VALUE = 0.23, MAX SERVICE TEMP = 850F VAPOR TRANSMISSION = 0.02 PERMS MAX, COMPLIES WITH ASTM C 547, CLASS 3, AND ASTM C1136 TYPE 1
TYPE 2	ARMACELL AP/ARMAFLEX SS FOAM INSULATION, 3.0-6.0 PCF, K-VALUE = 0.25, MAX SERVICE TEMP. = 180F VAPOR PERMEABILITY = 0.05 PERM-IN COMPLIES WITH ASTM C534, TYPE 1, ASTM C1338 AND ASTM G22
TYPE 3	PVC JACKETS, HIGH-IMPACT-RESISTANT, UV-RESISTANT, 30 MILS THICK, 1" OVERLAP AT LONGITDINAL SEAMS AND END JOINTS COMPLIES WITH ASTM D 1784 AND CLASS 16354-C.
TYPE 4	ALUMINUM JACKETS, 0.016" THICK, EMBOSSED FINISH, LONGITUDINAL SLIP JOINTS AND 2" LAPS COMPLIES WITH ASTM B 209
TYPE 5	ISULATED PIPE SUPPORTS, 360° PRE-MOLDED PIPE SUPPORTS, VAPOR BARRIER AND GALVANIZED STEEL SHIELD, FOR > 1 1/2" PIPES MINIMUM COMPRESSIVE STRENGTH: 100 PSIG FOR PIPE SIZE < 6", 450 PSIG FOR PIPE SIZE 6" AND LARGER

INSULATED PIPE SUPPORTS

PIPE SIZE	INSERT LENGTH	SHIELD LENGTH	SHIELD GAUGE	INSULATION	NOTES
1 1/2" TO 5"	6"	4"	20	TYPE 5	4
6" TO 8"	9"	6"	16	TYPE 5	4
10" TO 12"	9"	6"	14	TYPE 5	4
14" AND LARGER	12"	10"	12	TYPE 5	4

INSULATION THICKNESS FOR PIPES LOCATED WITHIN THE BUILDING THERMAL ENVELOPE

PIPING SYSTEM	CONTINUOUS VAPOR BARRIER	PIPE SIZE < 1 1/2"	1 1/2" - 4"	5" - 6"	>= 8"	INSULATION	NOTES
HCS & HCR	YES	1 1/2"	2"	2"	2"	TYPE 1	1,3
HWS & HWR	NO	1 1/2"	2"	2"	2"	TYPE 1	1
CWS & CWR	YES	1"	1 1/2"	1 1/2"	1 1/2"	TYPE 1	1,3
TWS & TWR	YES	1"	1 1/2"	1 1/2"	1 1/2"	TYPE 1	1,3
HRS & HRR	YES	1"	2"	2"	2"	TYPE 1	1,3
STEAM ? 70 PSI	NO	3"	4"	4 1/2"	4 1/2"	TYPE 1	1
STEAM > 70 PSI	NO	4 1/2"	5"	5"	5"	TYPE 1	1
COOL COIL COND	YES	1/2"	1/2"	1/2"	1/2"	TYPE 2	2
REFRIG SUCTION	YES	3/4"	3/4"	3/4"	3/4"	TYPE 2	2

INSULATION THICKNESS FOR PIPES LOCATED OUTSIDE THE BUILDING THERMAL ENVELOPE

PIPING SYSTEM	CONTINUOUS VAPOR BARRIER	PIPE SIZE <= 1 1/2"	2" - 4"	5" - 6"	>= 8"	INSULATION	NOTES
HCS & HCR	YES	1 1/2"	2"	2"	2"	TYPE 1,4	1,3
HWS & HWR	NO	1 1/2"	2"	2"	2"	TYPE 1,4	1
CWS & CWR	YES	1"	1 1/2"	1 1/2"	1 1/2"	TYPE 1,4	1,3
TWS & TWR	YES	1"	1 1/2"	1 1/2"	1 1/2"	TYPE 1,4	1,3
HRS & HRR	YES	1"	2"	2"	2"	TYPE 1,4	1,3
STEAM <= 70 PSI	NO	3"	4"	4 1/2"	4 1/2"	TYPE 1,4	1
STEAM > 70 PSI	NO	4 1/2"	5"	5"	5"	TYPE 1,4	1
COOL COIL COND	YES	1/2"	1/2"	1/2"	1/2"	TYPE 2	2
REFRIG SUCTION	YES	3/4"	3/4"	3/4"	3/4"	TYPE 2	2

NOTES:

1. ALL FITTINGS, VALVES, TEES, FLANGES, CONNECTIONS, ETC. SHALL BE INSULATED AND COVERED WITH THE APPROPRIATE PVC INSULATED FITTING COVERS. FITTING COVERS SHALL MATCH PVC JACKETS. (FOR FIBER GLASS INSULATION)
2. ALL FITTINGS, VALVES, TEES, FLANGES, CONNECTIONS, ETC. SHALL BE INSULATED AND COVERED WITH THE APPROPRIATE ARMACELL FACTORY-FABRICATED INSULATION FITTINGS. PROVIDE ARMAFIX PRE-INSULATED PIPE HANGER FITTINGS AT ALL HANGER LOCATIONS
3. SEAL LONGITUDINAL SEAMS, ENG JOINTS AND PROTRUSIONS WITH VAPOR-BARRIER MASTIC AND JOINT SEALANT
4. PIPE INSERT THICKNESS SHALL BE EQUAL TO THE ADJOINING INSULATION THICKNESS

GENERAL NOTES: (APPLY ALL TO ABOVE)

A. THE BASIS FOR FIBER GLASS PIPE INSULATION AND FITTING COVERS IS JOHNS-MANVILLE WHICH SHALL REPRESENT THE MINIMUM LEVEL OF CONSTRUCTION. PRODUCTS MANUFACTURED BY OWENS-CORNING AND KNAUF SHALL BE PERMITTED TO BID.
B. THE BASIS FOR FLEXIBLE ELASTOMERIC INSULATION IS ARMACELL WHICH SHALL REPRESENT THE MINIMUM LEVEL OF CONSTRUCTION. PRODUCTS MANUFACTURED BY AEROFLEX SHALL BE PERMITTED TO BID.
C. INSTALL ALL PIPE INSULATION PER MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS.
D. INSTALL INSULATION CONTINUOUSLY THROUGH PENETRATIONS

CABINET UNIT HEATER & UNIT HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	CFM	HOT WATER COIL OUT (MBH)	GPM	V/PH	MCA	MOCP	NOTES

NOTES:

1. PROVIDE UNIT WITH FACTORY MOUNTED AND WIRED DISCONNECT FOR A SINGLE-POINT ELECTRICAL CONNECTION.
2. PROVIDE A UNIT-MOUNTED, FACTORY WIRED THERMOSTAT.
3. PROVIDE MANUFACTURER'S STANDARD 24V WALL-MOUNTED THERMOSTAT.
4. PROVIDE WITH MERV 6 FILTER. [CABINET UNIT HEATER ONLY]
5. PROVIDE WITH MANUFACTURER'S STANDARD LOUVER, WALL/CEILING MOUNTING BRACKET, AND DUST SHIELD. [UNIT HEATER ONLY]
6. PROVIDE FACTORY WIRED AND PIPED CONTROL PACKAGE. [HW HEAT ONLY]

GENERAL NOTES (APPLY TO ALL ABOVE):

A. HOT WATER HEATING COILS SHALL BE SELECTED FOR 180F ENTERING WATER TEMPERATURE. AND 160F LEAVING WATER TEMPERATURE. MAXIMUM WATER PRESSURE DROP SHALL BE 10' W.C.
B. FUEL SOURCE FOR GAS HEATER IS NATURAL GAS [PROPANE].
C. ELECTRIC HEAT KW SHOWN IS ACTUAL OUTPUT AT THE VOLTAGE SHOWN.
D. CABINET COLOR TO BE SELECTED BY ARCHITECT FROM MANUFACTURER'S STANDARD COLOR.

CABINET UNIT HEATER & UNIT HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	CFM	KW	V/PH	MCA	MOCP	NOTES
								#
								#
								#

NOTES:

1. PROVIDE UNIT WITH FACTORY MOUNTED AND WIRED DISCONNECT FOR A SINGLE-POINT ELECTRICAL CONNECTION.
2. PROVIDE A UNIT-MOUNTED, FACTORY WIRED THERMOSTAT.
3. PROVIDE MANUFACTURER'S STANDARD 24V WALL-MOUNTED THERMOSTAT.
4. PROVIDE WITH MERV 6 FILTER. [CABINET UNIT HEATER ONLY]
5. PROVIDE WITH MANUFACTURER'S STANDARD LOUVER, WALL/CEILING MOUNTING BRACKET, AND DUST SHIELD. [UNIT HEATER ONLY]

GENERAL NOTES (APPLY TO ALL ABOVE):

A. ELECTRIC HEAT kW SHOWN IS ACTUAL OUTPUT AT THE VOLTAGE SHOWN.
B. CABINET COLOR TO BE SELECTED BY ARCHITECT FROM MANUFACTURER'S STANDARD COLOR.

DUCTWORK INSULATION

INSULATION	DESCRIPTION
TYPE 1	WRAP INSULATION - CERTAINTEED SOFTTOUCH, TYPE 150, FSK FACED, 1 1/2" THICK, 1.5 PCF, K-VALUE = 0.24, R-VALUE = 6.2, VAPOR TRANSMISSION = 0.02 PERMS MAX. COMPLIES WITH ASTM C553 TYPE II, ASTM C1290 AND ASTM C1338 FUNGI RESISTANCE
TYPE 2	WRAP INSULATION - CERTAINTEED SOFTTOUCH, TYPE 75, FSK FACED, 3" THICK, 0.75 PCF, K-VALUE = 0.31, R-VALUE = 9.6, VAPOR TRANSMISSION = 0.02 PERMS MAX. COMPLIES WITH ASTM C553 TYPE II, ASTM C1290 AND ASTM C1338 FUNGI RESISTANCE
TYPE 3	BOARD INSULATION - CERTAINTEED CERTAPRO CB110, FSK FACED, 1 1/2" THICK, 1.1 PCF, K-VALUE = 0.25, R-VALUE = 6.0 VAPOR TRANSMISSION = 0.02 PERMS MAX. COMPLIES WITH ASTM C612 TYPE II, ASTM C1290 AND ASTM C1338 FUNGI RESISTANCE
TYPE 4	BOARD INSULATION - CERTAINTEED CERTAPRO CB300, FSK FACED, 2" THICK, 3.0 PCF, K-VALUE = 0.23, R-VALUE = 8.7 VAPOR TRANSMISSION = 0.02 PERMS MAX. COMPLIES WITH ASTM C612 TYPE II, ASTM C1290 AND ASTM C1338 FUNGI RESISTANCE
TYPE 5	DUCT LINER - CERTAINTEED TOUGHGARD R DUCT LINER, TYPE 200, 1/2" THICK, 2.0 PCF, K-VALUE = 0.24, R-VALUE = 2.1, NRC = 0.45, COMPLIES WITH ASTM C1071 TYPE I, ASTM G22 BACTERIA RESISTANCE AND ASTM C1338 FUNGI RESISTANCE.
TYPE 6	DUCT LINER - CERTAINTEED TOUGHGARD R DUCT LINER, TYPE 150, 2" THICK, 1.5 PCF, K-VALUE = 0.23, R-VALUE = 8.3, NRC = 0.90. COMPLIES WITH ASTM C1071 TYPE I, ASTM G22 BACTERIA RESISTANCE AND ASTM C1338 FUNGI RESISTANCE.
TYPE 7	FIRE RATED INSULATION WRAP - 3M FIRE BARRIER DUCT WRAP 615+ FLEXIBLE HIGH-TEMPERATURE FIRE-RESISTANT WRAP WITH SCRIM REINFORCED FOIL. 1 1/2" THICK, 6 PCF, K-VALUE = 0.24, R-VALUE = 6.3
TYPE 8	FLEXIBLE ELASTOMERIC INSULATION - ARMACELL ARMATUFF WHITE, LAMINATE COMPOSITE LAYER OF COATED FOIL AND POLYMER ON ARMAFLEX INSULATION. 2" THICK, 3.0 - 6.0 PCF, K-VALUE = 0.27, R-VALUE = 8.0, VAPOR TRANSMISSION = 0.00 PERMS. COMPLIES WITH ASTM C534 TYPE II, ASTM C1338 FUNGI RESISTANCE AND ASTM G22 BACTERIAL RESISTANCE

DUCTS LOCATED IN RESIDENTAIL SPACES WITHIN THE BUILDING THERMAL ENVELOPE

DUCT TYPE - CONCEALED LOCATION	INSULATION	NOTES	DUCT TYPE - EXPOSED LOCATION	INSULATION	NOTES
ROUND LOW PRESSURE SUPPLY AIR	NONE	#	ROUND LOW PRESSURE SUPPLY AIR	NONE	#
ROUND OUTDOOR AIR	TYPE 2	#	ROUND OUTDOOR AIR	TYPE 2	#
ROUND VENTILATION AIR	NONE	#	ROUND VENTILATION AIR	NONE	#
ROUND LOW PRESSURE EXHAUST AIR	NONE	#	ROUND LOW PRESSURE EXHAUST AIR	NONE	#
ROUND LOW PRESSURE RELIEF AIR	TYPE 2	#	ROUND LOW PRESSURE RELIEF AIR	TYPE 2	#
RECTANGULAR LOW PRESSURE SUPPLY AIR	NONE	#	RECTANGULAR LOW PRESSURE SUPPLY AIR	NONE	#
RECTANGULAR OUTDOOR AIR	TYPE 2	#	RECTANGULAR OUTDOOR AIR	TYPE 4	#
RECTANGULAR VENTILATION AIR	NONE	#	RECTANGULAR VENTILATION AIR	NONE	#
RECTANGULAR LOW PRESSURE EXHAUST AIR	NONE	#	RECTANGULAR LOW PRESSURE EXHAUST AIR	NONE	#
RECTANGULAR LOW PRESSURE RELIEF AIR	TYPE 2	#	RECTANGULAR LOW PRESSURE RELIEF AIR	TYPE 4	#
OUTSIDE AIR PLENUM	TYPE 4	#	OUTSIDE AIR PLENUM	TYPE 4	#
		#			#

DUCTS LOCATED WITHIN THE BUILDING THERMAL ENVELOPE

DUCT TYPE - CONCEALED LOCATION	INSULATION	NOTES	DUCT TYPE - EXPOSED LOCATION	INSULATION	NOTES
ROUND MEDIUM PRESSURE SUPPLY AIR	TYPE 1	#	ROUND MEDIUM PRESSURE SUPPLY AIR	TYPE 1	#
ROUND LOW PRESSURE SUPPLY AIR	TYPE 1	#	ROUND LOW PRESSURE SUPPLY AIR	TYPE 1	#
ROUND LOW PRESSURE RETURN AIR	NONE	#	ROUND LOW PRESSURE RETURN AIR	NONE	#
ROUND OUTDOOR AIR	TYPE 2	#	ROUND OUTDOOR AIR	TYPE 2	#
ROUND VENTILATION AIR	NONE	#	ROUND VENTILATION AIR	NONE	#
ROUND MIXED AIR	TYPE 1	#	ROUND MIXED AIR	TYPE 1	#
ROUND LOW PRESSURE EXHAUST AIR	NONE	#	ROUND LOW PRESSURE EXHAUST AIR	NONE	#
ROUND LOW PRESSURE RELIEF AIR	TYPE 2	#	ROUND LOW PRESSURE RELIEF AIR	TYPE 2	#
RECTANGULAR MEDIUM PRESSURE SUPPLY AIR	TYPE 1	#	RECTANGULAR MEDIUM PRESSURE SUPPLY AIR	TYPE 1	#
RECTANGULAR LOW PRESSURE SUPPLY AIR	TYPE 1	#	RECTANGULAR LOW PRESSURE SUPPLY AIR	TYPE 1	#
RECTANGULAR LOW PRESSURE RETURN AIR	NONE	#	RECTANGULAR LOW PRESSURE RETURN AIR	NONE	#
RECTANGULAR OUTDOOR AIR	TYPE 2	#	RECTANGULAR OUTDOOR AIR	TYPE 2	#
RECTANGULAR VENTILATION AIR	NONE	#	RECTANGULAR VENTILATION AIR	NONE	#
RECTANGULAR MIXED AIR	TYPE 1	#	RECTANGULAR MIXED AIR	TYPE 1	#
RECTANGULAR LOW PRESSURE EXHAUST AIR	NONE	#	RECTANGULAR LOW PRESSURE EXHAUST AIR	NONE	#
RECTANGULAR LOW PRESSURE RELIEF AIR	TYPE 2	#	RECTANGULAR LOW PRESSURE RELIEF AIR	TYPE 2	#
KITCHEN HOOD GREASE EXHAUST	TYPE 7	1	KITCHEN HOOD GREASE EXHAUST	TYPE 7	1
OUTSIDE AIR PLENUM	TYPE 2	#	OUTSIDE AIR PLENUM	TYPE 2	#
RETURN AIR PLENUM	TYPE 1	#	RELIEF AIR PLENUM	TYPE 1	#

DUCTS LOCATED OUTSIDE THE BUILDING THERMAL ENVELOPE (UNCONDITIONED SPACES)

DUCT TYPE - CONCEALED LOCATION	INSULATION	NOTES	DUCT TYPE - EXPOSED LOCATION	INSULATION	NOTES
ROUND MEDIUM PRESSURE SUPPLY AIR	TYPE 2	#	ROUND MEDIUM PRESSURE SUPPLY AIR	TYPE 2	#
ROUND LOW PRESSURE SUPPLY AIR	TYPE 2	#	ROUND LOW PRESSURE SUPPLY AIR	TYPE 2	#
ROUND LOW PRESSURE RETURN AIR	TYPE 2	#	ROUND LOW PRESSURE RETURN AIR	TYPE 2	#
ROUND OUTDOOR AIR	TYPE 1	#	ROUND OUTDOOR AIR	TYPE 1	#
ROUND VENTILATION AIR	TYPE 2	#	ROUND VENTILATION AIR	NONE	#
ROUND MIXED AIR	TYPE 2	#	ROUND MIXED AIR	TYPE 2	#
ROUND LOW PRESSURE EXHAUST AIR	TYPE 1	#	ROUND LOW PRESSURE EXHAUST AIR	TYPE 1	#
ROUND LOW PRESSURE RELIEF AIR	NONE	#	ROUND LOW PRESSURE RELIEF AIR	NONE	#
RECTANGULAR MEDIUM PRESSURE SUPPLY AIR	TYPE 2	#	RECTANGULAR MEDIUM PRESSURE SUPPLY AIR	TYPE 2	#
RECTANGULAR LOW PRESSURE SUPPLY AIR	TYPE 2	#	RECTANGULAR LOW PRESSURE SUPPLY AIR	TYPE 2	#
RECTANGULAR LOW PRESSURE RETURN AIR	TYPE 2	#	RECTANGULAR LOW PRESSURE RETURN AIR	TYPE 2	#
RECTANGULAR OUTDOOR AIR	TYPE 1	#	RECTANGULAR OUTDOOR AIR	TYPE 2	#
RECTANGULAR VENTILATION AIR	TYPE 2	#	RECTANGULAR VENTILATION AIR	NONE	#
RECTANGULAR MIXED AIR	TYPE 2	#	RECTANGULAR MIXED AIR	TYPE 2	#
RECTANGULAR LOW PRESSURE EXHAUST AIR	TYPE 1	#	RECTANGULAR LOW PRESSURE EXHAUST AIR	TYPE 1	#
RECTANGULAR LOW PRESSURE RELIEF AIR	NONE	#	RECTANGULAR LOW PRESSURE RELIEF AIR	NONE	#
KITCHEN HOOD EXHAUST	TYPE 7	1	KITCHEN HOOD EXHAUST	TYPE 7	1
OUTSIDE AIR PLENUM	TYPE 1	#	OUTSIDE AIR PLENUM	TYPE 1	#
RELIEF AIR PLENUM	TYPE 2	#	RELIEF AIR PLENUM	TYPE 2	#

DUCTS LOCATED OUTSIDE THE BUILDING

DUCT TYPE	INSULATION	NOTES		INSULATION	NOTES
ROUND SUPPLY AIR	TYPE 8	#	RECTANGULAR SUPPLY AIR	TYPE 8	#
ROUND RETURN AIR	TYPE 8	#	RECTANGULAR RETURN AIR	TYPE 8	#
ROUND EXHAUST AIR	NONE	#	RECTANGULAR EXHAUST AIR	NONE	#

DUCTS LOCATED OUTSIDE THE BUILDING

DUCTWORK LOCATED OUTSIDE OF THE BUILDNG SHALL BE KINGSPAN THERMADUCT/KOOLDUCT MANUFACTURED BY KINGSPAN. DUCT SHALL BE DOUBLE WALL DUCT WITH A THICKNESS OF 2 3/8", MINIMUM R-VALUE OF 16.2 AND MAXIMUM WEIGHT OF 4.6 POUNDS PER SQUARE FOOT. EXTERIOR COATING OF UV STABLE 38 MIL HIGH IMPACT RESISTANT TITANIUM INFUSED VINYL WITH FACTORY MANUFACTURED SEAMLESS CORNERS.

ACOUSTICALLY LINED DUCTS

DUCT TYPE	INSULATION	NOTES		INSULATION	NOTES
RECTANGULAR SUPPLY AIR AT CENTRAL UNIT	TYPE 5	2	RECTANGULAR EXHAUST AIR	TYPE 5	5
RECTANGULAR SUPPLY AIR AT FAN TERMINAL UNIT	TYPE 5	3	RECTANGULAR RETURN AIR BOOTS	TYPE 5	#
RECTANGULAR RETURN AIR AT CENTRAL UNIT	TYPE 5	4	RECTANGULAR TRANSFER AIR	TYPE 5	#

NOTES:

1. KITCHEN HOOD GREASE EXHAUST DUCTS FROM HOOD CONNECTION TO EXHAUST FAN CONNECTION, SHALL RECEIVE A TWO LAYER WRAP OF FIRE RATED INSULATION.
2. THE VERTICAL DUCTWORK FROM THE UNIT DISCHARGE TO HORIZONTAL AND THE FIRST 10 FEET OF HORIZONTAL DUCTWORK IN ALL DIRECTIONS (TYPICAL FOR CENTRAL AHU, RTU, MAU, DOAU, ETC.)
3. THE FIRST 10 FEET OF DUCTWORK FROM THE FAN TERMINAL OUTLET
4. THE VERTICAL DUCTWORK FROM THE UNIT INLET TO HORIZONTAL AND THE FIRST 10 FEET OF HORIZONTAL DUCTWORK IN ALL DIRECTIONS (TYPICAL FOR CENTRAL AHU, RTU, MAU, DOAU, ETC.)
5. THE FIRST 10 FEET OF DUCTWORK FROM THE EXHAUST FAN INLET

GENERAL NOTES: (APPLY ALL TO ABOVE)

A. THE BASIS FOR THE DUCT INSULATION IN THIS SCHEDULE IS CERTAIN-TEED WHICH SHALL REPRESENT THE MINIMUM LEVEL OF CONSTRUCTION. PRODUCTS MANUFACTURED BY OWENS-CORNING, JOHNS-MANSVILLE, KNAUF, 3M, FIREMASTER AND AEROFLEX SHALL BE PERMITTED TO BID.
B. REFER TO FLOOR PLANS AS ADDITIONAL INSULATION REQUIREMENTS MAY BE INDICATED THERE.
C. THE REQUIREMENT FOR ACOUSTICAL INSULATION IS IN ADDITION TO THE THERMAL INSULATION REQUIREMENT. PROVIDE EXTERNAL THERMAL INSULATION AND INTERNAL ACOUSTICAL LINER AS INDICATED.
D. INSTALL ALL DUCT INSULATION PER MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS.

DEFINITIONS:

SUPPLY AIR - CONDITIONED AIR FROM AN AIR HANDLING SYSTEM TO AN OCCUPIED SPACE
RETURN AIR - AIR FROM AN OCCUPIED SPACE BACK TO AN AIR HANDLING SYSTEM
VENTILATION AIR - CONDITIONED AIR FROM THE DISCHARGE OF THE DOAU TO THE OCCUPIED SPACE
RELIEF AIR - AIR DOWNSTREAM OF THE DOAU/ERW ENERGY RECOVERY SYSTEM TO OUTSIDE THE BUILDING
OUTSIDE AIR - UNCONDITIONED AIR FROM OUTSIDE THE BUILDING TO AN AIR HANDLING SYSTEM
EXHAUST AIR - AIR THAT IS REMOVED FROM A BUILDING SPACE AND CONVEYED TO OUTSIDE THE BUILDING

LOW PRESSURE - LESS THAN 2" STATIC PRESSURE
MEDIUM PRESSURE - GREATER THAN 2" AND LESS THAN 4" STATIC PRESSURE

CONCEALED LOCATION: DUCT IS LOCATED ABOVE A CEILING, WITHIN CHASE OR SHAFT, ETC.
EXPOSED LOCATION: DUCT IS NOT CONCEALED WITH THE BUILDING CONSTRUCTION (FINISHED SPACES OR UNFINSHED SUCH AS MECHANICAL ROOMS)

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PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Mechanical Schedules

M6.05

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Ventilation Calculation - 4th Floor - Meeting Rooms

Rm #	Name	SF	Occupancy Category	Rp CFM/Pers	Ro CFM/SF	Occ Density #/1000 SF	Design Occupant #	Pz Calc. Occ.	Vbz OA CFM	Ez Dist. Eff.	Voz Reqd. OA
401	Elevator Lobby	1,200	Lobby/Prefunc.	7.5	0.06		7	0.0	124.5	1.0	125
402	Prefunction	1,900	Lobby/Prefunc.	7.5	0.06		57	0.0	541.5	1.0	540
403	Corridor	410	Corridor	0.0	0.06			0.0	24.6	1.0	25
404	Passage	190	Corridor	0.0	0.06			0.0	11.4	1.0	10
405	Mens	270	-	0.0	0.06			0.0	16.2	1.0	15
406	Womens	260	-	0.0	0.06			0.0	15.6	1.0	15
410	Warming Kitchen	440	Kitchen	7.5	0.12		9	0.0	120.3	1.0	120
411	Meeting 4-1	740	Conference	5.0	0.06		49	0.0	289.4	1.0	290
412	Meeting 4-2	760	Conference	5.0	0.06		49	0.0	290.6	1.0	290
413	Meeting 4-3	730	Conference	5.0	0.06		49	0.0	288.8	1.0	290
414	Meeting 4-4	790	Conference	5.0	0.06		49	0.0	292.4	1.0	290
415	Meeting 4-5	440	Conference	5.0	0.06		20	0.0	126.4	1.0	125
416	Meeting 4-6	420	Conference	5.0	0.06		20	0.0	125.2	1.0	125
420	Reception	200	Reception	5.0	0.06		3	0.0	27.0	1.0	25
421	Testing	155	Office	5.0	0.06		2	0.0	19.3	1.0	20
422	Open Office	190	Office	5.0	0.06		2	0.0	21.4	1.0	20
423	Office	150	Office	5.0	0.06		2	0.0	19.0	1.0	20
424	Open Office	190	Office	5.0	0.06		2	0.0	21.4	1.0	20
425	Office	150	Office	5.0	0.06		2	0.0	19.0	1.0	20
426	Work Station	190	Office	5.0	0.06		2	0.0	21.4	1.0	20
427	Conference	170	Conference	5.0	0.06		8	0.0	50.2	1.0	50
428	Open Office	190	Office	5.0	0.06		2	0.0	21.4	1.0	20
429	Office	150	Office	5.0	0.06		2	0.0	19.0	1.0	20
450	Open Office	190	Office	5.0	0.06		2	0.0	21.4	1.0	20
451	Office	150	Office	5.0	0.06		2	0.0	19.0	1.0	20
	Net SF:	10,625				Total Design Occupants	340	0.0		Total Floor OA:	2,535

Ventilation Calculation - 5th-19th Floor - Guest Rooms

Rm #	Name	SF	Occupancy Category	Rp CFM/Pers	Ro CFM/SF	Occ Density #/1000 SF	Design Occupant #	Pz Calc. Occ.	Vbz OA CFM	Ez Dist. Eff.	Voz Reqd. OA
500A	Corridor	670	Corridor	0.0	0.06	0.0		0.0	40.2	1.0	40
500B/C	Corridors	958	Corridor	0.0	0.06	0.0		0.0	57.5	1.0	55
501	Double Queen +	505	Guest Room	5.0	0.06	0.0	4	0.0	50.3	1.0	50
502	Double Queen +	512	Guest Room	5.0	0.06	0.0	4	0.0	50.7	1.0	50
503	Double Queen +	512	Guest Room	5.0	0.06	0.0	4	0.0	50.7	1.0	50
504	Double Queen +	548	Guest Room	5.0	0.06	0.0	4	0.0	52.9	1.0	55
505	Double Queen +	512	Guest Room	5.0	0.06	0.0	4	0.0	50.7	1.0	50
506	Double Queen +	512	Guest Room	5.0	0.06	0.0	4	0.0	50.7	1.0	50
507	King +	467	Guest Room	5.0	0.06	0.0	3	0.0	43.0	1.0	45
508	King +	395	Guest Room	5.0	0.06	0.0	3	0.0	38.7	1.0	40
509	King +	389	Guest Room	5.0	0.06	0.0	3	0.0	38.3	1.0	40
510	King +	398	Guest Room	5.0	0.06	0.0	3	0.0	38.9	1.0	40
511	King +	407	Guest Room	5.0	0.06	0.0	3	0.0	39.4	1.0	40
512	King +	472	Guest Room	5.0	0.06	0.0	3	0.0	43.3	1.0	45
513	King +	435	Guest Room	5.0	0.06	0.0	3	0.0	41.1	1.0	40
514	King +	436	Guest Room	5.0	0.06	0.0	3	0.0	41.2	1.0	40
515	King +	427	Guest Room	5.0	0.06	0.0	3	0.0	40.6	1.0	40
516	King +	426	Guest Room	5.0	0.06	0.0	3	0.0	40.6	1.0	40
517	King +	453	Guest Room	5.0	0.06	0.0	3	0.0	42.2	1.0	40
518	King +	427	Guest Room	5.0	0.06	0.0	3	0.0	40.6	1.0	40
519	King +	447	Guest Room	5.0	0.06	0.0	3	0.0	41.8	1.0	40
520	Ice	71	Storage	0.0	0.12	0.0		0.0	8.5	1.0	10
521	Electrical	89	Storage	0.0	0.12	0.0		0.0	10.7	1.0	10
522	Housekeeping	228	Storage	0.0	0.12	0.0		0.0	27.4	1.0	25
	Net SF:	10,696				Total Design Occupants	63			Total Floor OA:	975

Ventilation Calculation - 21st Floor

Rm #	Name	SF	Occupancy Category	Rp CFM/Pers	Ro CFM/SF	Occ Density #/1000 SF	Design Occupant #	Pz Calc. Occ.	Vbz OA CFM	Ez Dist. Eff.	Voz Reqd. OA
2102	Elev. Equip.	1,053	-	0.0	0.06	0.0		0.0	63.2	1.0	65
2103	Elev. Equip.	416	-	0.0	0.06	0.0		0.0	25.0	1.0	25
2103	Mech. Equip.	1,020	-	0.0	0.06	0.0		0.0	61.2	1.0	60
2104	Storage	132	Storage	0.0	0.12	0.0		0.0	15.8	1.0	15
2105	Storage	3,130	Storage	0.0	0.12	0.0		0.0	375.6	1.0	375
21XX	Storage	835	Storage	0.0	0.12	0.0		0.0	100.2	1.0	100
	Net SF:	6,586				Total Design Occupants	0			Total Floor OA:	640

Ventilation Calculation - Basement

Rm #	Name	SF	Occupancy Category	Rp CFM/Pers	Ro CFM/SF	Occ Density #/1000 SF	Design Occupant #	Pz Calc. Occ.	Vbz OA CFM	Ez Dist. Eff.	Voz Reqd. OA
1	Elevator Corridor	842	Corridor	0.0	0.06	0.0		0.0	50.5	1.0	50
2	Corridor	937	Corridor	0.0	0.06	0.0		0.0	56.2	1.0	55
3	Nurse	78	Office	5.0	0.06	0.0	1	0.0	9.7	1.0	10
4	Seating	1,471	Dining Room	7.5	0.18	0.0	60	0.0	714.8	1.0	715
5	Vending	64	-	0.0	0.06	0.0		0.0	3.8	1.0	5
6	Comp	75	Office	5.0	0.06	0.0	2	0.0	14.5	1.0	15
7	Servery	580	Cafeteria	7.5	0.18	0.0	4	0.0	134.4	1.0	135
8	Warming/Staging	357	Cafeteria	7.5	0.18	0.0	2	0.0	79.3	1.0	80
10	Hskpng Office	139	Office	5.0	0.06	0.0	2	0.0	18.3	1.0	20
11	Dry/Folding	808	Commercial laundry	25.0	0.06	0.0	2	0.0	98.5	1.0	100
12	Clean Linen	307	Laundry/storage	7.5	0.12	0.0	2	0.0	51.8	1.0	50
13	Wash	856	Commercial laundry	25.0	0.06	0.0	2	0.0	101.4	1.0	100
14	Soiled Linen	211	Laundry/storage	7.5	0.12	0.0	1	0.0	32.8	1.0	35
15	Utility	122	-	0.0	0.06	0.0		0.0	7.3	1.0	5
20	Corridor	268	Corridor	0.0	0.06	0.0		0.0	16.1	1.0	15
21	Womens Locker	744	-	0.0	0.06	0.0	6	0.0	44.6	1.0	45
22	Change	39	-	0.0	0.06	0.0		0.0	2.3	1.0	0
23	Women	183	-	0.0	0.06	0.0		0.0	11.0	1.0	10
24	Shower	89	-	0.0	0.06	0.0		0.0	5.3	1.0	5
25	Mens Locker	752	-	0.0	0.06	0.0	6	0.0	45.1	1.0	45
26	Change	39	-	0.0	0.06	0.0		0.0	2.3	1.0	0
27	Men	183	-	0.0	0.06	0.0		0.0	11.0	1.0	10
28	Shower	89	-	0.0	0.06	0.0		0.0	5.3	1.0	5
50	Corridor	644	Corridor	0.0	0.06	0.0		0.0	38.6	1.0	40
51	Hr Training	592	Classroom	10.0	0.12	0.0	18	0.0	251.0	1.0	250
52	Hr Clerk	292	Office	5.0	0.06	0.0	8	0.0	57.5	1.0	60
53	Hr Dir	135	Office	5.0	0.06	0.0	2	0.0	18.1	1.0	20
54	Passage	88	Corridor	5.0	0.06	0.0		0.0	5.3	1.0	5
55	Eng Off	138	Office	5.0	0.06	0.0	2	0.0	18.3	1.0	20
56	Eng Work	178	Office	5.0	0.06	0.0	2	0.0	20.7	1.0	20
57	Stor	57	Storage	0.0	0.12	0.0		0.0	6.8	1.0	5
58	Stor	55	Storage	0.0	0.12	0.0		0.0	6.6	1.0	5
59	Elec	51	-	0.0	0.06	0.0		0.0	3.1	1.0	5
60	Vestibule	299	-	0.0	0.06	0.0		0.0	17.9	1.0	20
61	Central Plant	3,918	-	0.0	0.06	0.0		0.0	235.1	1.0	235
62	Unit	213	-	0.0	0.06	0.0		0.0	12.8	1.0	15
63	Pool Equipment	546	-	0.0	0.06	0.0		0.0	32.8	1.0	35
64	Elec Service	419	-	0.0	0.06	0.0		0.0	25.1	1.0	25
65	Unit	315	-	0.0	0.06	0.0		0.0	18.9	1.0	20
66	Mechanical	1,042	-	0.0	0.06	0.0		0.0	62.5	1.0	65
67	Unassigned	195	Mech	0.0	0.06	0.0		0.0	11.7	1.0	10
68	Unassigned	1,010	Mech	0.0	0.06	0.0		0.0	60.6	1.0	60
70	Unassigned	219	Game Arcade	7.5	0.12	20.0	5	4.4	63.8	1.0	65
71	Unassigned	480	Game Arcade	7.5	0.12	20.0	10	9.6	132.6	1.0	135
72	Unassigned	354	Game Arcade	7.5	0.12	20.0	8	7.1	102.5	1.0	100
73	Unassigned	1,027	Game Arcade	7.5	0.12	20.0	21	20.5	280.7	1.0	280
81	Back House Corridor	1,950	Corridor	0.0	0.06	0.0		0.0	117.0	1.0	115
80	Garage Basement Vault	7,900	Game Arcade	7.5	0.12	20.0	158	158.0	2133.0	1.0	2135
82-84	South Mech Rooms/Unnamed	2,600	Game Arcade	7.5	0.12	20.0	52	52.0	702.0	1.0	700
0X	Zone 15 Mech Space	6,250	Storage	0.0	0.12	0.0		0.0	750.0	1.0	750
B005	Elev Equip	161	-	0.0	0.06	0.0		0.0	9.7	1.0	10
B006	Exist Tele	56	-	0.0	0.06	0.0		0.0	3.4	1.0	5
0X	Elev Mech 1	50	-	0.0	0.06	0.0		0.0	3.0	1.0	5
0X	Elev Mech 2	50	-	0.0	0.06	0.0		0.0	3.0	1.0	5
0X	Zone 13	760	-	0.0	0.06	0.0		0.0	45.6	1.0	45
0X	Zone 6 Unassigned	500	-	0.0	0.06	0.0		0.0	30.0	1.0	30
0X	Unassigned	500	-	0.0	0.06	0.0		0.0	30.0	1.0	30
	Net SF:	42,277				Total Design Occupants	376			Total Floor OA:	6,835

Ventilation Calculation - 1st Floor

Rm #	Name	SF	Occupancy Category	Rp CFM/Pers	Ro CFM/SF	Occ Density #/1000 SF	Design Occupant #	Pz Calc. Occ.	Vbz OA CFM	Ez Dist. Eff.	Voz Reqd. OA
101	VESTIBULE	143	Corridor	0.0	0.06	0.0	0	0.0	8.6	1.0	10
102	VESTIBULE	231	Corridor	0.0	0.06	0.0	0	0.0	13.9	1.0	15
103	GRAND LOBBY	3,476	Lobbies/Prefunc.	7.5	0.06	30.0	100	104.3	958.6	1.0	960
104	ELEVATOR LOBBY	834	Corridor	0.0	0.06	0.0	0	0.0	50.0	1.0	50
105	TECH LOUNGE	1,068	Lobbies/Prefunc.	7.5	0.06	30.0	25	32.0	251.6	1.0	250
106	FIRE COMMAND	181	-	0.0	0.06	0.0	0	0.0	10.9	1.0	10
107	GRAND LOBBY LOUNGE	2,006	Lobbies/Prefunc.	7.5	0.06	30.0	40	60.2	420.4	1.0	420
108	STOR	65	Storage	0.0	0.12	0.0	0	0.0	7.8	1.0	10
109	CONCIERGE	162	Lobbies/Prefunc.	7.5	0.06	30.0	2	4.9	24.7	1.0	25
110	CHEFS TABLE	149	Dining Room	7.5	0.18	0.0	6	0.0	71.8	1.0	70
111	COMP DINING	3,112	Dining Room	7.5	0.18	0.0	86	0.0	1205.2	1.0	1205
112	KITCHEN	623	Kitchen	7.5	0.12	20.0	6	12.5	119.8	1.0	120
113	SERVING	345	Kitchen	7.5	0.12	20.0	6	6.9	86.4	1.0	85
114	PASSAGE	318	Corridor	0.0	0.06	0.0	0	0.0	19.1	1.0	20
115	PANTRY/BAR STORAGE	183	Storage	0.0	0.12	0.0	0	0.0	22.0	1.0	20
116	WOMENS	170	-	0.0	0.06	0.0	0	0.0	10.2	1.0	10
117	MENS	187	-	0.0	0.06	0.0	0	0.0	11.2	1.0	10
120	PASSAGE	145	Corridor	0.0	0.06	0.0	0	0.0	8.7	1.0	10
121	DRY STORAGE	304	Storage	0.0	0.12	0.0	0	0.0	36.5	1.0	35
122	TOILET	81	-	0.0	0.06	0.0	0	0.0	4.9	1.0	5
123	DRINK STATION	515	Kitchen	7.5	0.12	20.0	2	10.3	76.8	1.0	75
124	DISHWASHING	292	Kitchen	7.5	0.12	20.0	4	5.8	65.0	1.0	65
125	BANQUET PLATING	603	Kitchen	7.5	0.12	20.0	12	12.1	162.4	1.0	160
126	BANQUET KITCHEN	669	Kitchen	7.5	0.12	20.0	12	13.4	170.3	1.0	170
127	COOLER ENTRY	652	Corridor	0.0	0.06	0.0	2	0.0	39.1	1.0	40
128	WALK-IN REF	427	Ref/Freezer	10.0	0.00	0.0	0	0.0	0.0	1.0	0
129	WALK-IN FR	120	Ref/Freezer	10.0	0.00	0.0	0	0.0	0.0	1.0	0
130	WALK-IN BEER/WINE	230	Ref/Freezer	10.0	0.00	0.0	0	0.0	0.0	1.0	0
131	DRY LIQOUR STORAGE	745	Storage	0.0	0.12	0.0	0	0.0	89.4	1.0	90
150	CORRIDOR	828	Corridor	0.0	0.06	0.0	0	0.0	49.7	1.0	50
151	CORRIDOR	101	Corridor	0.0	0.06	0.0	0	0.0	6.1	1.0	5
152	S&C CONF	120	Conference	5.0	0.06	50.0	4	6.0	27.2	1.0	25
153	S&C OFFICE	120	Office	5.0	0.06	0.0	2	0.0	17.2	1.0	15
154	S&C WORK ROOM	157	Office	5.0	0.06	0.0	2	0.0	19.4	1.0	20
155	LOWER POOL DECK	2,376	Swimming	0.0	0.48	0.0	30	0.0	1140.5	1.0	1140
156	UPPER POOL DECK	1,466	Swimming	0.0	0.48	0.0	30	0.0	703.7	1.0	705
157	WOMENS	180	-	0.0	0.06	0.0	0	0.0	10.8	1.0	10
158	CHANGING	57	-	0.0	0.06	0.0	0	0.0	3.4	1.0	5
159	MENS	178	-	0.0	0.06	0.0	0	0.0	10.7	1.0	10
160	CHANGING	47	-	0.0	0.06	0.0	0	0.0	2.8	1.0	5
161	CORRIDOR	161	Corridor	0.0	0.06	0.0	0	0.0	9.7	1.0	10
162	STORAGE	357	Storage	0.0	0.12	0.0	0	0.0	42.8	1.0	45
163	STORAGE	699	Storage	0.0	0.12	0.0	0	0.0	83.9	1.0	85
170	FITNESS	1,352	Health Club/Weights	20.0	0.06	10.0	20	13.5	481.1	1.0	480
171	TOILET	71	-	0.0	0.06	0.0	0	0.0	4.3	1.0	5
10X	ZONE 101 UNASSIGNED	2,800	Game Arcade	7.5	0.12	20.0	56	56.0	756.0	1.0	755
10X	ZONE 102 UNASSIGNED	4,030	Game Arcade	7.5	0.12	20.0	80	80.6	1083.6	1.0	1085
10X	ZONE 103 CORRIDOR	910	corridor	0.0	0.06	0.0	0	0.0	54.6	1.0	55
10X	ZONE 106 CORRIDOR	1,810	corridor	0.0	0.06	0.0	0	0.0	108.6	1.0	110
10X	ZONE 104 STORAGE	65	Storage	0.0	0.12	0.0	0	0.0	7.8	1.0	10
ZONE 109	ZONE 109 UNASSIGNED	1,180	-	0.0	0.06	0.0	0	0.0	70.8	1.0	70
10X	UNASSIGNED SOUTH	1,930	-	0.0	0.06	0.0	0	0.0	115.8	1.0	115
10X	ELEV MECH	55	-	0.0	0.06	0.0	0	0.0	3.3	1.0	5
	Net SF:	39,086				Total Design Occupants	527			Total Floor OA:	8,760

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H&B PROJECT NUMBER : 182630

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STATE OF MISSOURI
CASEY JOHN STEPHAN
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Mechanical Schedules

M6.06

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PLAN NOTES:

1 APPROXIMATE LOCATION OF EXISTING PLUMBING FIXTURE.

2 APPROXIMATE LOCATION OF EXISTING PLUMBING FIXTURE.

3 3" TRAPPED WASTE UP TO FLOOR DRAIN.

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE PLUMBING SYSTEMS COMPLETE AND PER APPLICABLE CODES INCLUDING ALL NECESSARY COMPONENTS AND OFFSETS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR OTHER CONDITIONS.

B. REFER TO THE ARCHITECTURAL PLANS FOR THE EXACT LOCATIONS OF PLUMBING FIXTURES.

C. COORDINATE THE INSTALLATION OF PLUMBING AND PIPING WITH THE WORK OF ALL OTHER TRADES.

D. WHERE WALL MOUNTED FLUSH VALVE SENSORS ARE USED, THE PLUMBING CONTRACTOR SHALL COORDINATE THE LOCATION OF THE SENSORS WITH THE ELECTRICAL AND ARCHITECTURAL TRADES TO AVOID CONFLICTS WITH GRAB BARS OR ANY OTHER ACCESSORIES.

E. PIPING SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT OR PANELS. PROVIDE THE CODE REQUIRED WORKING CLEARANCE AROUND ALL ELECTRICAL EQUIPMENT AND PANELS.

F. THE CONTRACTOR SHALL NOT LOCATE PIPING BELOW DUCT MOUNTED AIR TERMINAL UNITS, TERMINAL HEATING COILS, OR OTHER EQUIPMENT.

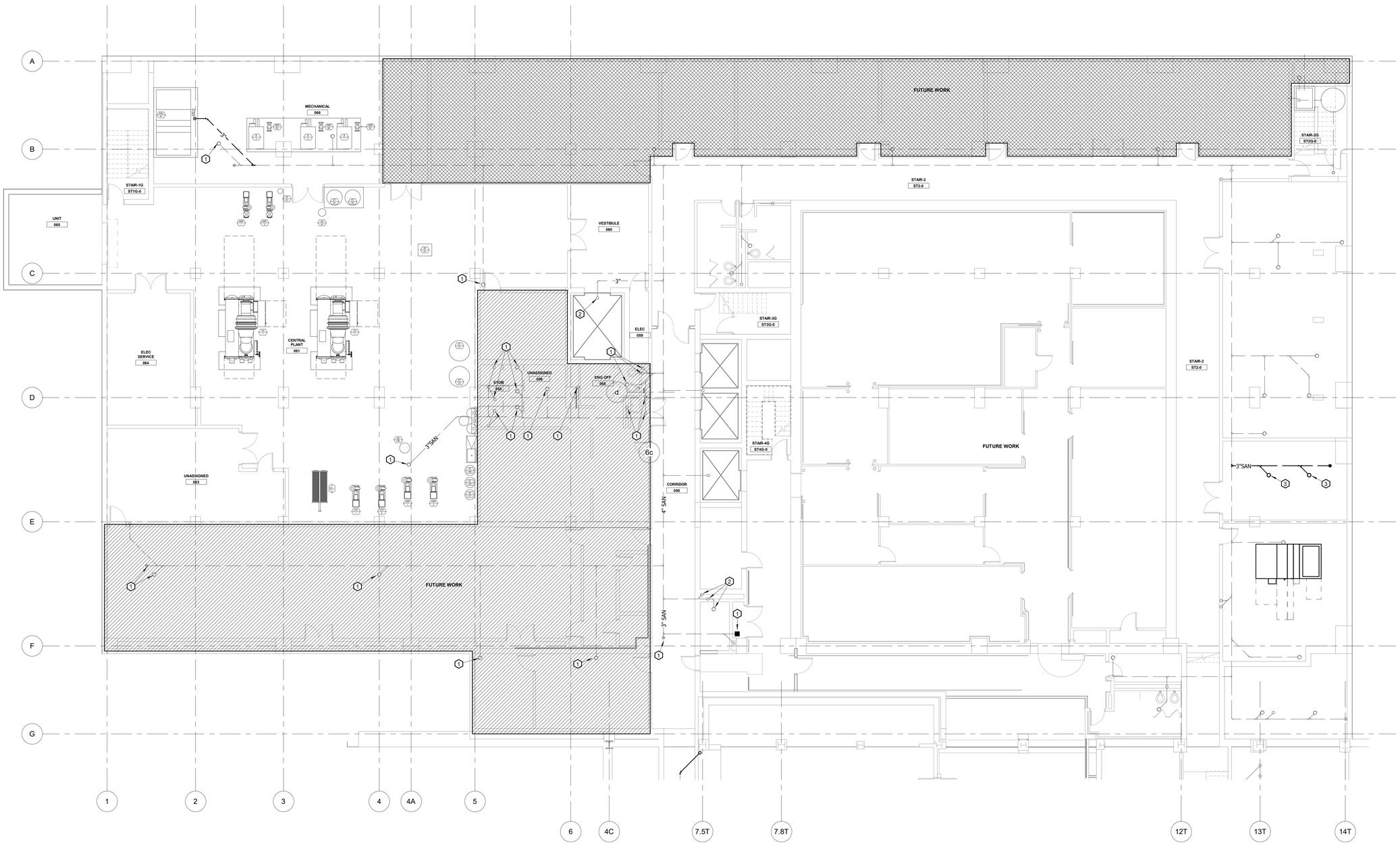
G. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL PLUMBING SYSTEMS.

H. COORDINATE THE SHUT DOWN OF ANY EXISTING SERVICES AND/OR EQUIPMENT WITH THE OWNER'S REPRESENTATIVE.

I. PLUMBING VENT PIPING THROUGH THE ROOF SHALL BE LOCATED A MINIMUM OF 10'-0" AWAY FROM ANY FRESH AIR INTAKE LOCATION AND A MINIMUM OF 18" CLEAR FROM THE INSIDE FACE OF THE PARAPET.

J. PROVIDE THE CODE REQUIRED CLEARANCE FOR ALL CLEANOUTS INSTALLED IN SANITARY WASTE AND VENT PIPING.

K. MINIMUM UNDERGROUND PIPE SIZE SHALL BE 2".



1 GARAGE BASEMENT FLOOR BELOW GRADE PLUMBING PLAN

Scale: 1/8" = 1'-0"

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Brandon
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage Basement Floor Below Grade Plumbing Plan

P1.00-G

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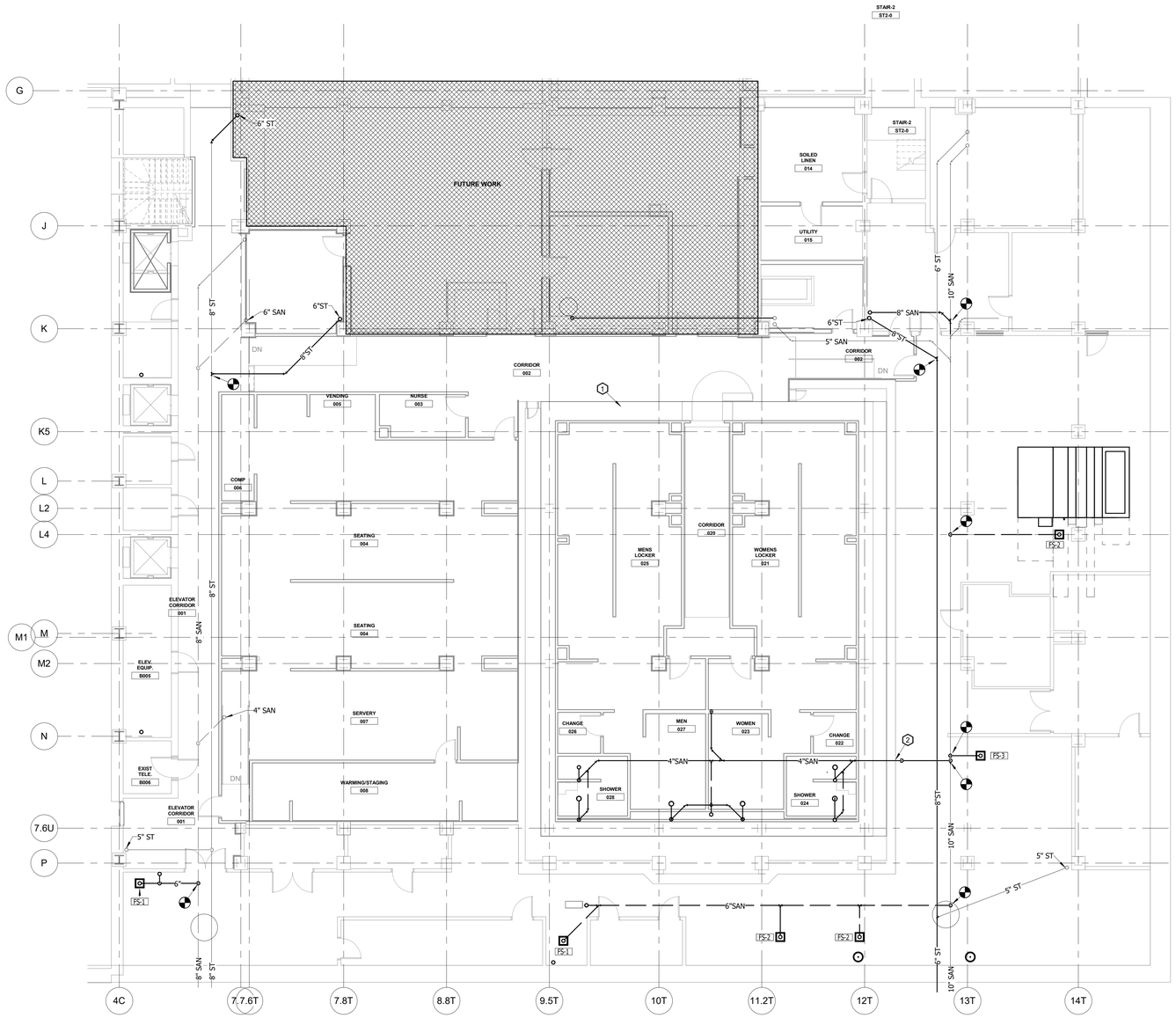

1 TOWER BASEMENT FLOOR BELOW GRADE PLUMBING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 SANITARY WITHIN VAULT IS ROUTED ABOVE VAULT FLOOR, BELOW RAISED FLOOR.

2 CORE DRILL VAULT WALL FOR SANITARY ROUTING EXITING BASEMENT LOCKER ROOM.

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Tower Basement Floor
Below Grade Plumbing Plan
P1.00-T

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GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

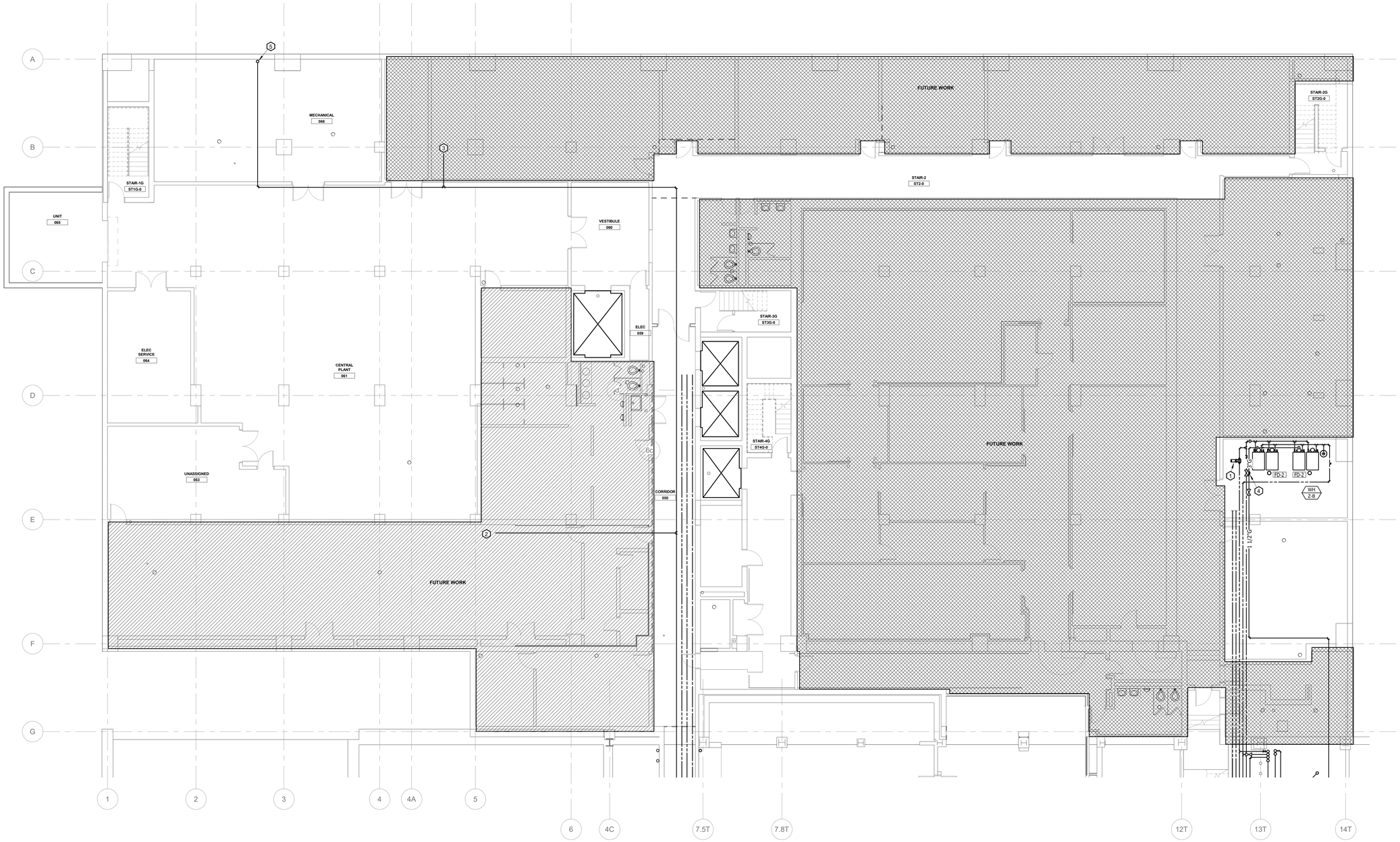
1 HOT WATER CIRCULATION PUMP Z-B: 10 GPM AT 15' HEAD.

2 GAS PRESSURE REGULATOR FOR POOL EQUIPMENT. SIZED TO DROP ___ MBH FROM 5 PSI TO 14" WC. VENT TO EXTERIOR.

3 GAS PRESSURE REGULATOR FOR HEATING WATER BOILERS. SIZED TO DROP ___ MBH FROM 5 PSI TO 14" WC. VENT TO EXTERIOR.

4 GAS PRESSURE REGULATOR FOR DOMESTIC WATER HEATERS. SIZED TO DROP 5400 MBH FROM 5 PSI TO 14" WC. VENT TO EXTERIOR.

5 GAS UP AND THROUGH WALL TO REVISED GAS SERVICE. SERIVCE SHALL BE SIZED FOR ___ MBH AND DELIVERED AT 5 PSI. COORDINATE WITH UTILITY PROVIDER.



1 GARAGE BASEMENT FLOOR ABOVE GRADE PLUMBING PLAN

Scale: 1/8" = 1'-0"

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9/8/2020

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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage Basement Floor Above Grade Plumbing Plan

P1.01-G

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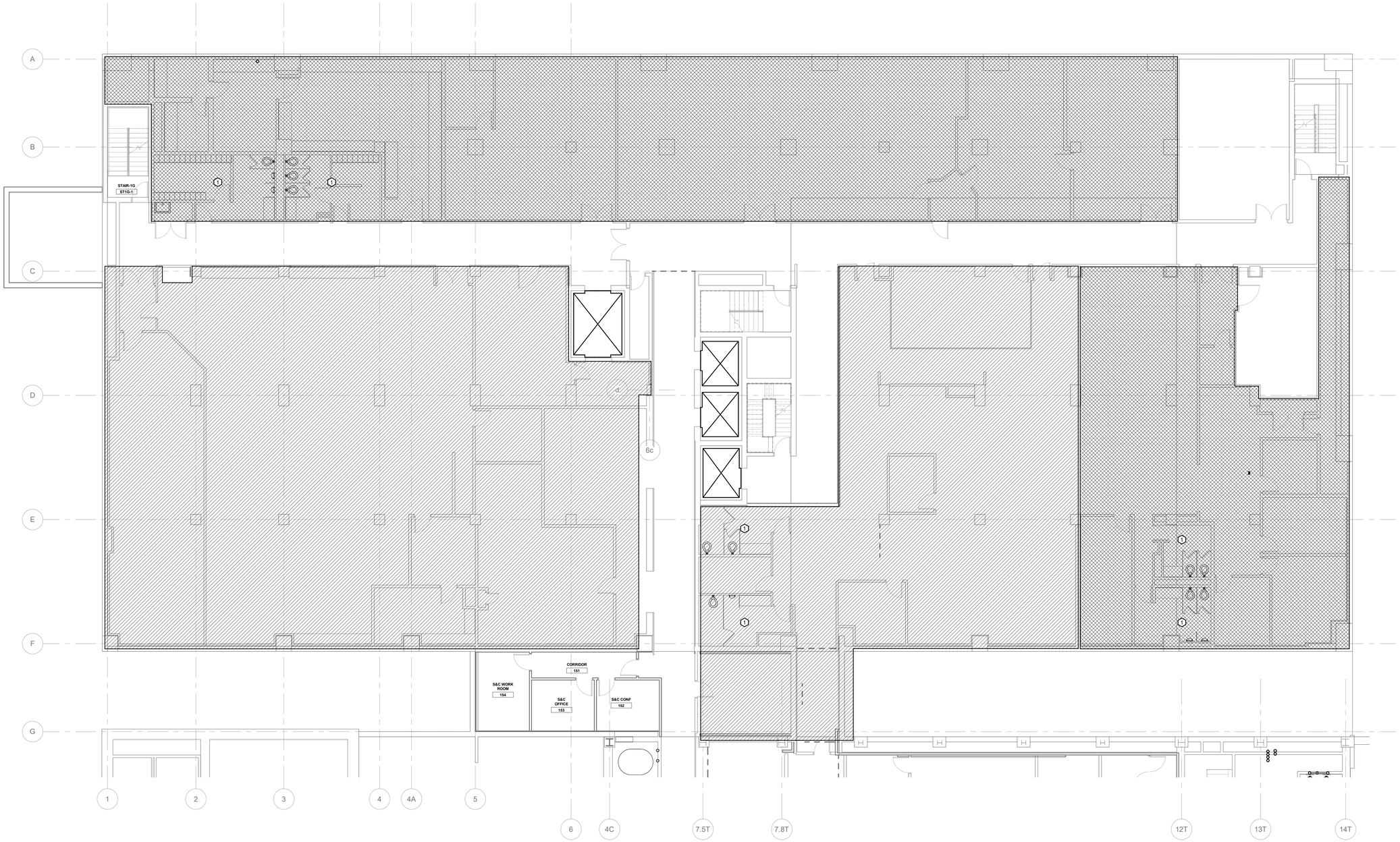
GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 PLUMBING FIXTURES ON THIS LEVEL WILL BE SERVED BY SUPPLY LINES IN BASEMENT.



1 GARAGE GROUND FLOOR PLUMBING PLAN

Scale: 1/8" = 1'-0"

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NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage Ground Floor Plumbing Plan

P1.01-G1

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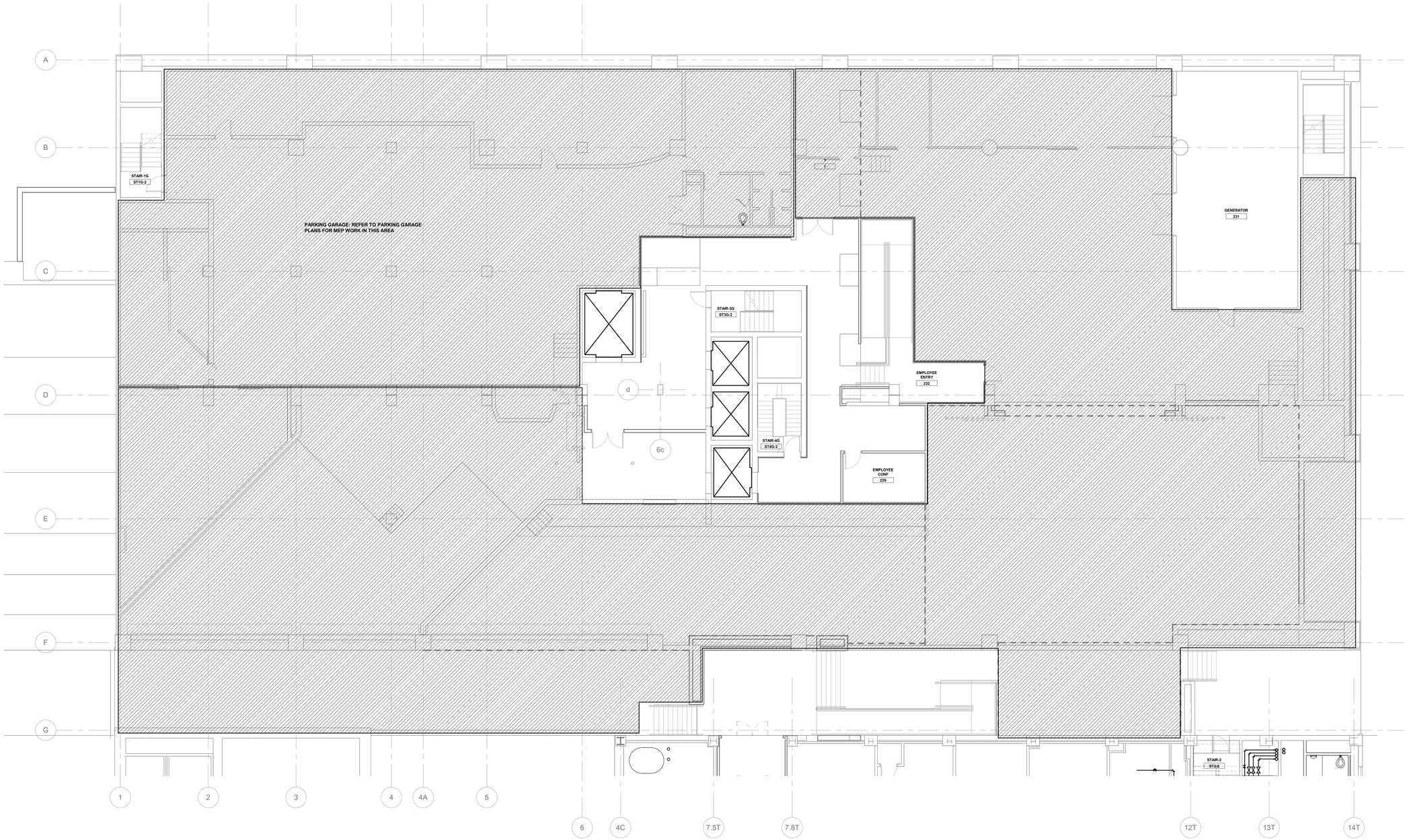
GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

DETAIL# FOR NOTES IN THE FIGURE DRAWING THE TEXT OFTEN DETAIL#



1 GARAGE DOCK FLOOR PLUMBING PLAN

Scale: 1/8" = 1'-0"

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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage Dock Floor Plumbing Plan
P1.01-G2

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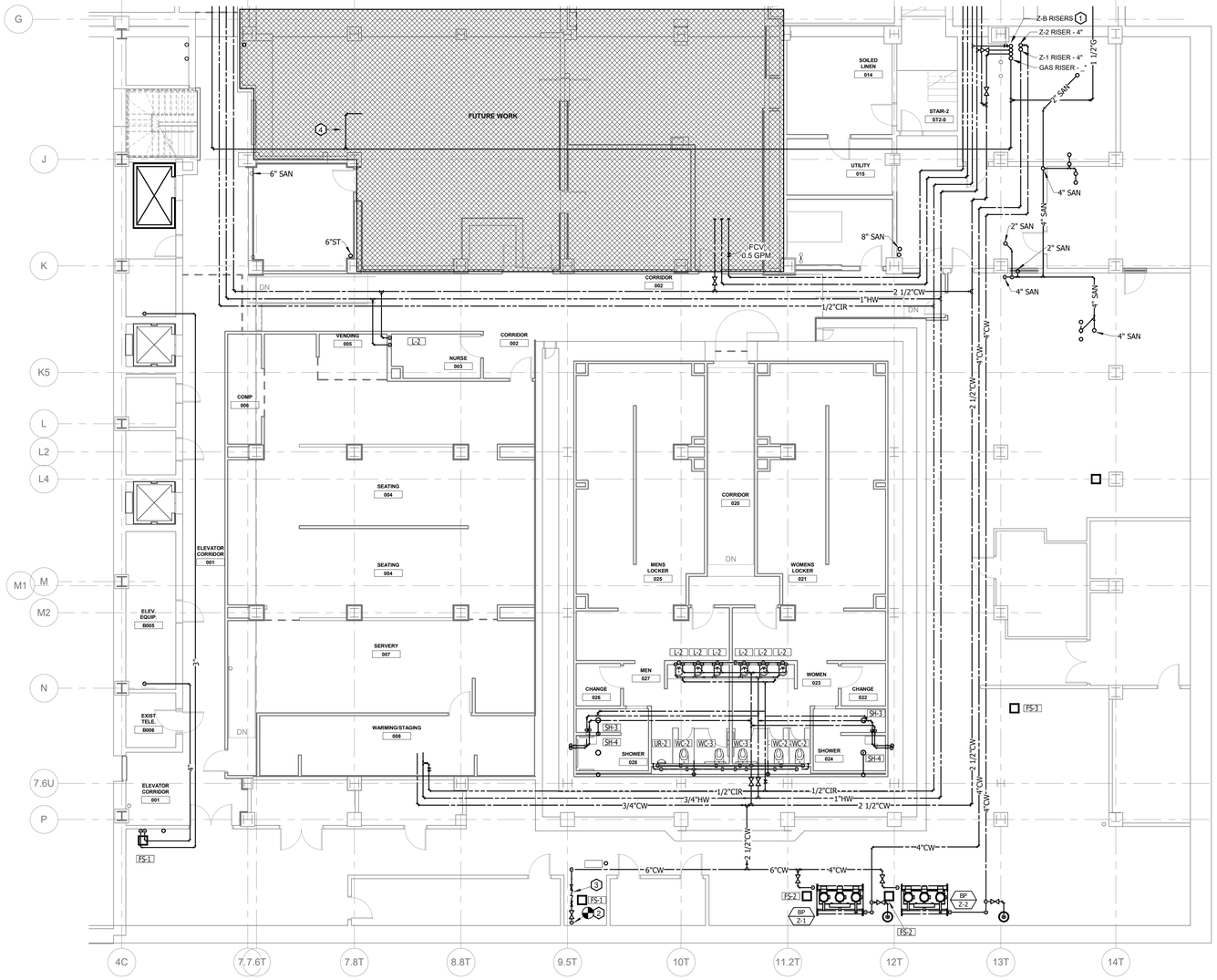

1 TOWER BASEMENT FLOOR ABOVE GRADE PLUMBING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1. ZONE Z-8 RISERS: __" DWC, __"DHW, 1" DHWR.
2. CONNECT TO EXISTING 6" CITY DOMESTIC WATER LINE.
3. PROVIDE NEW 6" REDUCED PRESSURE BACKFLOW PREVENTER.
4. GAS PRESSURE REGULATOR FOR LAUNDRY DRYERS. SIZED TO DROP ___ MBH FROM 5 PSI TO 14" WC. VENT TO EXTERIOR.

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Tower Basement Floor
Above Grade Plumbing Plan

P1.01-T

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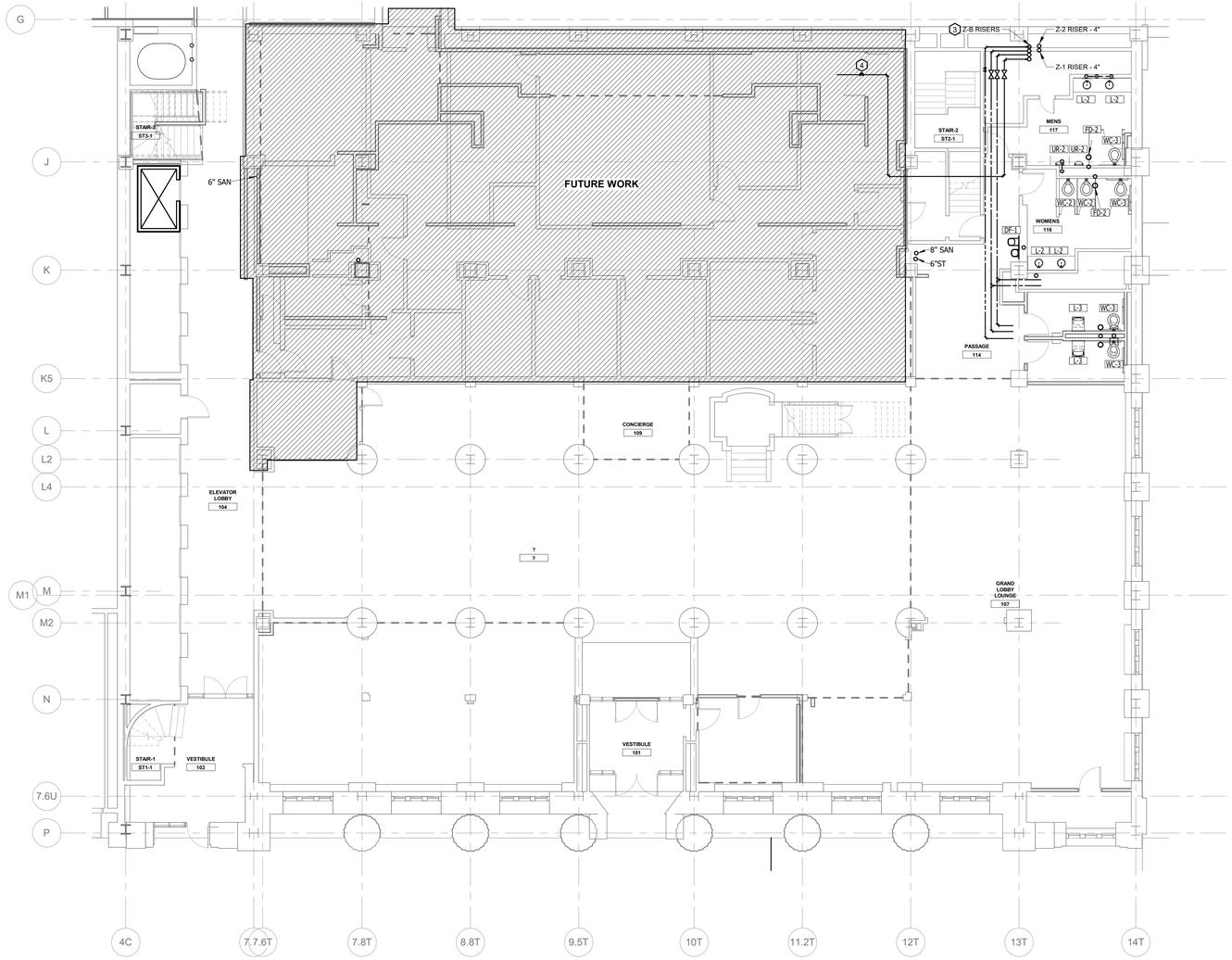

1 TOWER FIRST FLOOR PLUMBING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

3 ZONE Z-8 RISERS: __" DCW, ___" DHW, 1" DHWR

4 GAS PRESSURE REGULATOR FOR KITCHEN EQUIPMENT. SIZED TO DROP ___ MBH FROM 5 PSI TO 14" WC. VENT TO EXTERIOR.

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The Grand Reserve

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Scale: See Drawing
Issue Date: September 8, 2020

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Rev. #	Revision Description	Issue Date

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Tower First Floor Plumbing Plan

P1.01-T1

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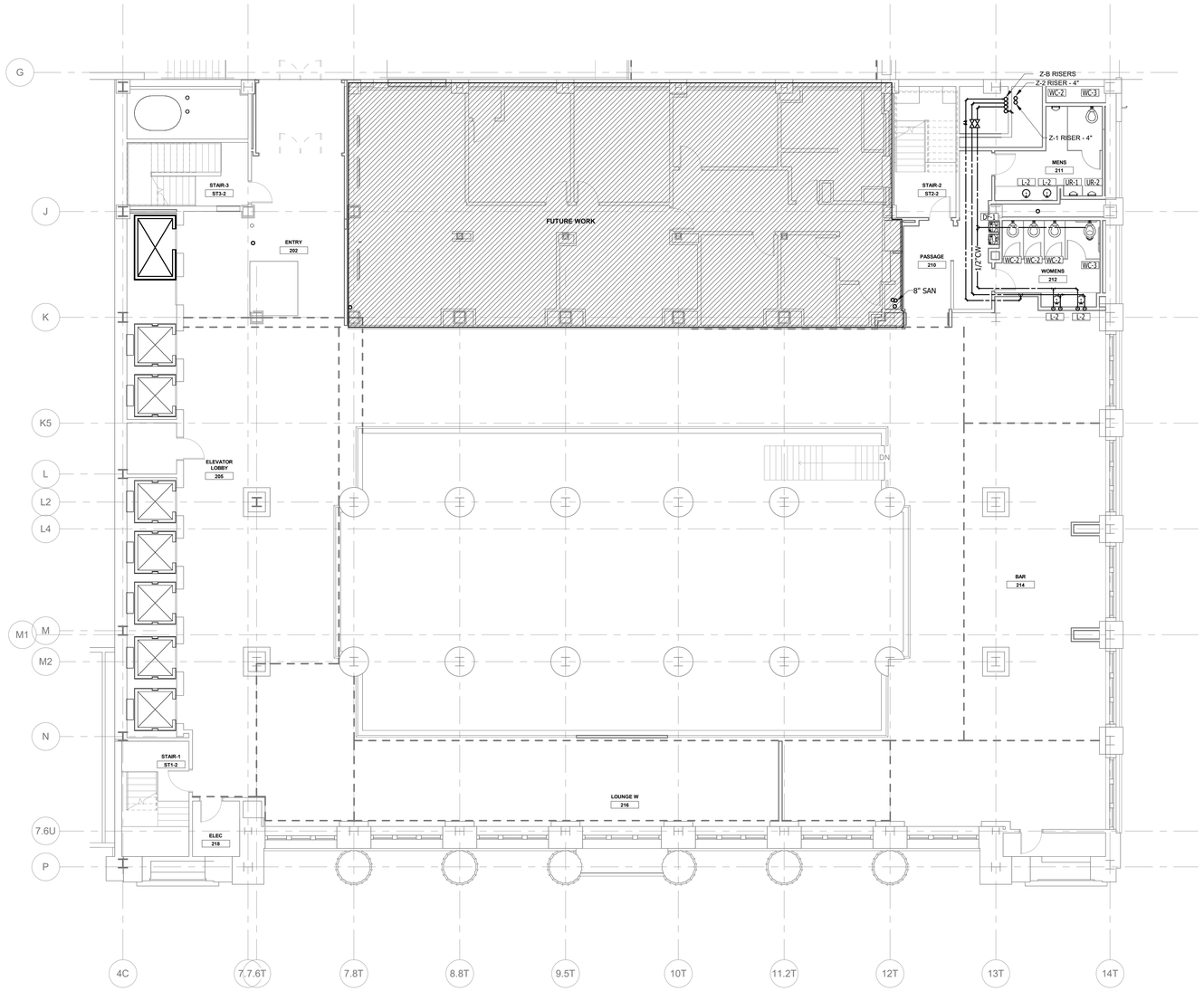

1 TOWER SECOND FLOOR PLUMBING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

DETAIL# FOR NOTES IN THE PLAN DRAWING THE TEXT OFTEN DETAIL#

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Tower Second Floor Plumbing Plan

P1.01-T2

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9/8/2020 11:36:28 AM

GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 HOT WATER CIRCULATION PUMP Z-1: 20 GPM AT 35' HEAD.

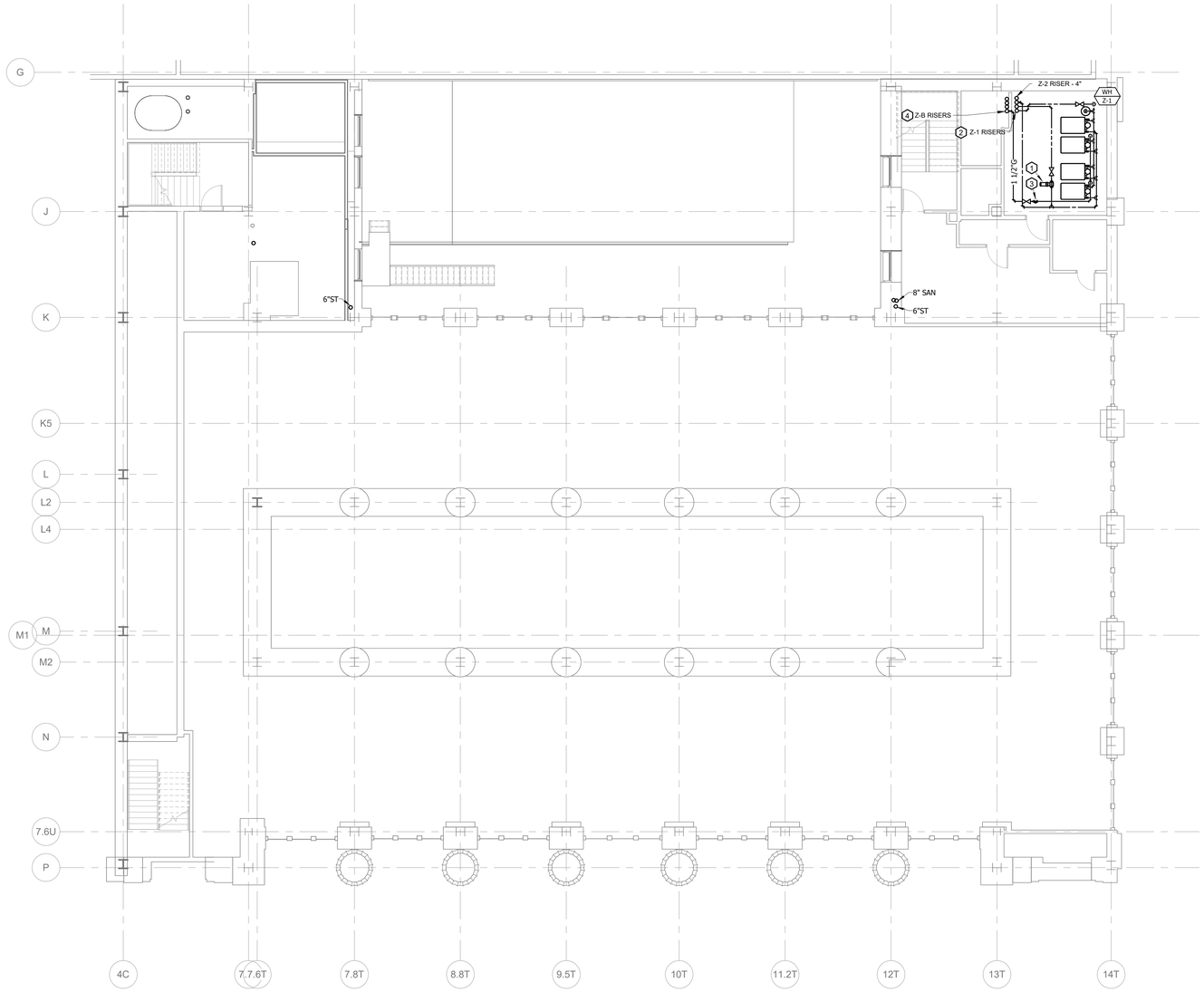
2 ZONE Z-1 RISERS: 2-1/2" DCW, 2-1/2" DHW, 1-1/2" DHWR.

3 GAS PRESSURE REGULATOR FOR DOMESTIC HOT WATER HEATERS. SIZED TO DROP 5400 MBH FROM 5 PSI TO 14" WC. VENT TO EXTERIOR.

4 ZONE Z-B RISERS: 1-1/2" DCW, 1" DHW, 3/4" DHWR.

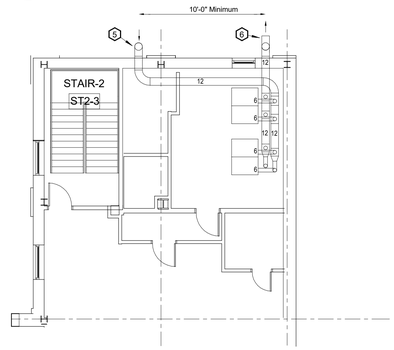
5 12" COMBUSTION AIR INLET FOR WH-Z1. REFER TO HORIZONTAL VENTING DETAIL.

6 12" COMBUSTION AIR OUTLET FOR WH-Z1. REFER TO HORIZONTAL VENTING DETAIL.



1 TOWER THIRD 'B' FLOOR PLUMBING PLAN

Scale: 1/8" = 1'-0"



2 ENLARGED WATER HEATER VENTING PLAN

Scale: 1/8" = 1'-0"

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Tower - Third B Floor Plumbing Plan

P1.01-T3B

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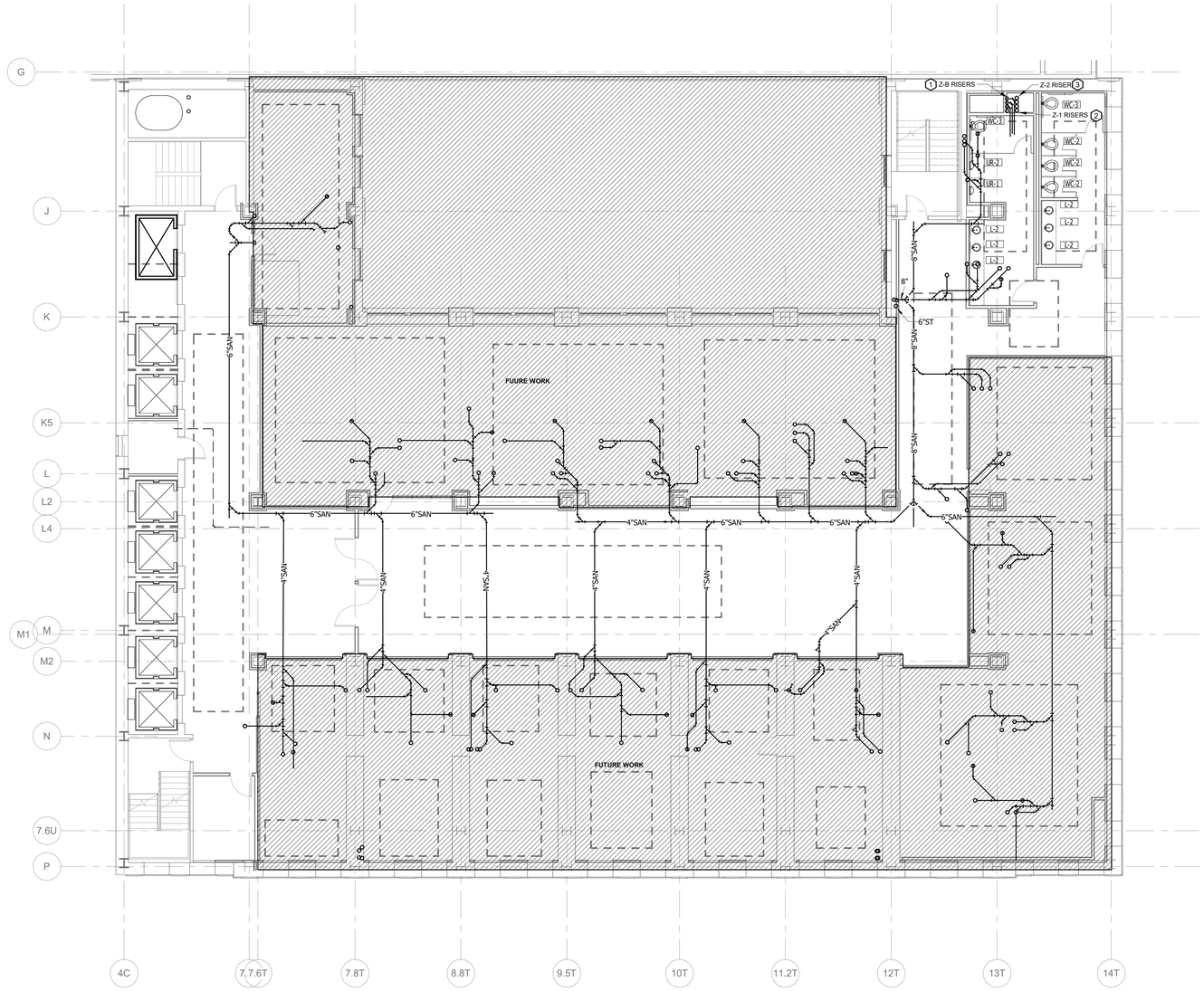

1 TOWER FOURTH FLOOR PLUMBING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 ZONE Z-B RISERS: 1-1/2" DCW, 1" DHW, 3/4" DHWR

2 ZONE Z-1 RISERS: 2-1/2" DCW, 2-1/2" DHW, 1-1/2" DHWR

3 ZONE Z-2 RISER: 4" DCW

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9/8/2020

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REVISION SCHEDULE		
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Tower Fourth Floor
Plumbing Plan

P1.01-T4

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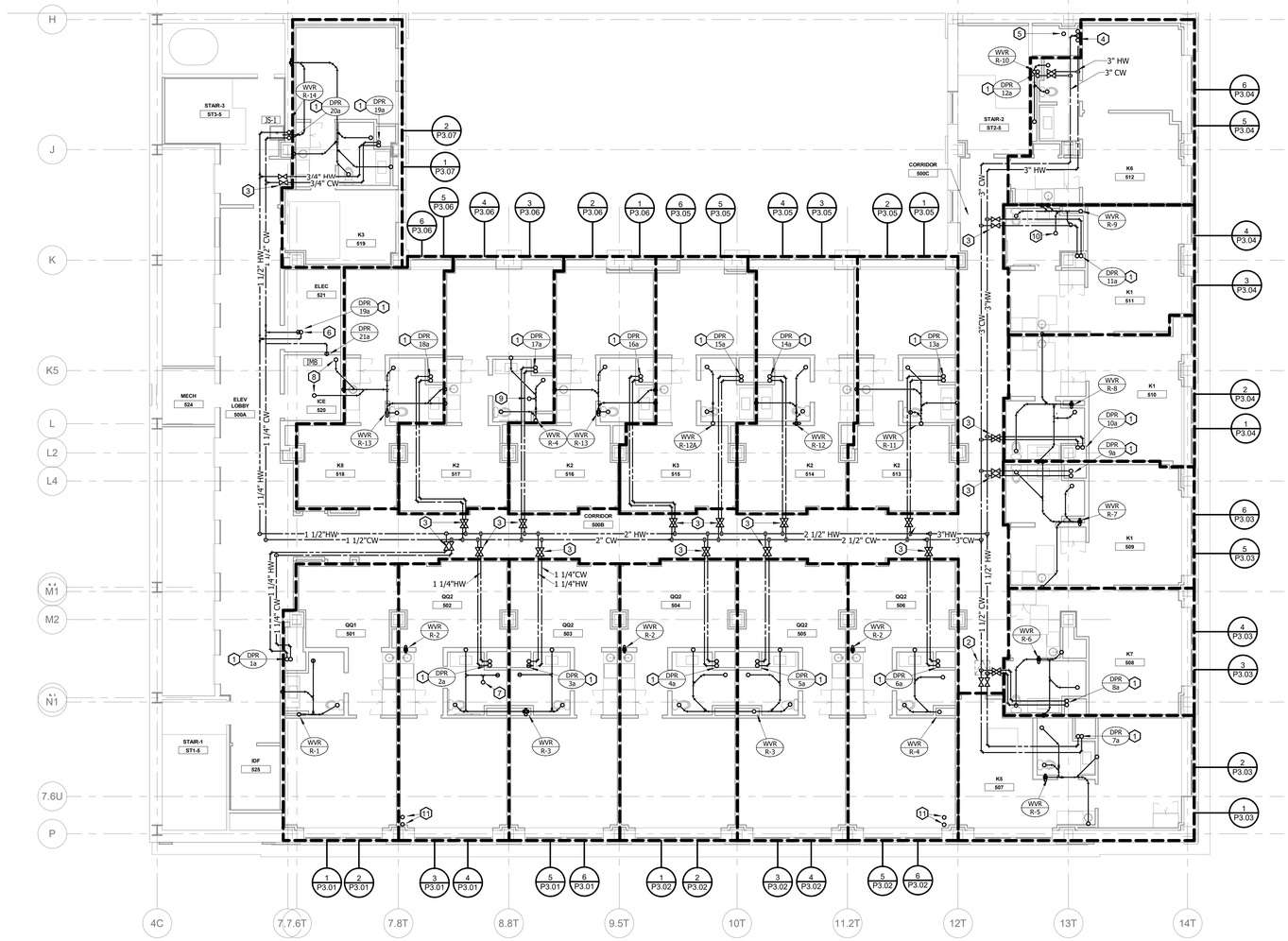

1 FIFTH FLOOR PLAN PLUMBING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. PROVIDE PLUMBING SYSTEMS COMPLETE AND PER APPLICABLE CODES INCLUDING ALL NECESSARY COMPONENTS AND OFFSETS WHICH ARE REQUIRED DUE TO SPACE CONSTRAINTS OR OTHER CONDITIONS.

B. REFER TO THE ARCHITECTURAL PLANS FOR THE EXACT LOCATIONS OF PLUMBING FIXTURES.

C. COORDINATE THE INSTALLATION OF PLUMBING AND PIPING WITH THE WORK OF ALL OTHER TRADES.

D. WHERE WALL MOUNTED FLUSH VALVE SENSORS ARE USED, THE PLUMBING CONTRACTOR SHALL COORDINATE THE LOCATION OF THE SENSORS WITH THE ELECTRICAL AND ARCHITECTURAL TRADES TO AVOID CONFLICTS WITH GRAB BARS OR ANY OTHER ACCESSORIES.

E. PIPING SHALL NOT BE LOCATED OVER ELECTRICAL EQUIPMENT OR PANELS. PROVIDE THE CODE REQUIRED WORKING CLEARANCE AROUND ALL ELECTRICAL EQUIPMENT AND PANELS.

F. THE CONTRACTOR SHALL NOT LOCATE PIPING BELOW DUCT MOUNTED AIR TERMINAL UNITS, TERMINAL HEATING COILS, OR OTHER EQUIPMENT.

G. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL PLUMBING SYSTEMS.

H. COORDINATE THE SHUT DOWN OF ANY EXISTING SERVICES AND/OR EQUIPMENT WITH THE OWNER'S REPRESENTATIVE.

I. PLUMBING VENT PIPING THROUGH THE ROOF SHALL BE LOCATED A MINIMUM OF 10'-0" AWAY FROM ANY FRESH AIR INTAKE LOCATION AND A MINIMUM OF 18" CLEAR FROM THE INSIDE FACE OF THE PARAPET.

J. PROVIDE THE CODE REQUIRED CLEARANCE FOR ALL CLEANOUTS INSTALLED IN SANITARY WASTE AND VENT PIPING.

K. MINIMUM UNDERGROUND PIPE SIZE SHALL BE 2".

PLAN NOTES:

1 DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES. DOMESTIC WATER RISERS NUMBERED FOR CLARITY. ALL RISERS SHOWN ON FLOORS 5-12 WILL BE RISER 01. SEE PLUMBING RISER 01 ON SHEET P3.01

2 PROVIDE 24x24 ACCESS PANEL IN CORRIDOR CEILING TO SERVICE DOMESTIC WATER RISER SHUTOFF VALVES.

3 LOCATE DOMESTIC WATER RISER SHUTOFF VALVES ABOVE ACT PORTION OF CEILING IN CORRIDOR. REFERENCE ARCHITECT'S REFLECTED CEILING PLAN.

4 Z-1 RISER: HOT AND COLD WATER DISTRIBUTED ABOVE 5TH FLOOR CEILING. HOT WATER RECIRCULATION DOWN FROM TWELTH FLOOR. Z-2 RISER: UP

5 6" WASTE RISER.

6 COLD AND HOT WATER UP TO UNIT 619. REFERENCE SHEET P1.01-T6 FOR CONTINUATION.

7 PROVIDE FLOOR DRAIN FOR UNIT 602 OUTSIDE ADA ROLL-IN SHOWER. REFERENCE PLUMBING RISER 03 ON SHEET P3.02

8 REFERENCE ENLARGED PLAN 6 ON SHEET P2.06 FOR FLOOR DRAIN LOCATION.

9 PROVIDE FLOOR DRAIN FOR UNIT 617 OUTSIDE ADA ROLL-IN SHOWER. REFERENCE PLUMBING RISER 04 ON SHEET P3.02

10 PROVIDE FLOOR DRAIN FOR UNIT 611 OUTSIDE ADA ROLL-IN SHOWER. REFERENCE PLUMBING RISER 04 ON SHEET P3.03.

11 4" WASTE AND VENT UP AND DOWN.

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STATE OF MISSOURI
CASEY JOHN STEPHAN
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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Tower - Fifth Floor Plan Plumbing

P1.01-T5

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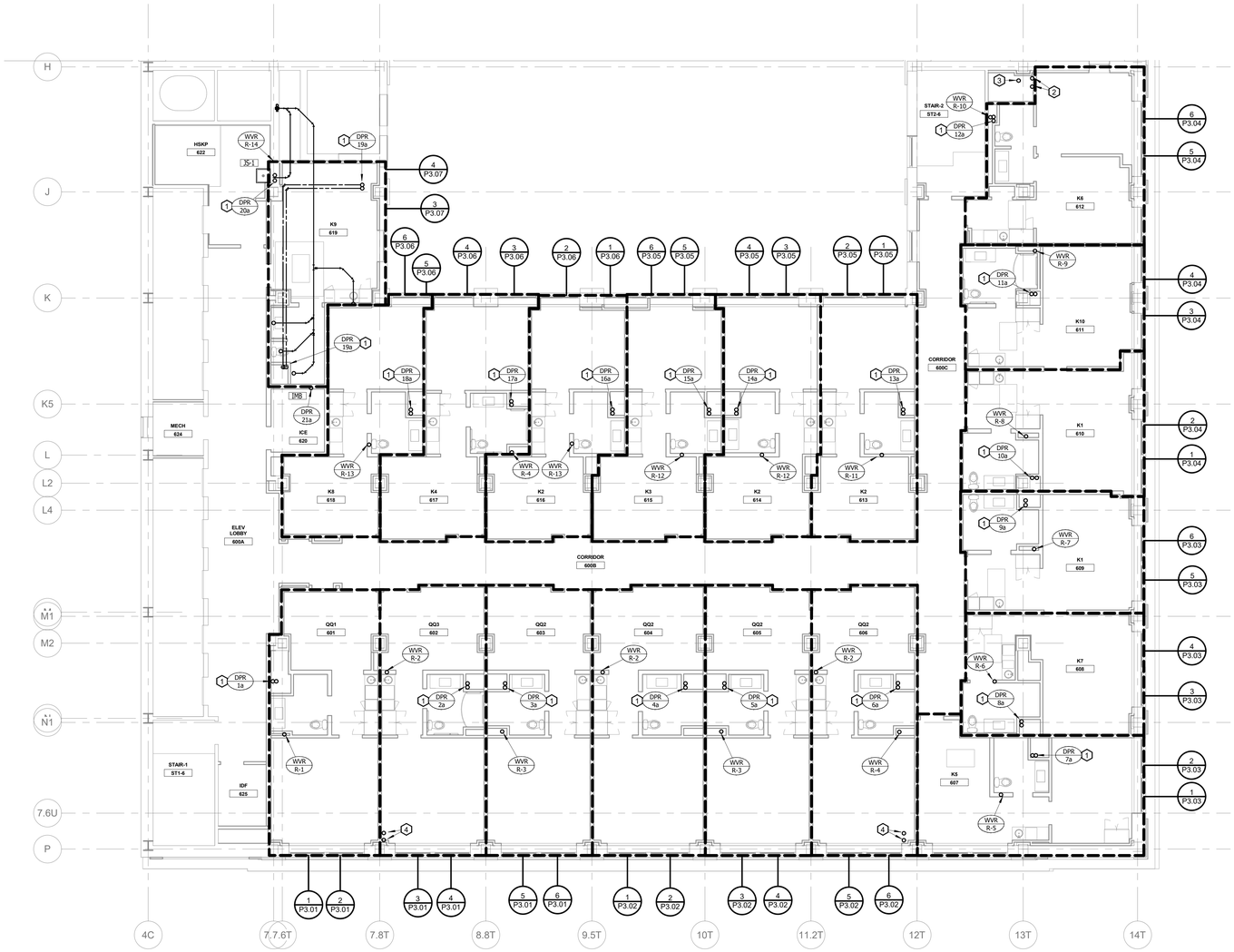

1 SIXTH FLOOR PLAN PLUMBING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES.

2 Z-1 RISER: HOT WATER RECIRCULATION DOWN. Z-2 RISER: UP.

3 6" WASTE RISER.

4 4" WASTE AND VENT UP AND DOWN.

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STATE OF MISSOURI
CASEY JOHN STEVENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS

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H&B PROJECT NUMBER : 1820630

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Tower - Sixth Floor Plan Plumbing

P1.01-T6

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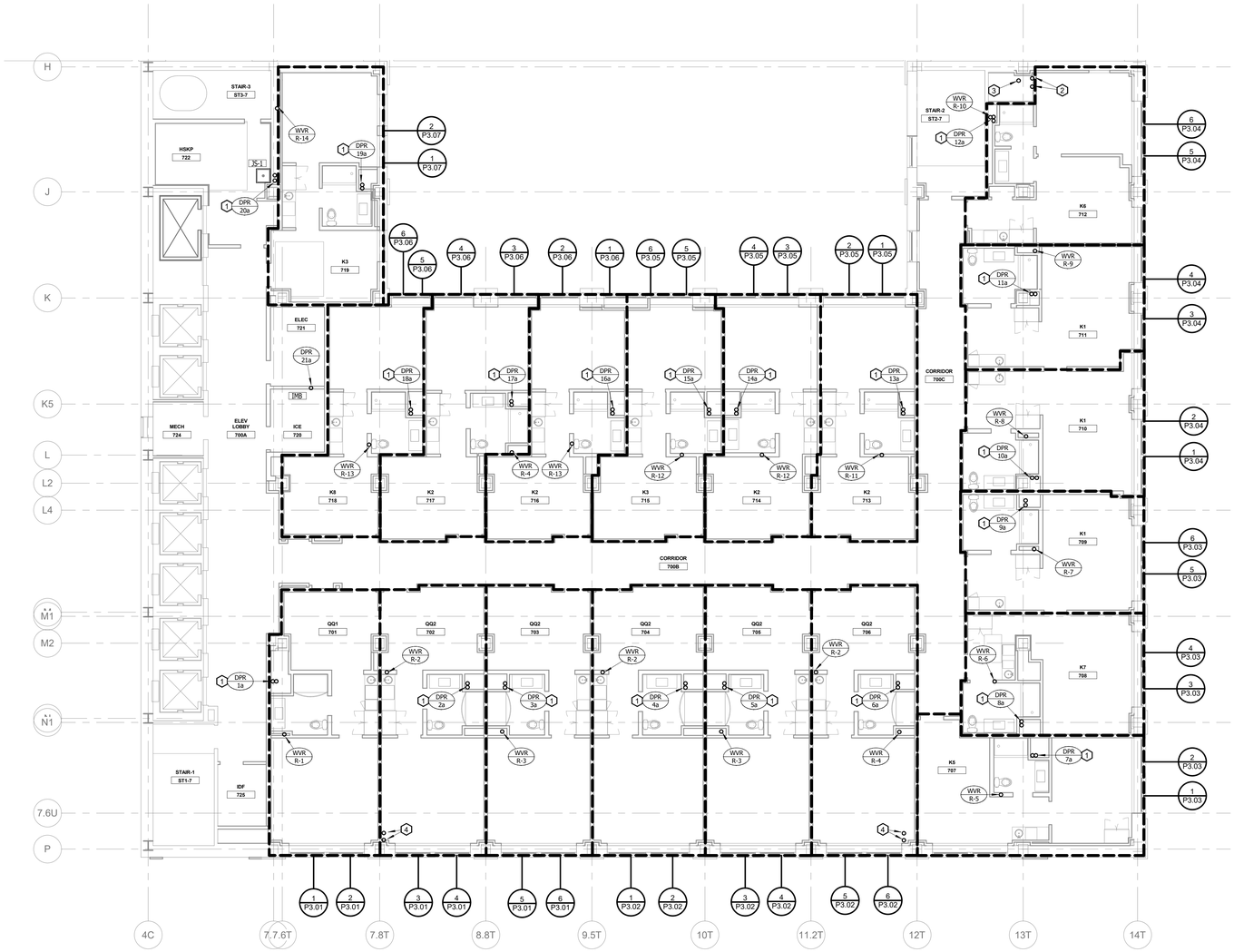

1 SEVENTH FLOOR PLAN PLUMBING (TYPICAL FLOOR 10,16)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES.

2 Z-1 RISER: HOT WATER RECIRCULATION DOWN. Z-2 RISER: UP.

3 6" WASTE RISER.

4 4" WASTE AND VENT UP AND DOWN.

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Tower - Seventh Floor Plumbing Plan

P1.01-T7

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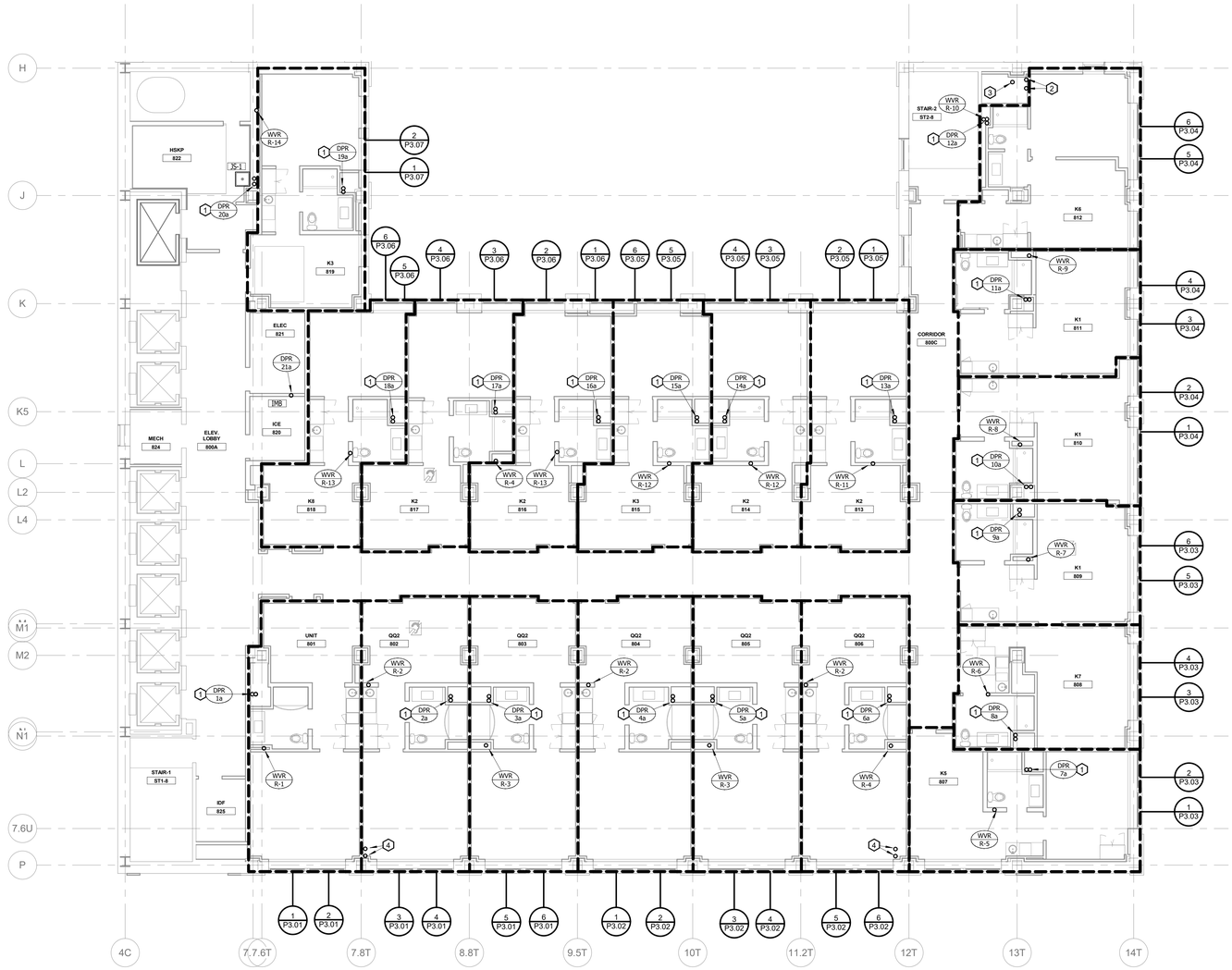

1 EIGHTH FLOOR PLAN PLUMBING (TYPICAL FLOOR 14,17)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1. DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES.
2. Z-1 RISER: HOT WATER RECIRCULATION DOWN. Z-2 RISER: UP.
3. 6" WASTE RISER.
4. 4" WASTE AND VENT UP AND DOWN.

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STATE OF MISSOURI
CASEY JOHN STONE
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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Eighth Floor Plan Plumbing

P1.01-T8

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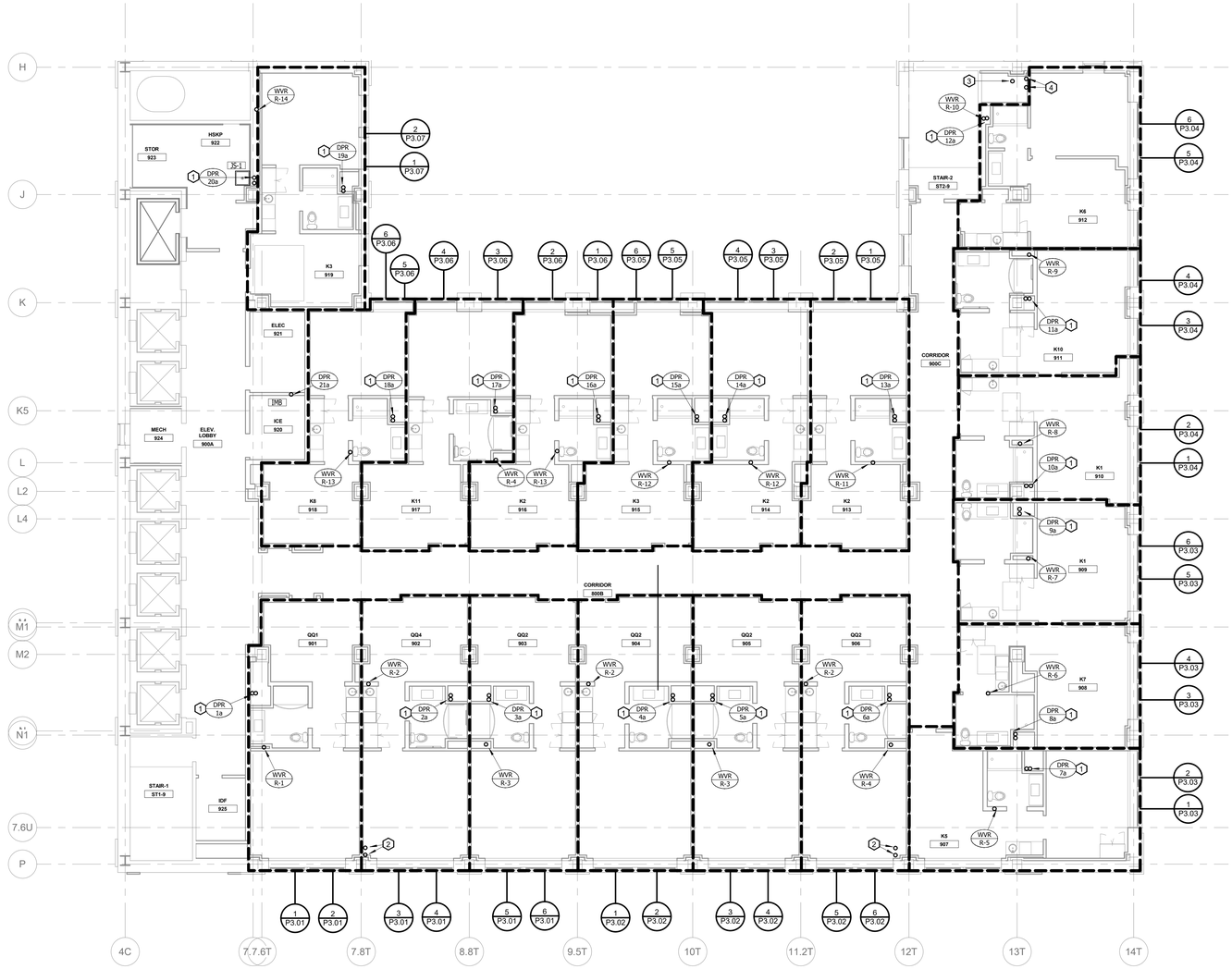

1 NINTH FLOOR PLAN PLUMBING (TYPICAL FLOOR 15)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P5.01 FOR RISER PIPE SIZES.

2 4" WASTE AND VENT UP AND DOWN.

3 6" WASTE RISER.

4 Z-1 RISER: HOT WATER RECIRCULATION DOWN. Z-2 RISER: UP.

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STATE OF MISSOURI
CASEY JOHN STEPHENS
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PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Ninth Floor Plan Plumbing

P1.01-T9

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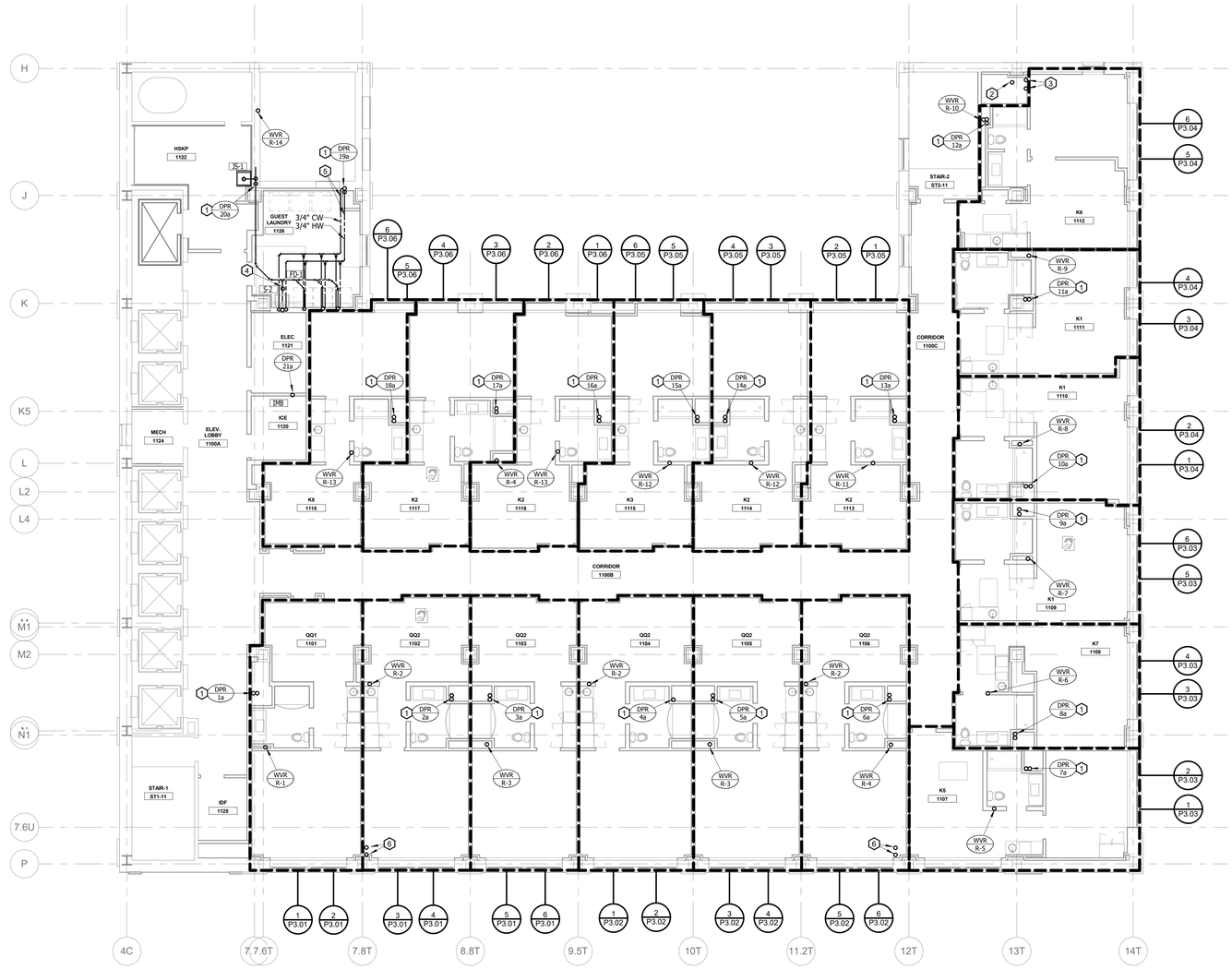

1 ELEVENTH FLOOR PLAN PLUMBING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES.

2 6" WASTE RISER.

3 Z-1 RISER: HOT WATER RECIRCULATION DOWN. Z-2 RISER: UP.

4 TIE FLOOR DRAIN INTO WASTE LINE SERVING S-2.

5 REFERENCE PIPE RISER DIAGRAM SERVING FLOORS 5-12 ON SHEET P3.01

6 4" WASTE AND VENT UP AND DOWN.

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
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Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Eleventh Floor Plan Plumbing

P1.01-T11

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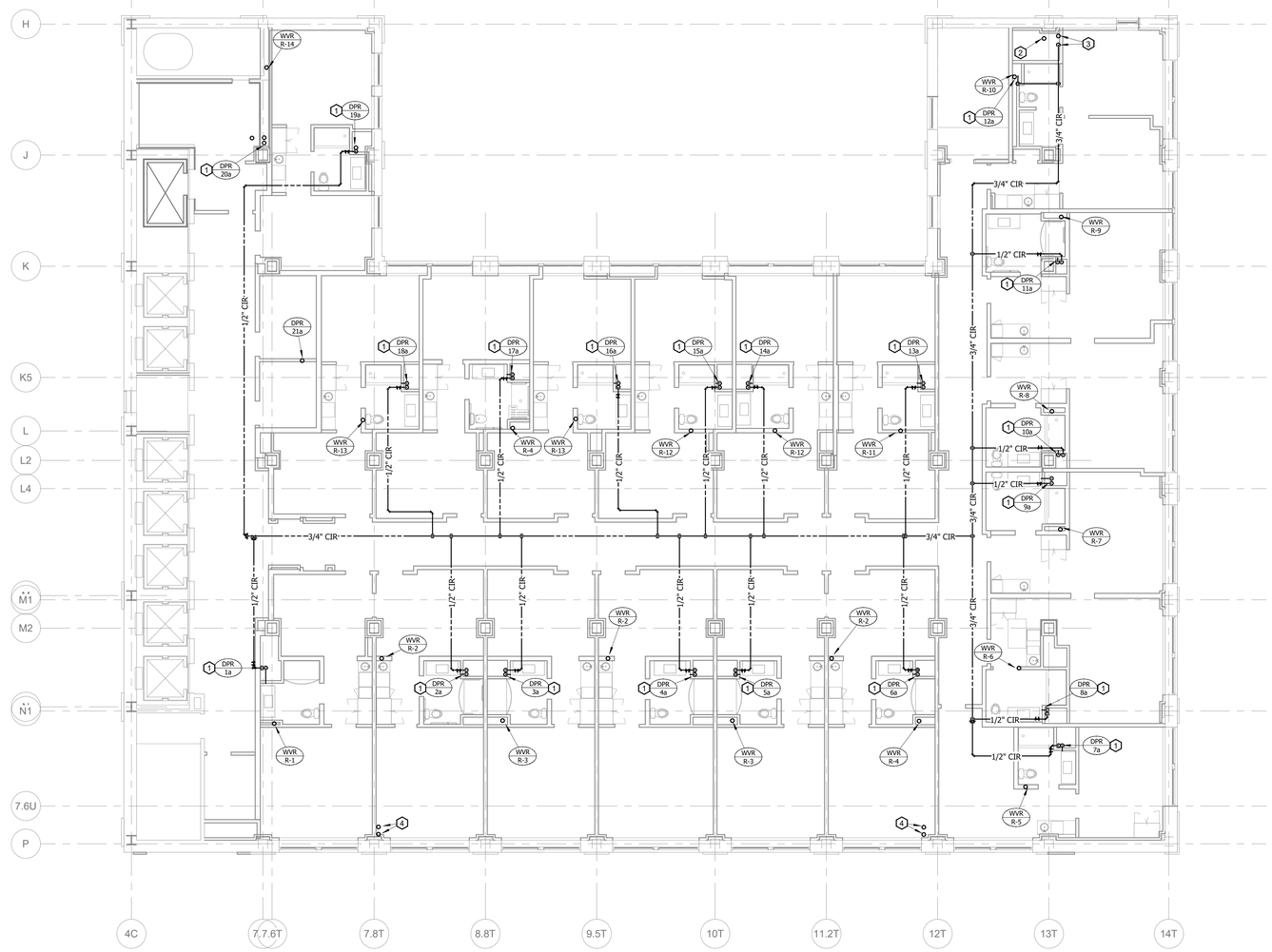

1 TWELTH FLOOR PLAN PLUMBING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES. DOMESTIC WATER RISERS NUMBERED FOR CLARITY. ALL RISERS SHOWN ON FLOORS 12-19 WILL BE RISER 02. SEE PLUMBING RISER 02 ON SHEET P3.01

2 6" WASTE RISER.

3 Z-1 RISER: HOT WATER RECIRCULATION UP. Z-2 RISER: UP.

4 4" WASTE AND VENT UP AND DOWN.

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STATE OF MISSOURI
CASEY JOHN STEVENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Twelth Floor Plan Plumbing

P1.01-T12

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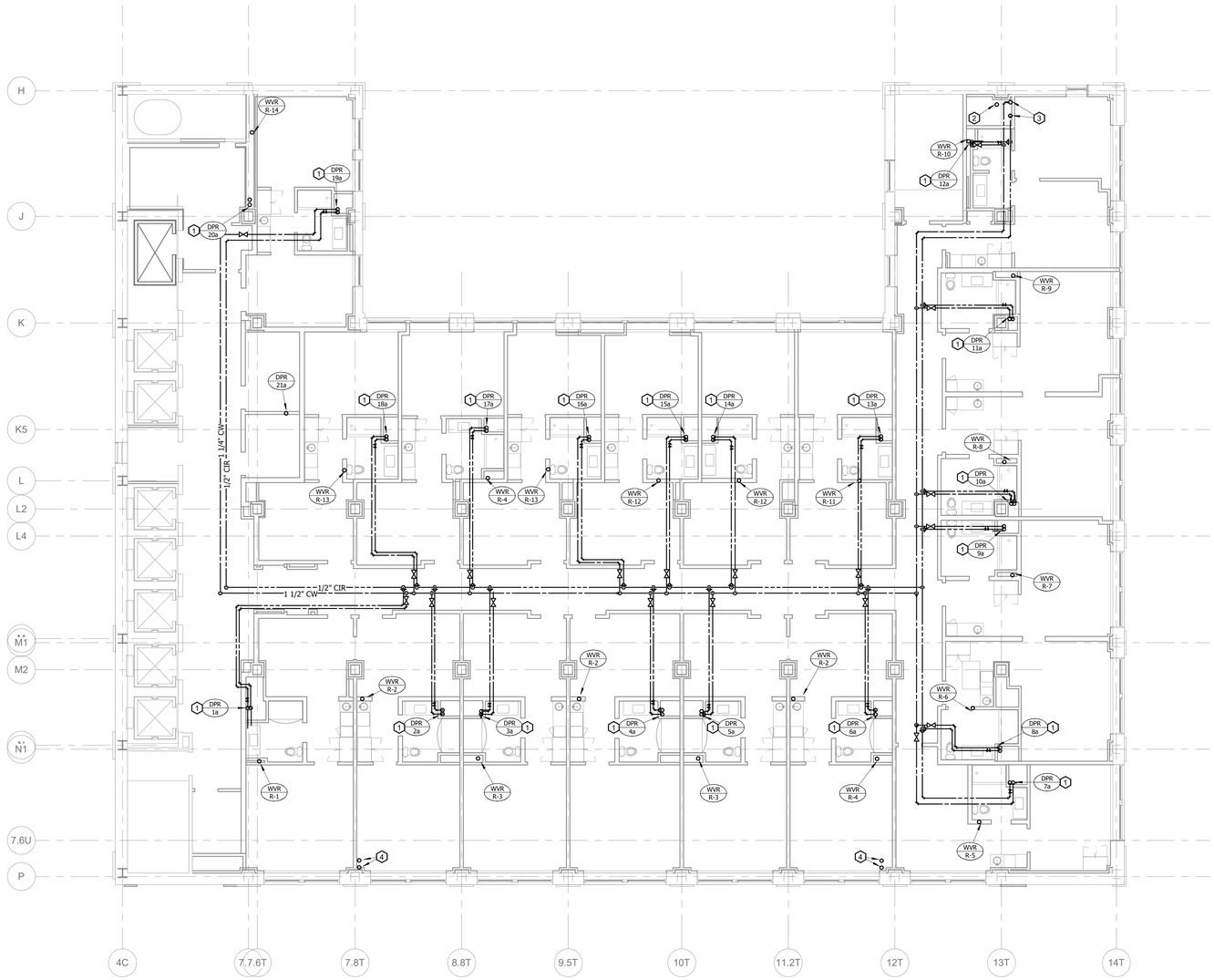

N

1 THIRTEENTH FLOOR PLAN PLUMBING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES. DOMESTIC WATER RISERS NUMBERED FOR CLARITY. ALL RISERS SHOWN ON FLOORS 12-19 WILL BE RISER 02. SEE PLUMBING RISER 02 ON SHEET P3.01

2 6" WASTE RISER.

3 Z-1 RISER: HOT WATER RECIRCULATION UP. Z-2 RISER: UP.

4 4" WASTE AND VENT UP AND DOWN.

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

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Kansas City, MO 64198

Project No.: 18A023
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REVISION SCHEDULE		
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Thirteenth Floor Plan
Plumbing

P1.01-T13

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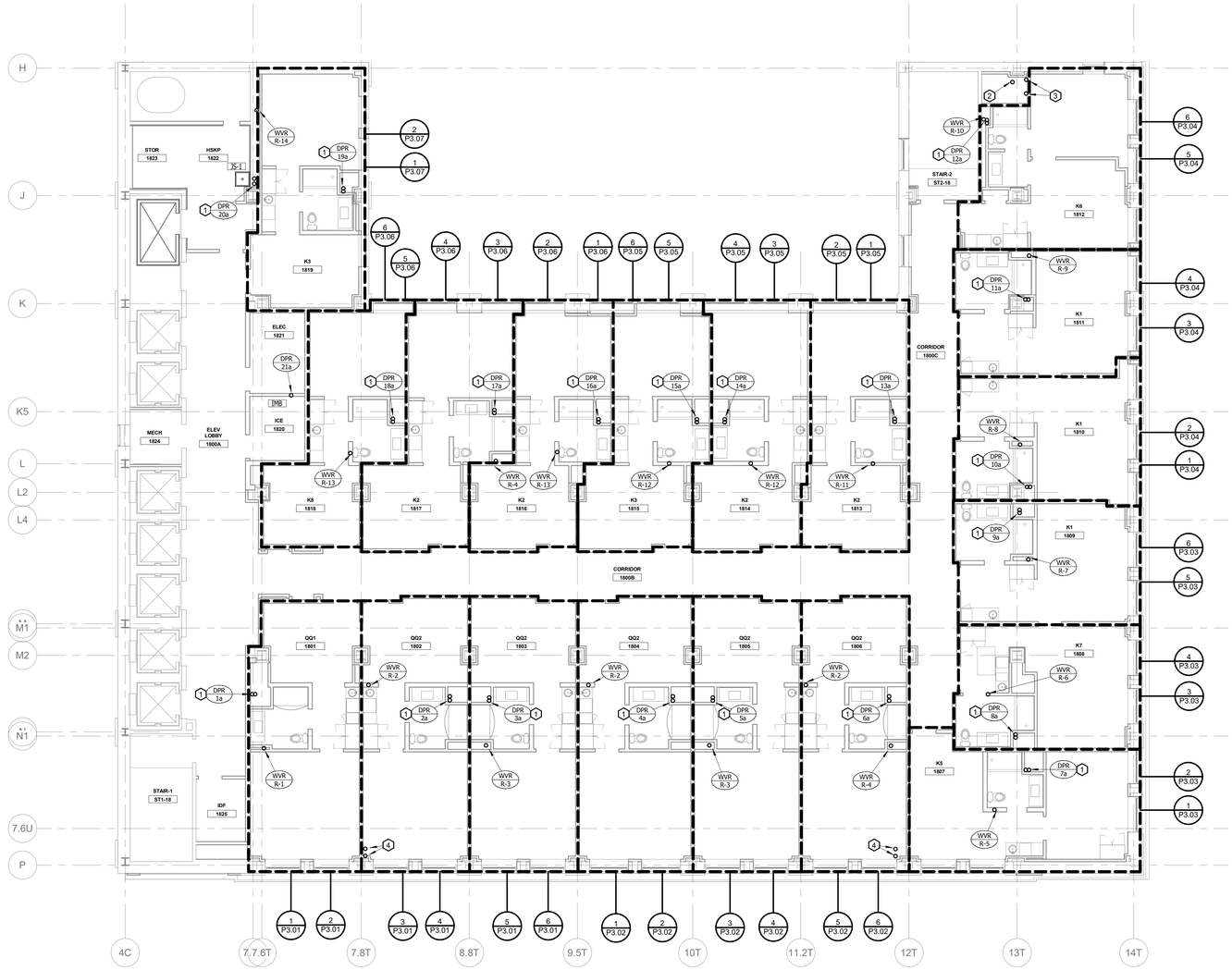

1 EIGHTEENTH FLOOR PLAN PLUMBING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1. DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES. DOMESTIC WATER RISERS NUMBERED FOR CLARITY. ALL RISERS SHOWN ON FLOORS 12-19 WILL BE RISER 02. SEE PLUMBING RISER 02 ON SHEET P3.01
2. 6" WASTE RISER.
3. Z-1 RISER: HOT WATER RECIRCULATION UP. Z-2 RISER: UP.
4. 4" WASTE AND VENT UP AND DOWN.

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STATE OF MISSOURI
CASEY JOHN STOHLER
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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Eighteenth Floor Plan
Plumbing

P1.01-T18

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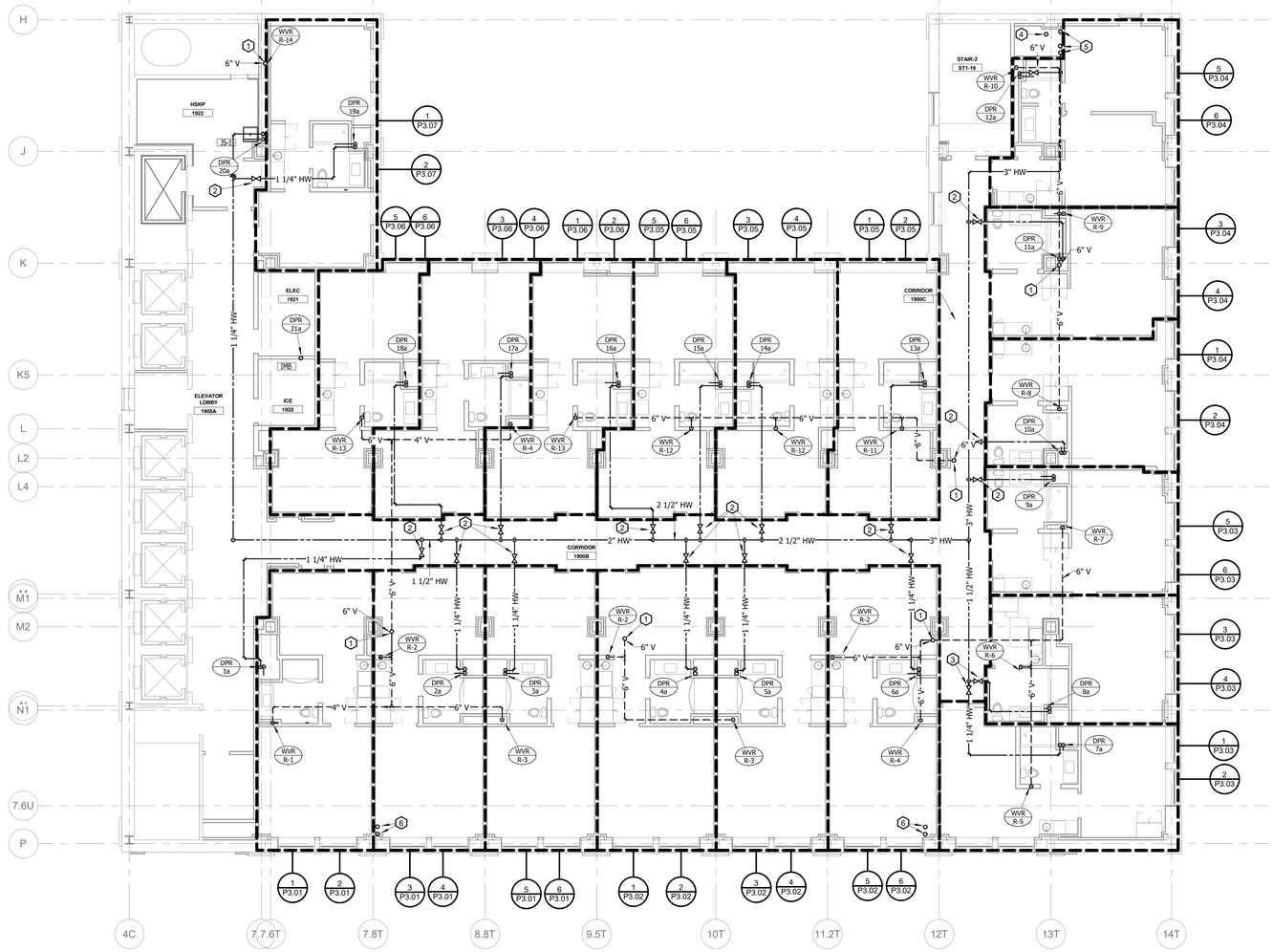

1 NINETEENTH FLOOR PLAN PLUMBING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1. VENT PIPE UP THROUGH FLOOR 20.
2. LOCATE DOMESTIC HOT WATER SHUTOFF VALVE ABOVE ACT PORTION OF CEILING IN CORRIDOR. REFERENCE ARCHITECT'S REFLECTED CEILING PLAN.
3. LOCATE DOMESTIC HOT WATER SHUTOFF VALVE ABOVE 24x24 ACCESS PANEL IN CORRIDOR CEILING.
4. 6" WASTE RISER.
5. Z-1 RISER: HOT WATER RECIRCULATION UP. Z-2 RISER: COLD WATER UP AND HOT WATER DISTRIBUTED ABOVE 19TH FLOOR CEIILING.
6. 4" WASTE AND VENT UP AND DOWN.

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PROFESSIONAL ENGINEER

9/8/2020

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FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
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Checked By: Checker
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Nineteenth Floor Plan Plumbing

P1.01-T19

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9/8/2020 10:01:45 AM

1 TOWER TWENTIETH FLOOR PLUMBING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 6" VENT THROUGH ROOF.

2 ZONE Z-2 RISERS: 2-1/2" DCW, 2-1/2" DHW, 1-1/2" DHWR.

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Tower Twentieth Floor Plumbing Plan

P1.01-T20

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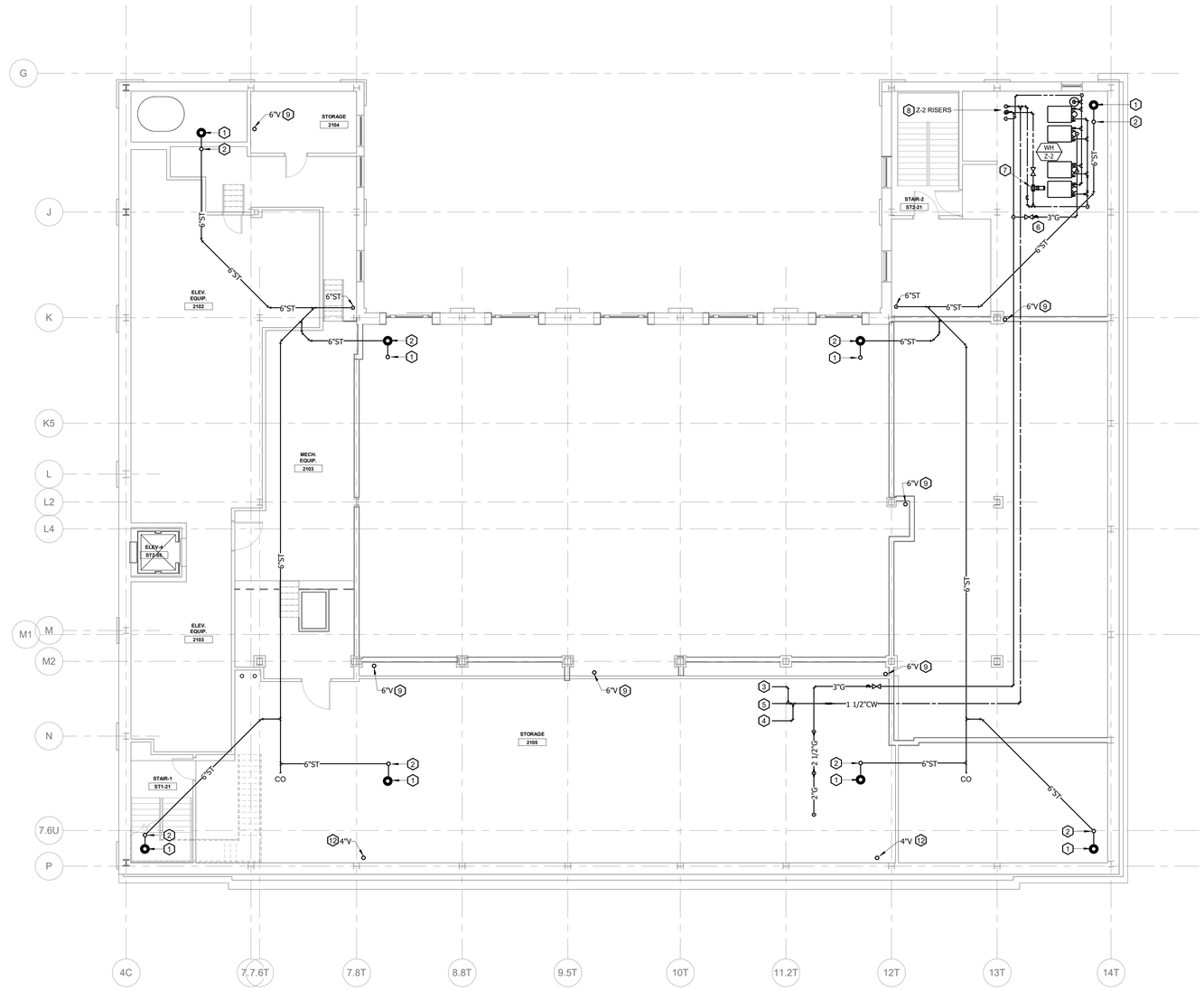
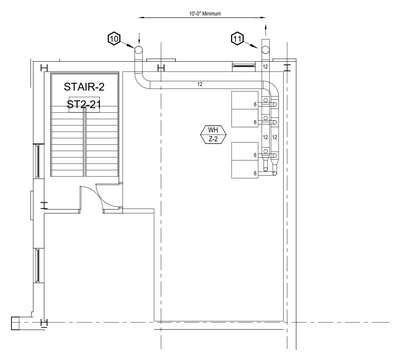


1 TOWER TWENTY FIRST FLOOR PLUMBING PLAN

Scale: 1/8" = 1'-0"



2 ENLARGED WATER HEATER VENTING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET P1.00-G FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1. 6" OVERFLOW STORM DRAIN UP TO 6" ORD-1.
2. 6" STORM DRAIN UP TO 6" RD-1.
3. 3/4" MAKEUP WATER TO HEAT PUMP SYSTEM. REFER TO MECHANICAL PIPING DIAGRAM FOR ADDITIONAL INFORMATION.
4. 3/4" MAKE UP WATER TO BOILER SYSTEM. REFER TO MECHANICAL PIPING DIAGRAM FOR ADDITIONAL INFORMATION.
5. 1-1/2" MAKE UP WATER TO TOWER SYSTEM. REFER TO MECHANICAL PIPING DIAGRAM FOR ADDITIONAL INFORMATION.
6. GAS PRESSURE REGULATOR FOR DOMESTIC WATER HEATERS. SIZED TO DROP 5400 MBH FROM 5 PSI TO 14" WC. VENT TO EXTERIOR.
7. HOT WATER CIRCULATION PUMP Z-2: 20 GPM AT 35' HEAD.
8. ZONE Z-2 RISERS: 2-1/2" DCW, 2-1/2" DHW, 1-1/2" DHWR.
9. 6" VENT UP.
10. 12" COMBUSTION AIR INLET. REFER TO HORIZONTAL VENTING DETAIL.
11. 12" COMBUSTION AIR OUTLET. REFER TO HORIZONTAL VENTING DETAIL.
12. 4" VENT UP.

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9/8/2020

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Tower Twenty First Floor Plumbing Plan

P1.01-T21

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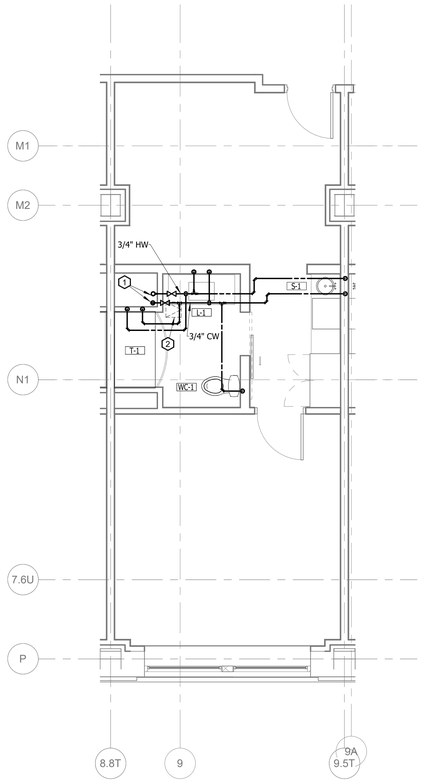
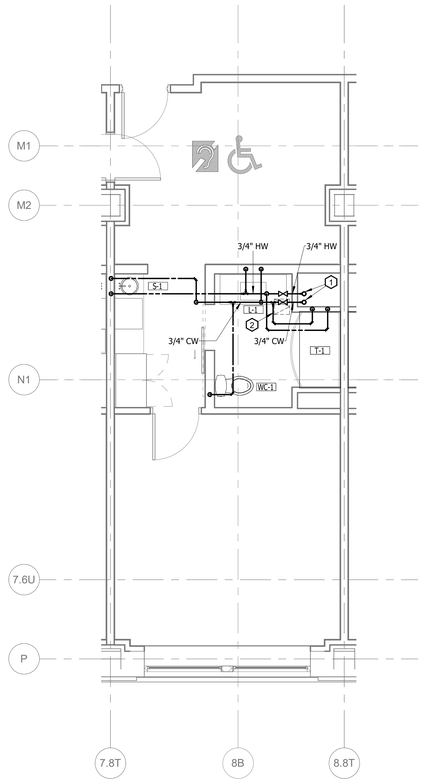


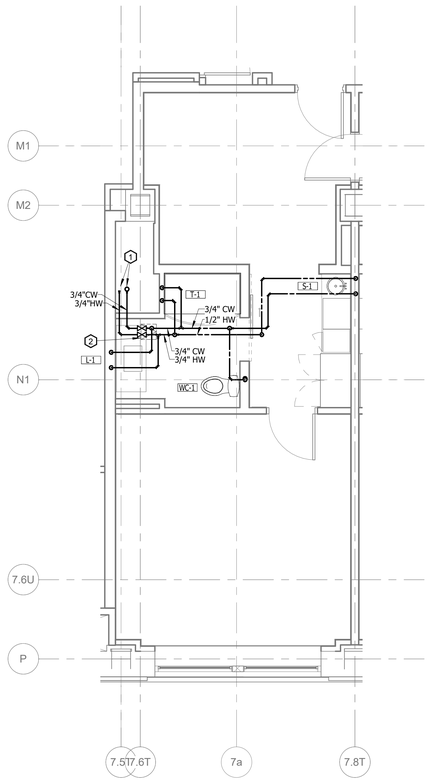
5 TYP. DOUBLE QUEEN 'C' - DOMESTIC WATER

Scale: Not to Scale



3 TYP. DOUBLE QUEEN 'B' ADA - DOMESTIC WATER

Scale: Not to Scale



1 TYP. DOUBLE QUEEN 'A' - DOMESTIC WATER

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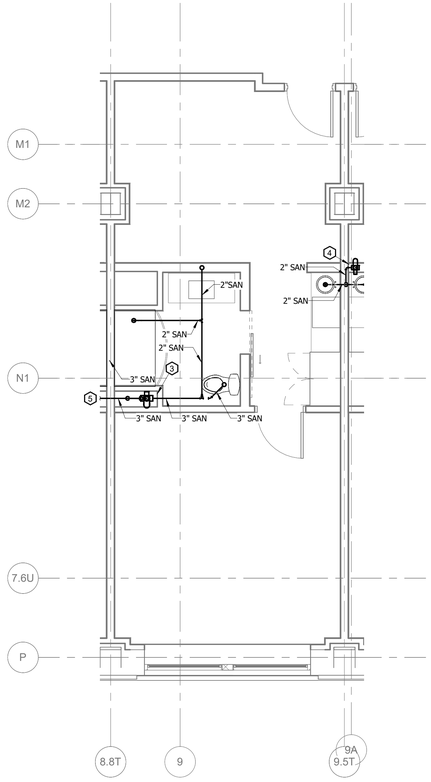
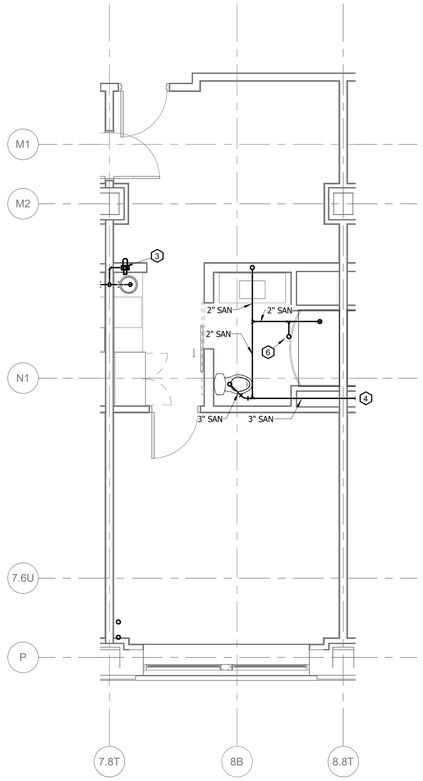


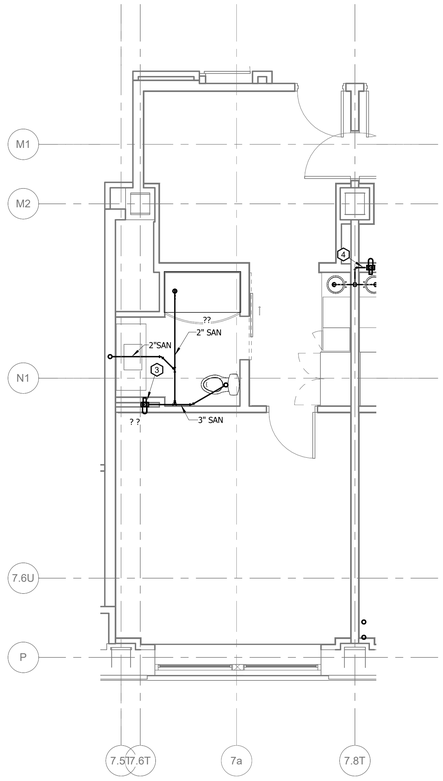
6 TYP. DOUBLE QUEEN 'C' - SANITARY

Scale: Not to Scale



4 TYP. DOUBLE QUEEN 'B' ADA - SANITARY

Scale: Not to Scale



2 TYP. DOUBLE QUEEN 'A' - SANITARY

Scale: Not to Scale

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1. DOMESTIC WATER PIPE RISER. REFERENCE SHEET P5.01 FOR RISER PIPE SIZES.
2. PROVIDE 12x12 ACCESS PANEL TO SERVICE SHUTOFF VALVES.
3. PROVIDE PROVENT FITTING ABOVE CEIILING AT THIS LOCATION.
4. CONNECT TO PROVENT FITTING IN ADJACENT UNIT.
5. WASTE FROM ADJACENT UNIT. CONNECT INTO PROVENT FITTING.
6. PROVIDE FLOOR DRAIN FOR UNIT 502 OUTSIDE ADA ROLL-IN SHOWER. REFERENCE PLUMBING RISER 03 ON SHEET P3.02.

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Enlarged Unit Plans
Plumbing

P3.01

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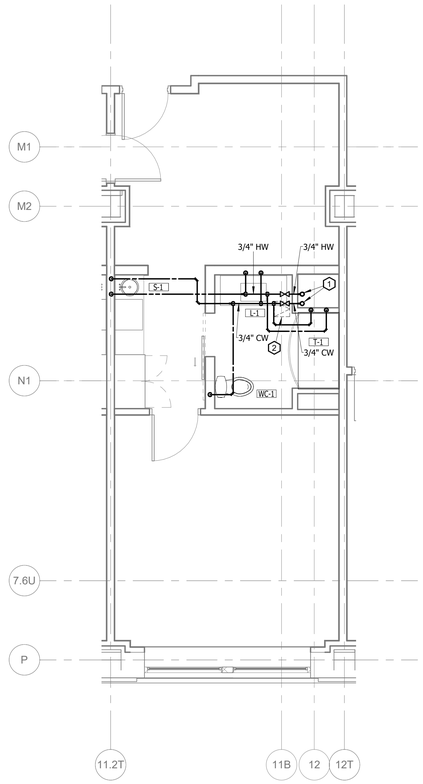
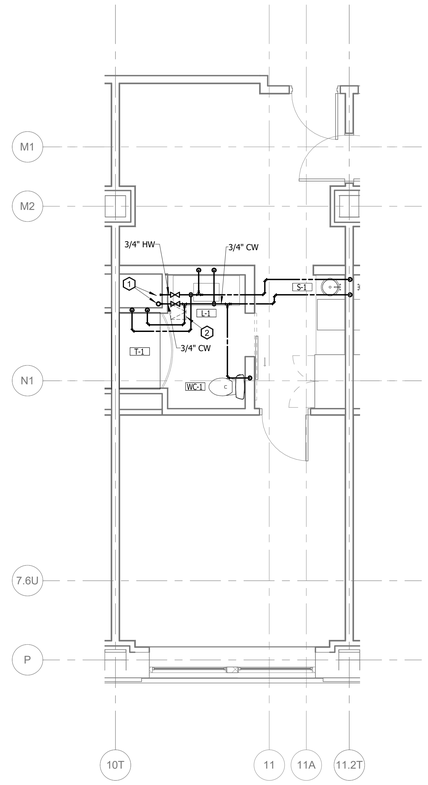


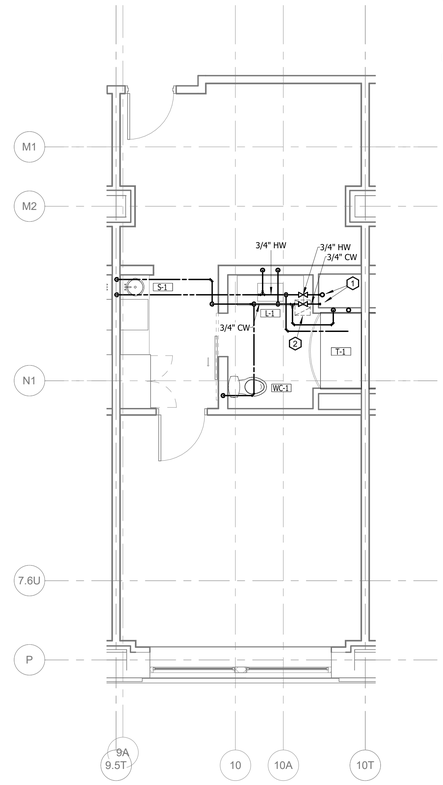
5 TYP. DOUBLE QUEEN 'F' - DOMESTIC WATER

Scale: Not to Scale



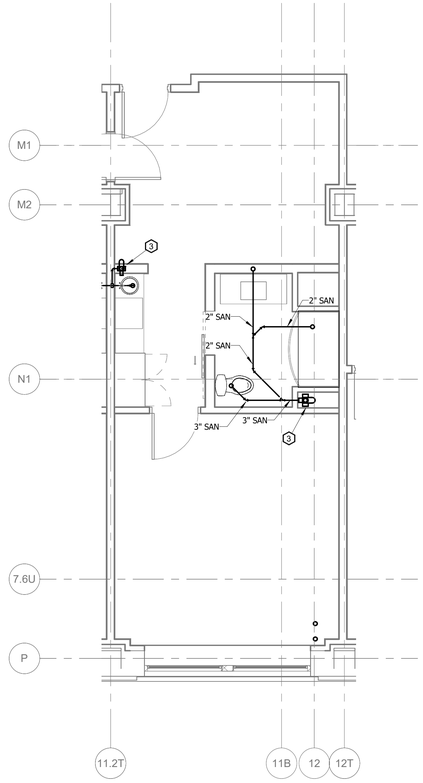
3 TYP. DOUBLE QUEEN 'E' - DOMESTIC WATER

Scale: Not to Scale



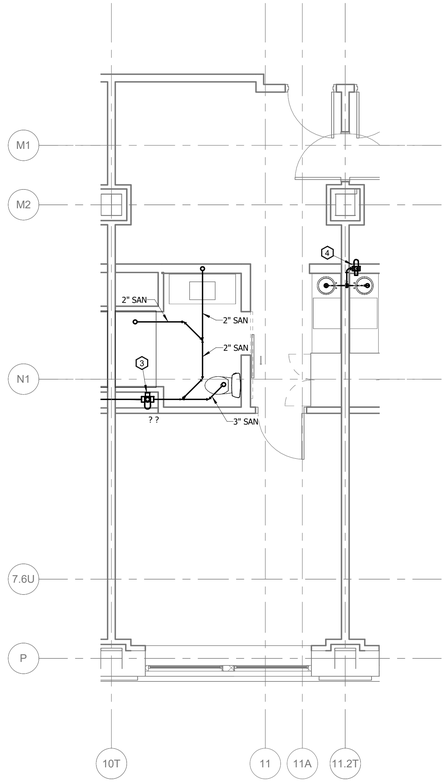
1 TYP. DOUBLE QUEEN 'D' - DOMESTIC WATER

Scale: Not to Scale



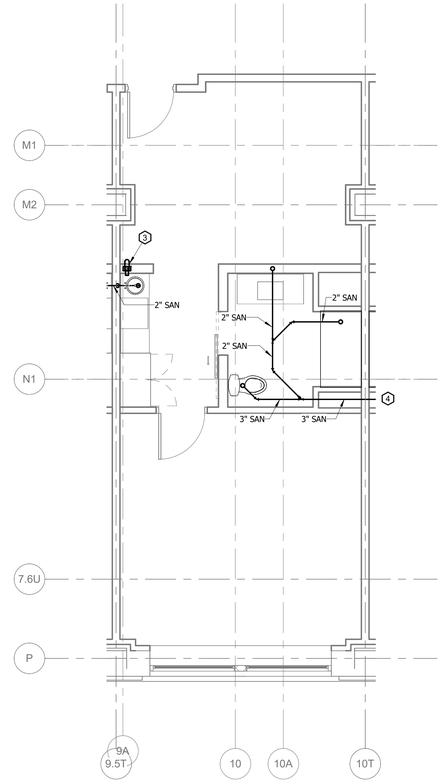
6 TYP. DOUBLE QUEEN 'F' - SANITARY

Scale: Not to Scale



4 TYP. DOUBLE QUEEN 'E' - SANITARY

Scale: Not to Scale



2 TYP. DOUBLE QUEEN 'D' - SANITARY

Scale: Not to Scale

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 DOMESTIC WATER PIPE RISER. REFERENCE SHEET P5.01 FOR RISER PIPE SIZES.

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4 CONNECT TO PROVENT FITTING IN ADJACENT UNIT.

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Enlarged Unit Plans
Plumbing

P3.02

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GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

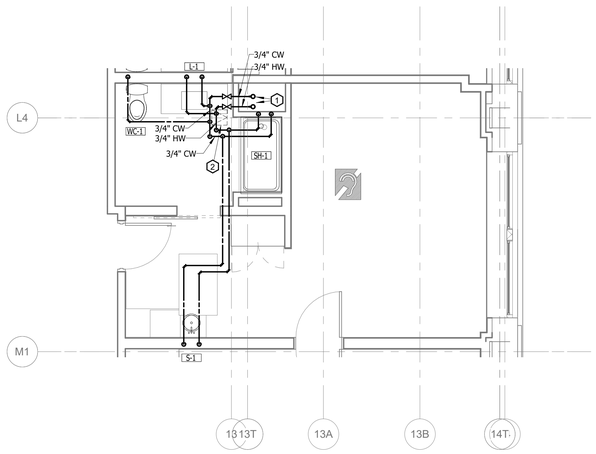
1 DOMESTIC WATER PIPE RISER. REFERENCE SHEET P5.01 FOR RISER PIPE SIZES.

2 PROVIDE 12x12 ACCESS PANEL TO SERVICE SHUTOFF VALVES.

3 PROVIDE PROVENT FITTING ABOVE CEIILING AT THIS LOCATION.

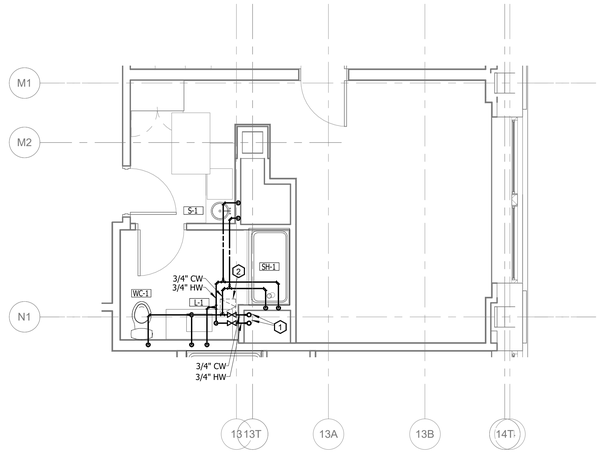
4 CONNECT TO PROVENT FITTING IN ADJACENT UNIT.

5 ROUTE HORIZONTAL HEAT PUMP CONDENSATE PIPE DOWN AND TIE INTO LAVATORY TAILPIECE.



5 TYP. KING 'C' - DOMESTIC WATER

Scale: Not to Scale



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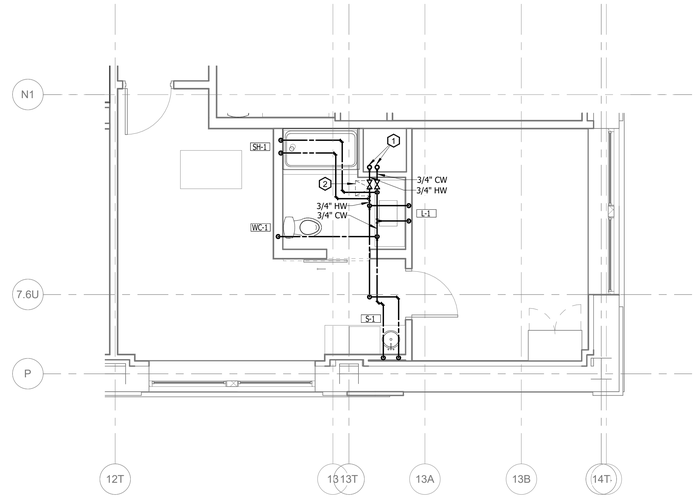

1 TYP. KING 'A' - DOMESTIC WATER

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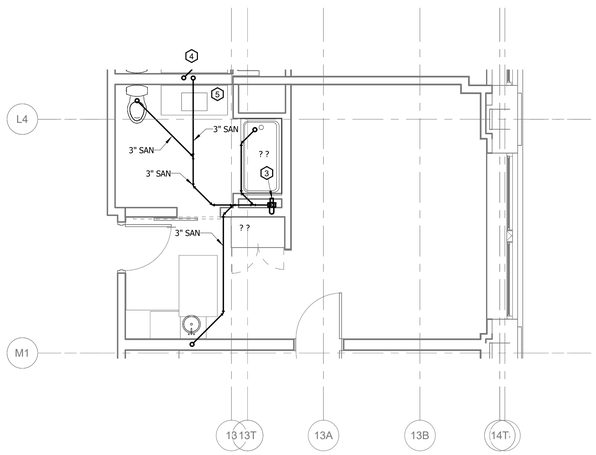
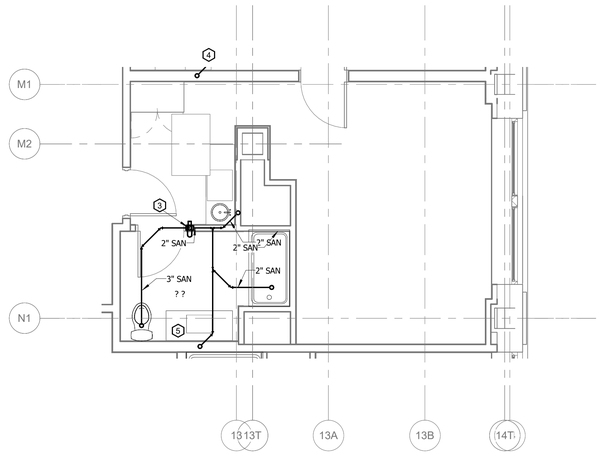


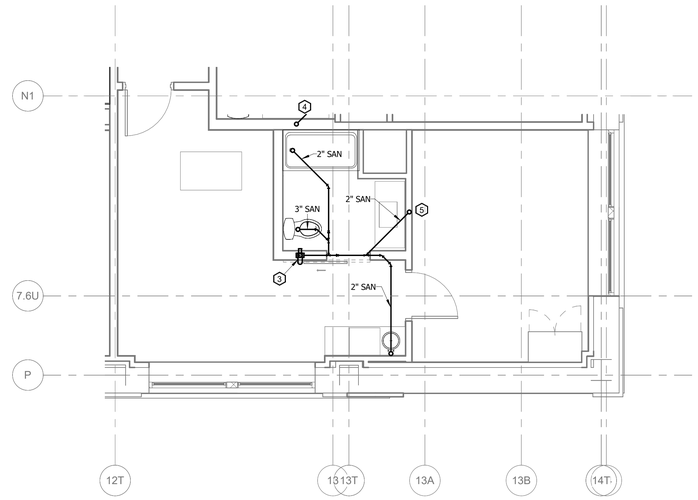
6 TYP. KING 'C' - SANITARY

Scale: Not to Scale



4 TYP. KING 'B' - SANITARY

Scale: Not to Scale



2 TYP. KING 'A' - SANITARY

Scale: Not to Scale

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS

15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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Enlarged Unit Plans
Plumbing

P3.03

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GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 DOMESTIC WATER PIPE RISER. REFERENCE SHEET P5.01 FOR RISER PIPE SIZES.

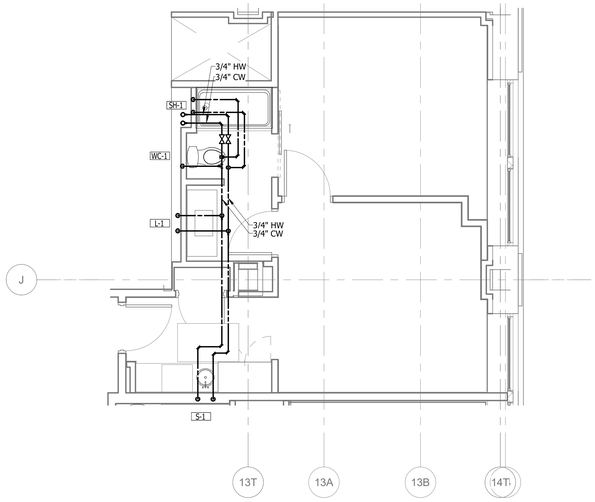
2 PROVIDE 12x12 ACCESS PANEL TO SERVICE SHUTOFF VALVES.

3 PROVIDE PROVENT FITTING ABOVE CEIILING AT THIS LOCATION.

4 CONNECT TO PROVENT FITTING IN ADJACENT UNIT.

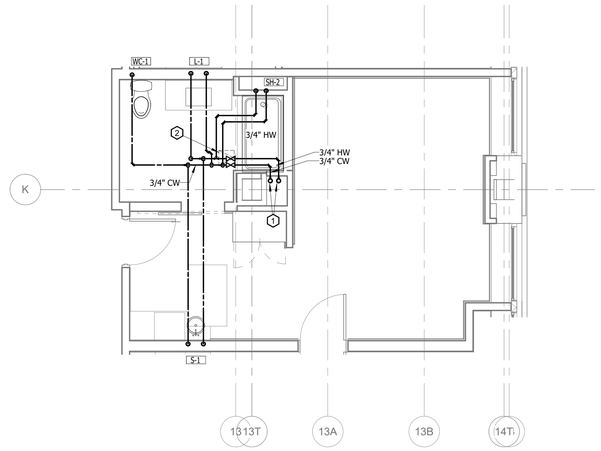
5 ROUTE HORIZONTAL HEAT PUMP CONDENSATE PIPE DOWN AND TIE INTO LAVATORY TAILPIECE.

6 PROVIDE FLOOR DRAIN FOR UNIT 611 OUTSIDE ADA ROLL-IN SHOWER. REFERENCE PLUMBING RISER 04 ON SHEET P3.03.



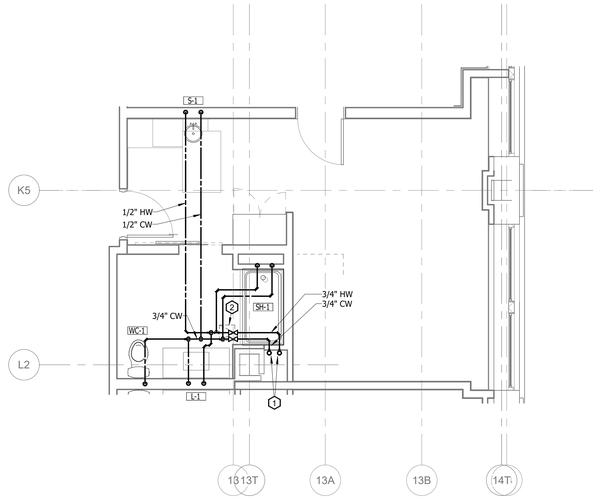
5 TYP. KING 'F' - DOMESTIC WATER

Scale: Not to Scale



3 TYP. KING 'E' ADA - DOMESTIC WATER

Scale: Not to Scale



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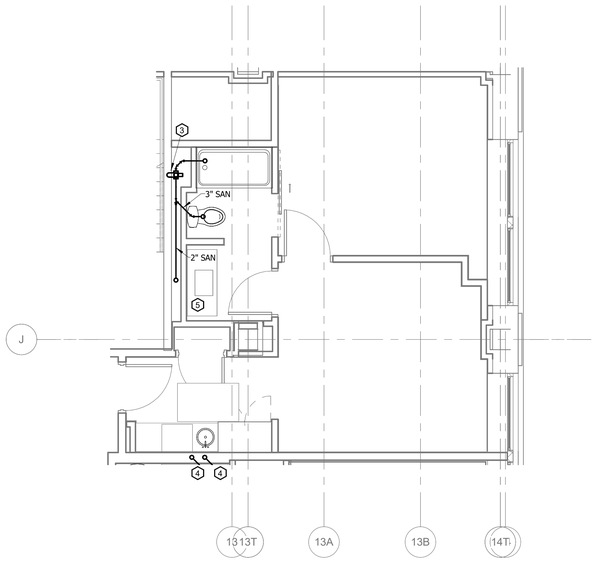
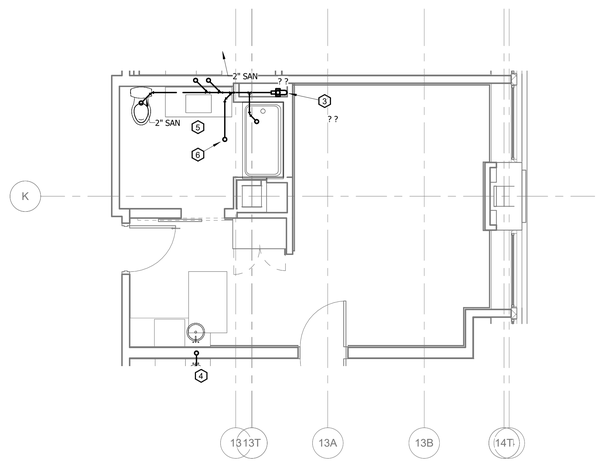
Scale: Not to Scale



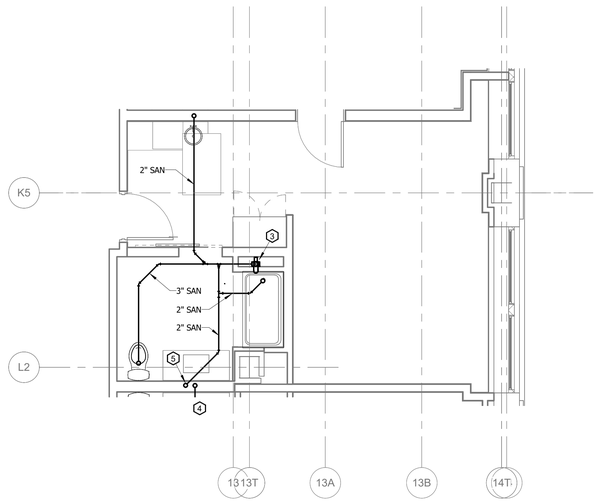
6 TYP. KING 'F' - SANITARY

Scale: Not to Scale



4 TYP. KING 'E' ADA - SANITARY

Scale: Not to Scale



2 TYP. KING 'D' - SANITARY

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The Grand Reserve

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HOSS & BROWN ENGINEERS

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H&B PROJECT NUMBER : 1820630

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Plumbing

P3.04

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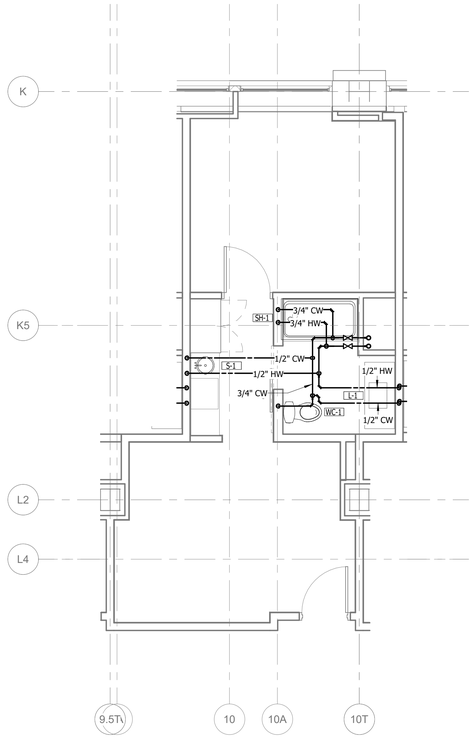
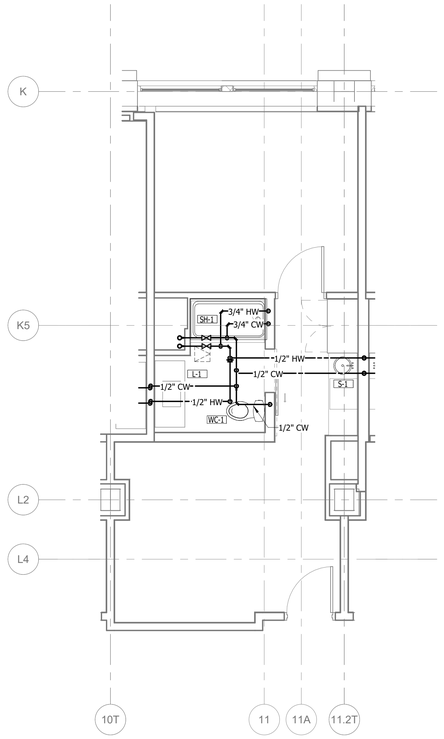


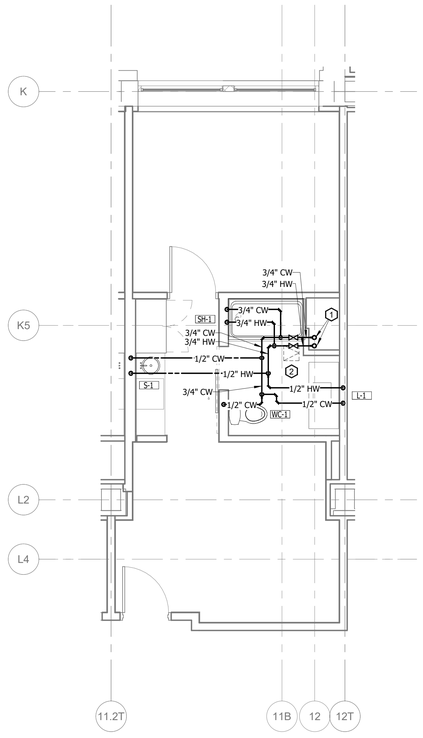
5 TYP. KING 'I' - DOMESTIC WATER

Scale: Not to Scale



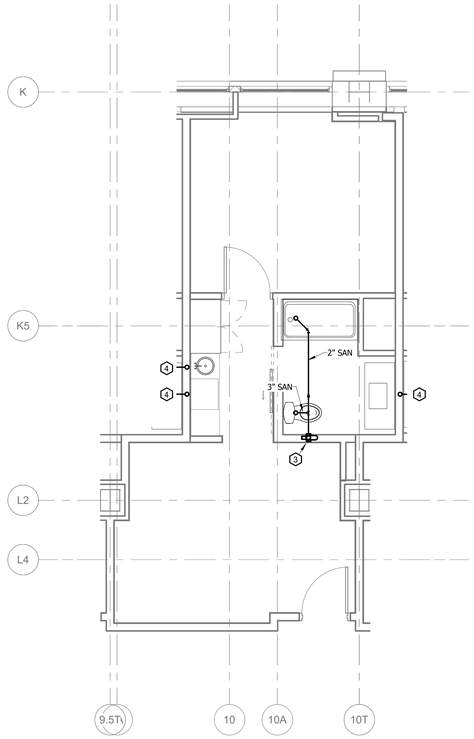
3 TYP. KING 'H' - DOMESTIC WATER

Scale: Not to Scale



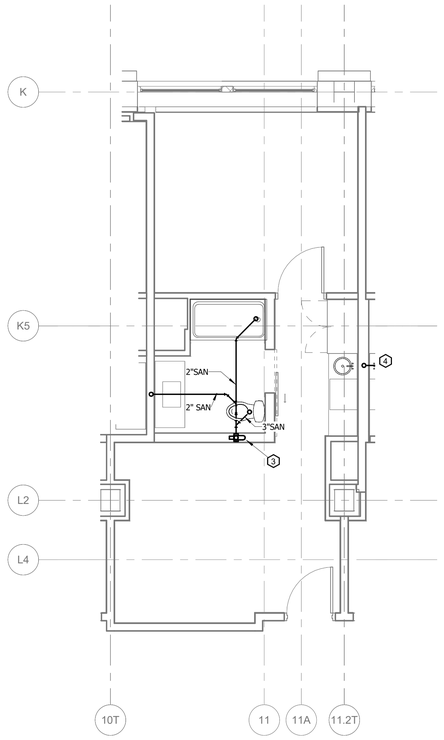
1 TYP. KING 'G' - DOMESTIC WATER

Scale: Not to Scale



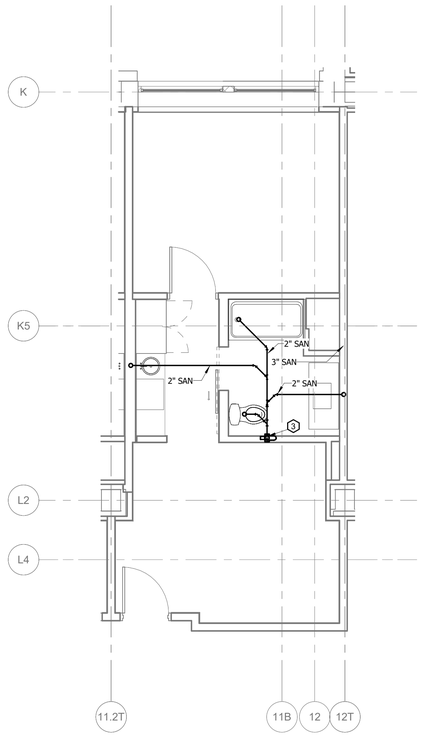
6 TYP. KING 'I' - SANITARY

Scale: Not to Scale



4 TYP. KING 'H' - SANITARY

Scale: Not to Scale



2 TYP. KING 'G' - SANITARY

Scale: Not to Scale

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1 DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES.

2 PROVIDE 12x12 ACCESS PANEL TO SERVICE SHUTOFF VALVES.

3 PROVIDE PROVENT FITTING ABOVE CEIILING AT THIS LOCATION.

4 CONNECT TO PROVENT FITTING IN ADJACENT UNIT.

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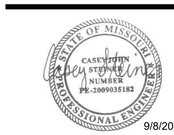

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Enlarged Unit Plans
Plumbing

P3.05

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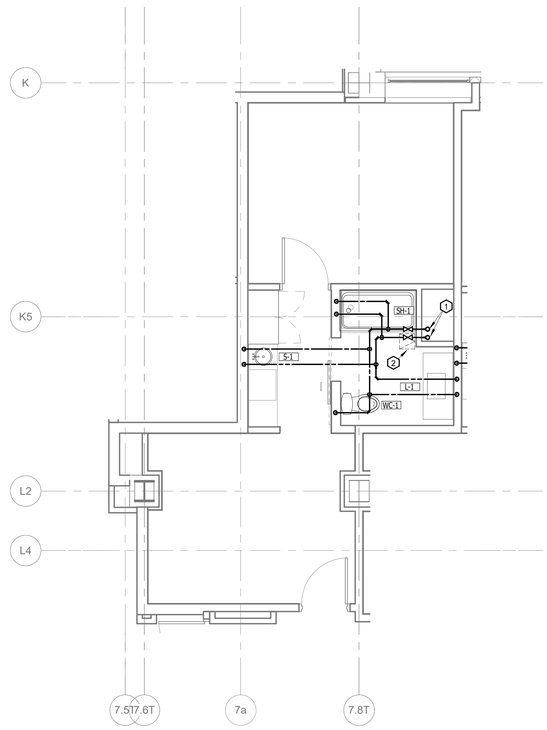
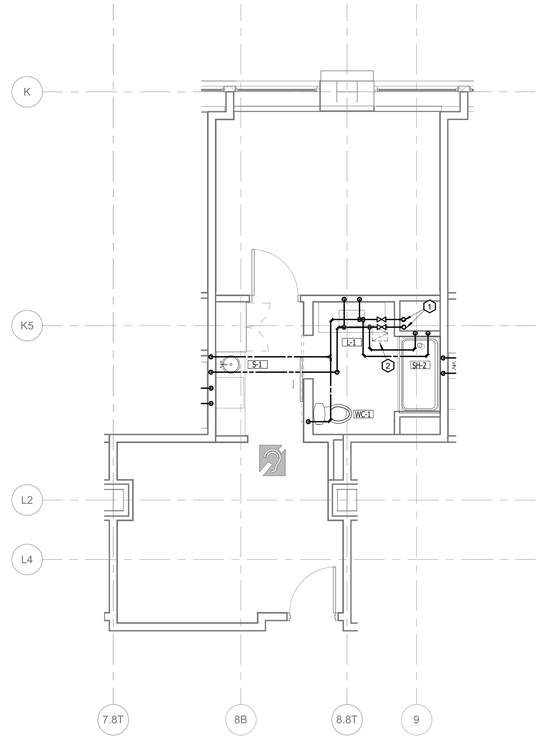


5 TYP. KING 'L' - DOMESTIC WATER

Scale: Not to Scale



3 TYP. KING 'K' ADA - DOMESTIC WATER

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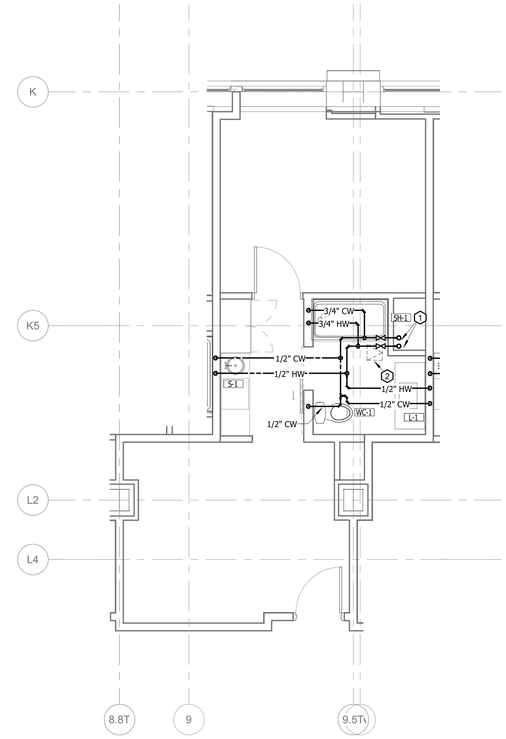
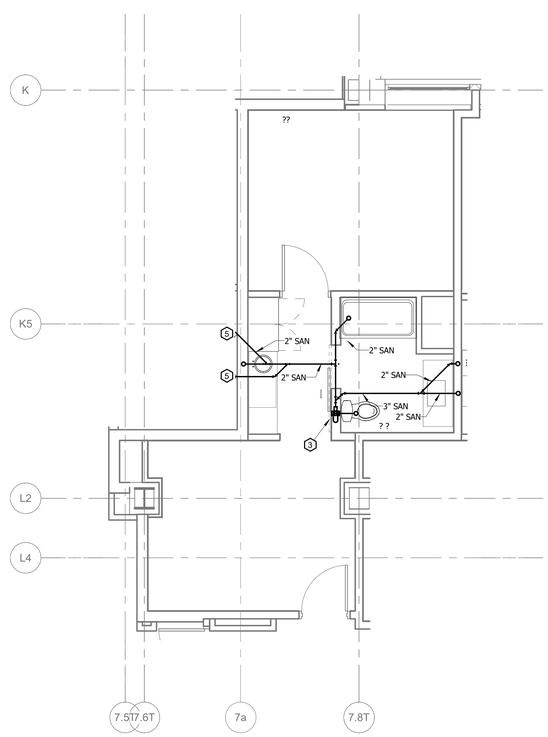


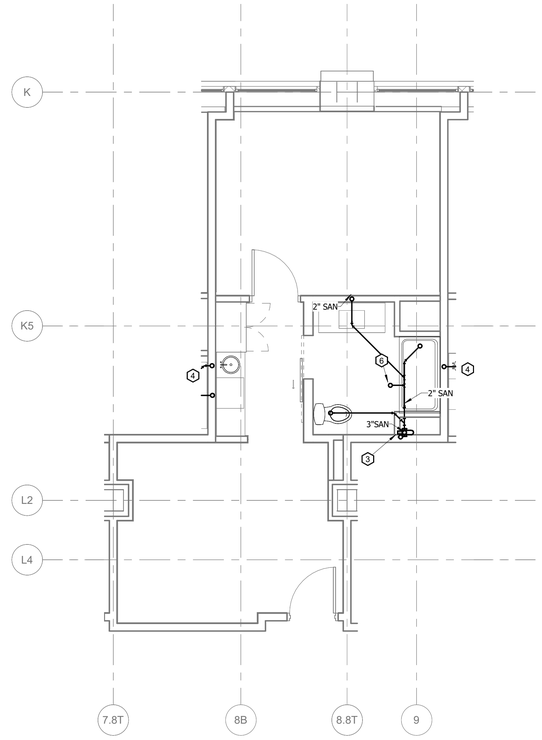
1 TYP. KING 'J' - DOMESTIC WATER

Scale: Not to Scale



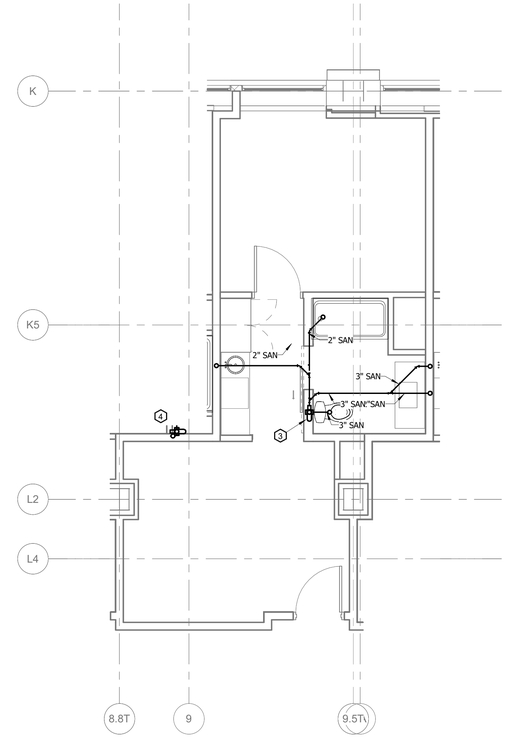
6 TYP. KING 'L' - SANITARY

Scale: Not to Scale



4 TYP. KING 'K' ADA - SANITARY

Scale: Not to Scale



2 TYP. KING 'J' - SANITARY

Scale: Not to Scale

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1. DOMESTIC WATER PIPE RISER. REFERENCE SHEET P5.01 FOR PIPE SIZE.
2. PROVIDE 12x12 ACCESS PANEL TO SERVICE SHUTOFF VALVES.
3. PROVIDE PROVENT FITTING ABOVE CEIILING AT THIS LOCATION.
4. CONNECT TO PROVENT FITTING IN ADJACENT UNIT.
5. CONNECT TO FLOOR DRAIN IN ICE ROOM.
6. PROVIDE FLOOR DRAIN FOR UNIT 617 OUTSIDE ADA ROLL-IN SHOWER. REFERENCE PLUMBING RISER 04 ON SHEET P3.02.

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Enlarged Unit Plans
Plumbing

P3.06

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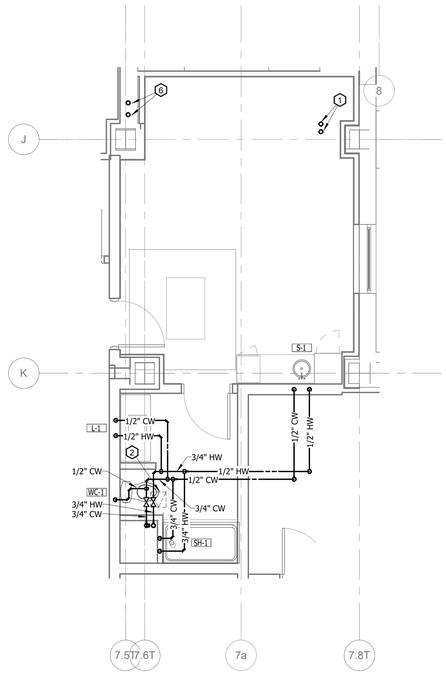
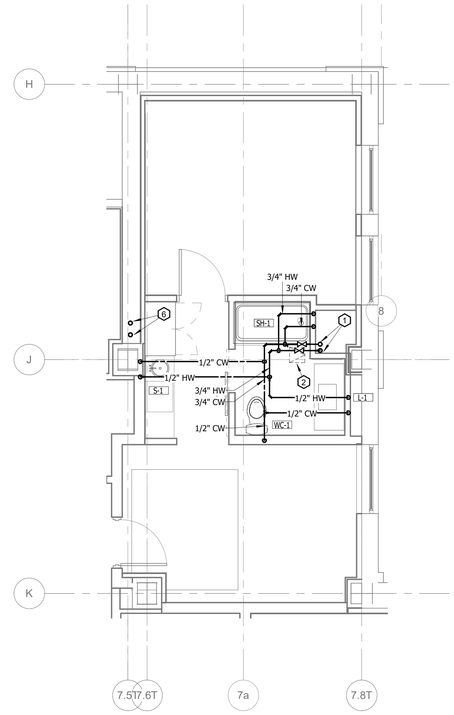


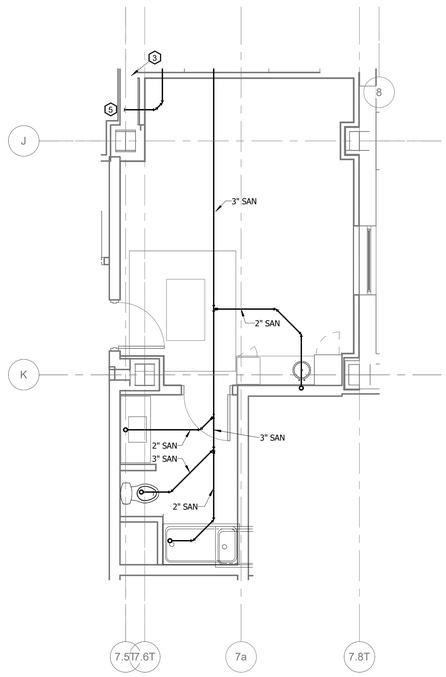
3 TYP. KING 'M1' - DOMESTIC WATER

Scale: Not to Scale



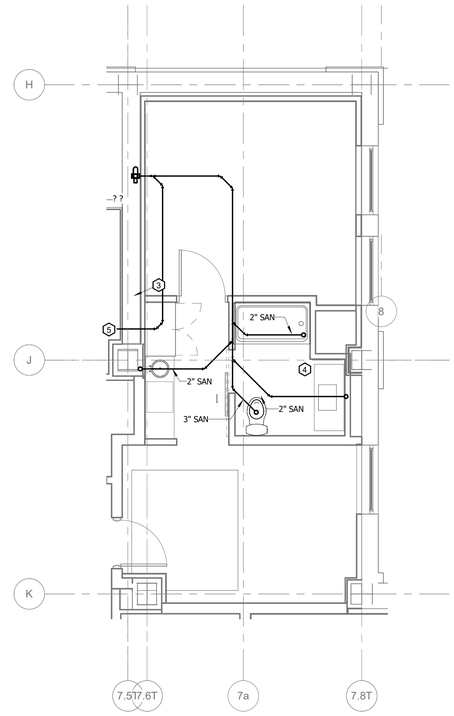
1 TYP. KING 'M' - DOMESTIC WATER

Scale: Not to Scale



4 TYP. KING 'M1' - SANITARY

Scale: Not to Scale



2 TYP. KING 'M' - SANITARY

Scale: Not to Scale

GENERAL NOTES:

A. REFER TO SHEET P1.01-T5 FOR PLUMBING GENERAL NOTES.

PLAN NOTES:

1. DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES.
2. PROVIDE 12x12 ACCESS PANEL TO SERVICE SHUTOFF VALVES.
3. PROVIDE PROVENT FITTING ABOVE CEEILING AT THIS LOCATION.
4. ROUTE HORIZONTAL HEAT PUMP CONDENSATE PIPE DOWN AND TIE INTO LAVATORY TAILPIECE.
5. CONNECT JANITOR SINK INTO WVR 14. SEE PIPE RISER DIAGRAM ON SHEET P3.05.
6. DOMESTIC WATER PIPE RISER UP THROUGH FLOOR 12 SERVING JANITOR SINK. REFERENCE SHEET P3.01 FOR RISER PIPE SIZES.

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9/8/2020

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Enlarged Unit Plans
Plumbing

P3.07

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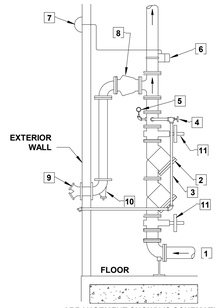


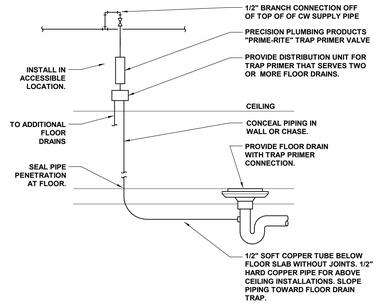
KEY

1. FIRE PROTECTION SERVICE
2. DOUBLE CHECK VALVE
3. MAIN DRAIN
4. MAIN DRAIN VALVE
5. PRESSURE GAUGE
6. FLOW SWITCH
7. ELECTRIC ALARM
8. CHECK VALVE
9. SIAMESE CONNECTION
10. BALL DRIP
11. SUPERVIZED OS&Y VALVES

ARRANGEMENT SHOWN IS SCHEMATIC. MODIFY TO SUIT MANUFACTURER'S STANDARDS, MEET LOCAL CODE REQUIREMENTS. ROUTE ALL DRAINS TO OUTSIDE AS SHOWN OR TO NEARBY FLOOR DRAIN.

1 FIRE DEPARTMENT WATER ENTRY

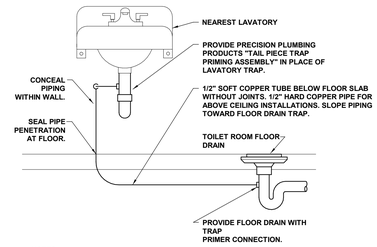
Scale: Not to Scale



NOTES:
1. PROVIDE TRAP PRIMERS AS DETAILED ABOVE T ALL LOCATIONS EXCEPT TOILET ROOM FLOOR DRAINS, UNLESS SPECIFICALLY INDICATED OTHERWISE ON THE PLANS.

2 Floor Drain Trap Primer Detail

Scale: Not to Scale



NOTES:
1. PROVIDE TAIL PIECE TRAP PRIMING ASSEMBLIES AT ALL TOILET ROOM FLOOR DRAINS UNLESS SPECIFICALLY INDICATED OTHERWISE.

3 Floor Drain Trap Primer Detail

Scale: Not to Scale

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Plumbing Details

P4.01

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H&B PROJECT NUMBER : 1820630

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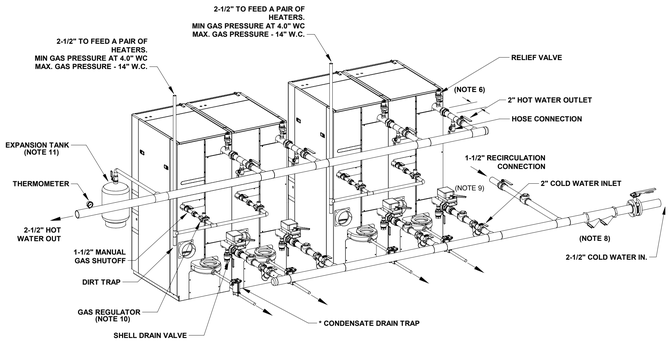
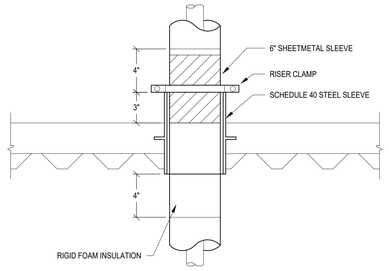


NOTES:
1. FOR ACTUAL SIZED AND LOCATIONS OF PIPING AND OTHER CONNECTIONS TO THE HEATER, SEE PLANS.
2. SHELL DRAIN VALVE AND CONDENSATE HOSE SHOULD BE ARRANGED TO PERMIT THE FLUIDS TO DRAIN FREELY, BY GRAVITY, TO A FLOOR DRAIN. RELIEF VALVE DISCHARGE SHOULD BE PIPED TO THE NEAREST FLOOR DRAIN. WHEN NO FLOOR DRAIN IS AVAILABLE, THE RELIEF VALVE DISCHARGE SHOULD BE PIPED VERTICALLY TO A HEIGHT OF AT LEAST 6" ABOVE THE FLOOR BUT NOT LESS THAN 2 PIPE DIAMETERS.
3. ALL (*) ITEMS ARE INCLUDED SEPARATELY IN SHIPMENT.
4. THIS IS A TYPICAL INSTALLATION DRAWING. LOCAL CODES AND AUTHORITIES SHOULD BE CONSULTED.
5. HOSE CONNECTION AT HEATER OUTLET IS FOR INITIAL HEATER CALIBRATION DURING START-UP.
6. LOCATE WATER INLET AND OUTLET FITTINGS (i.e.UNIONS, ELBOWS, ETC.) A MINIMUM OF 6" FROM WATER HEATER FITTINGS, TO PREVENT INTERFERENCE WITH REMOVAL OF HEATER PANELS.
7. HEATERS SHOULD BE PIPED REVERSE RETURN AS SHOWN.
8. IF PERMITTED BY LOCAL CODES, A CHECK VALVE MAY BE USED IN PLACE OF A BACKFLOW PREVENTER.
9. 2" COLD WATER MOTORIZED/SEQUENCING VALVE WIRED INTO EACH UNIT'S I/O BOX TERMINAL "AOUT" PER DRAWING SD-A-878.
10. AT 14" W.C. OR BELOW, A GAS REGULATOR IS OPTIONAL UNLESS REQUIRED BY LOCAL CODE.
11. POTABLE, DIAPHRAGM-TYPE THERMAL EXPANSION TANK SHALL BE PLACED ON THE PIPING AS SHOWN.

1 WATER HEATER DETAIL

Scale: Not to Scale

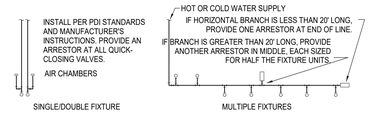


NOTES:

1. FIRESTOP AS REQUIRED BY ASSEMBLY. REFER TO ARCH. REFER TO FIRESTOP SPECIFICATION AND MANUFACTURER'S APPROVED UL DETAIL

2 FLOOR SLEEVE DETAIL

Scale: Not to Scale



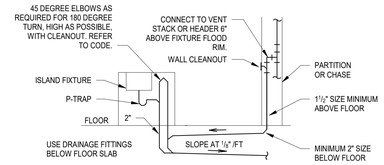
PDI SIZE	PIPE SIZE	FIXTURE UNIT LOAD
A	1/2"	1-11
B	3/4"	12-32
C	1"	33-60
D	1-1/4"	61-113
E	1-1/2"	114-154
F	2"	154-330

FIXTURE UNIT TABULATION		
FIXTURE	COLD	HOT
FLUSH VALVE WATER CLOSET	10	--
TANK WATER CLOSET	5	--
FLUSH VALVE URINAL	5	--
LAVATORY/SINK	1.5	1.5
JANITOR'S SINK	3	3
SHOWER/BATHTUB	2	2

NOTES:
1. INSTALL IN HORIZONTAL OR VERTICAL POSITION, BUT NEVER UPSIDE DOWN. INSTALL IN LINE WITH WATER FLOW DIRECTION IF POSSIBLE. SIZE THE UNITS AS SHOWN ON THE DRAWINGS AND/OR PER THE TABLES SHOWN ABOVE. PROVIDE ACCESS TO ALL WATER HAMMER ARRESTORS.

3 Water Hammer Arrestors

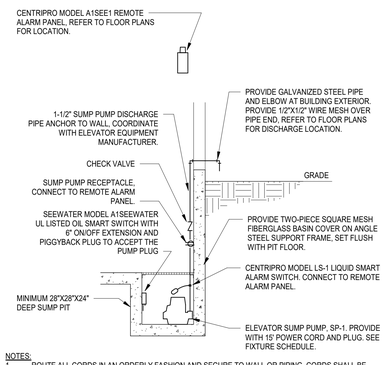
Scale: Not to Scale



NOTES:
ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST AS REQUIRED TO SUIT ACTUAL CONDITIONS. REFER TO FLOOR PLANS. PROVIDE SIMILAR SEPARATE SYSTEM FOR EACH FIXTURE. REFER TO LOCAL CODE FOR OTHER INFORMATION.

4 ISLAND FIXTURE VENT

Scale: Not to Scale

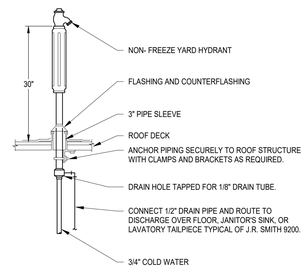


NOTES:
1. ROUTE ALL CORDS IN AN ORDERLY FASHION AND SECURE TO WALL OR PIPING. CORDS SHALL BE INSTALLED SO THAT THEY DON'T INTERFERE WITH EQUIPMENT OPERATION OR PUMP REMOVAL.
2. COORDINATE THE RECEPTACLE LOCATIONS WITH ELECTRICAL. PROVIDE FACTORY INSTALLED CORD AND PLUGS WITH ALL EQUIPMENT THAT IS SUFFICIENT IN LENGTH TO REACH RECEPTACLES. FIELD SPLICING OF CORDS IS NOT ACCEPTABLE. NEATLY COIL AND SECURE ANY EXTRA LENGTH OF CORD TO WALL.

SEQUENCE OF OPERATION:
1. THE OIL SMART SWITCH SHALL OPERATE THE PUMP AUTOMATICALLY BY TWO INDEPENDENT SENSING POINTS. ONE FOR PUMP ON AND ONE FOR PUMP OFF. THE OIL SMART SWITCH SHALL DIFFERENTIATE EBTWEEN OIL AND WATER. IF OIL IS SENSED BY THE PUMP ON PROBE THE PUMP WILL NOT OPERATE UNTIL THE PROBE IS AGAIN COVERED BY WATER.
2. A SEPARATE HIGH WATER ALARM SWITCH SHALL BE CONNECTED TO A HIGH WATER ALARM PANEL. IF THE WATER LEVEL REACHES THIS SWITCH AN AUDIBLE AND VISUAL ALARM SHALL BE INITIATED AT THE ALARM PANEL.

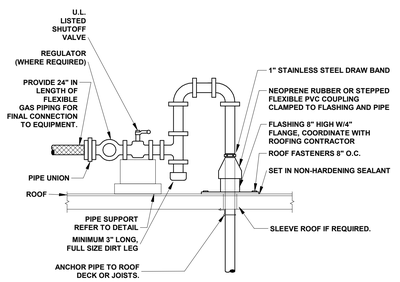
5 ELEVATOR SUMP PUMP

Scale: Not to Scale



6 P - 22 11 19 ROOF HYDRANT1

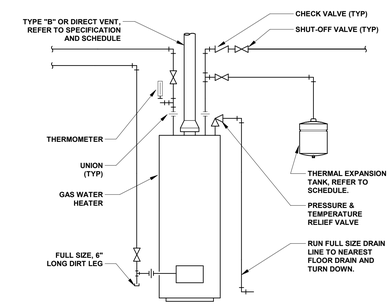
Scale: Not to Scale



NOTES:
REFER TO PLAN FOR PIPE SIZE(S) AND LOCATION(S). USE WELDED OR SCREWED FITTINGS AS SPECIFIED FOR PIPE SIZE. LOCATE PENETRATION MINIMUM 18" FROM ADJACENT WALLS.

7 PIPE THRU ROOF

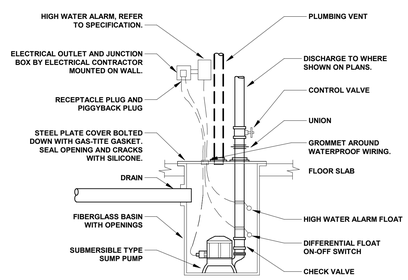
Scale: Not to Scale



NOTES:
1. REFER TO SCHEDULE AND SPECIFICATIONS. PIPING ARRANGEMENT SHOWN IS SCHEDMATIC. ADJUST TO SUIT FIELD CONDITIONS. REFER TO FLOOR PLANS FOR PIPE SIZES. PROVIDE CLEARANCES RECOMMENDED BY MANUFACTURER.

8 GAS WATER HEATER

Scale: Not to Scale



NOTES:
1. ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITIONS. ONLY CLEAR WATER WASTE, SUCH AS CONDENSATE, MAY ENTER THIS SUMP. LOCATE FLOATS AT ELEVATIONS RECOMMENDED BY PUMP MANUFACTURER.

9 SUMP PUMP SIMPLEX

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STATE OF MISSOURI
CASEY JOHN STONE
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Plumbing Details

P4.02

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H&B PROJECT NUMBER : 1820630

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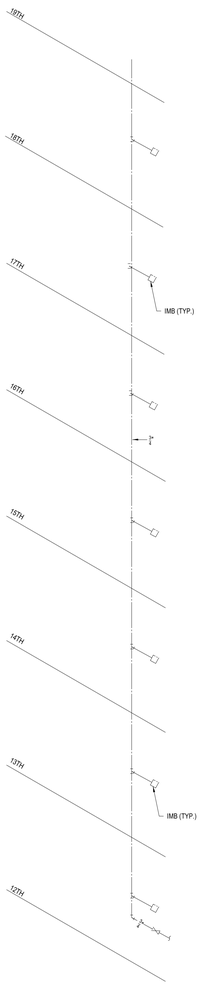

05 ICE MACHINE RISER #03B
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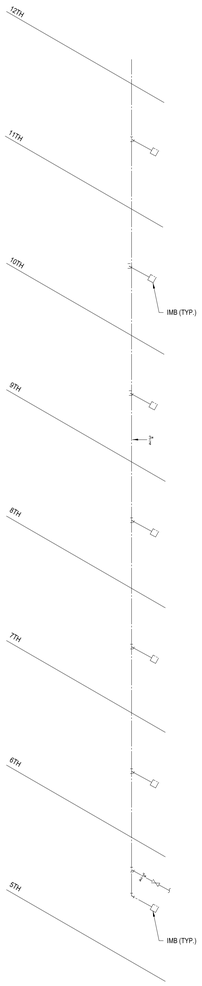

04 ICE MACHINE RISER #03A
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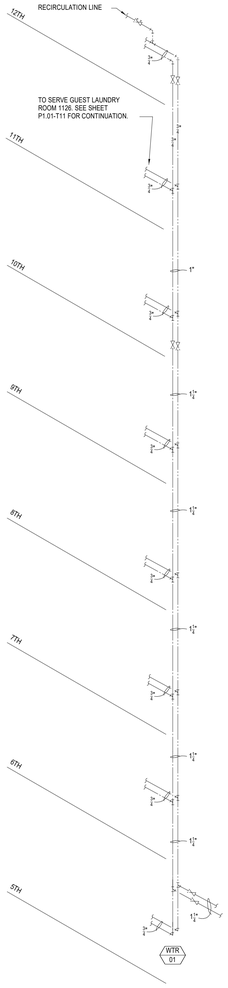

03 Plumbing Riser #01
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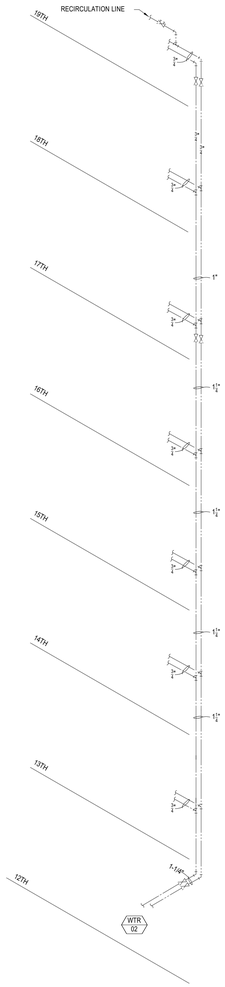

02 Plumbing Riser #02
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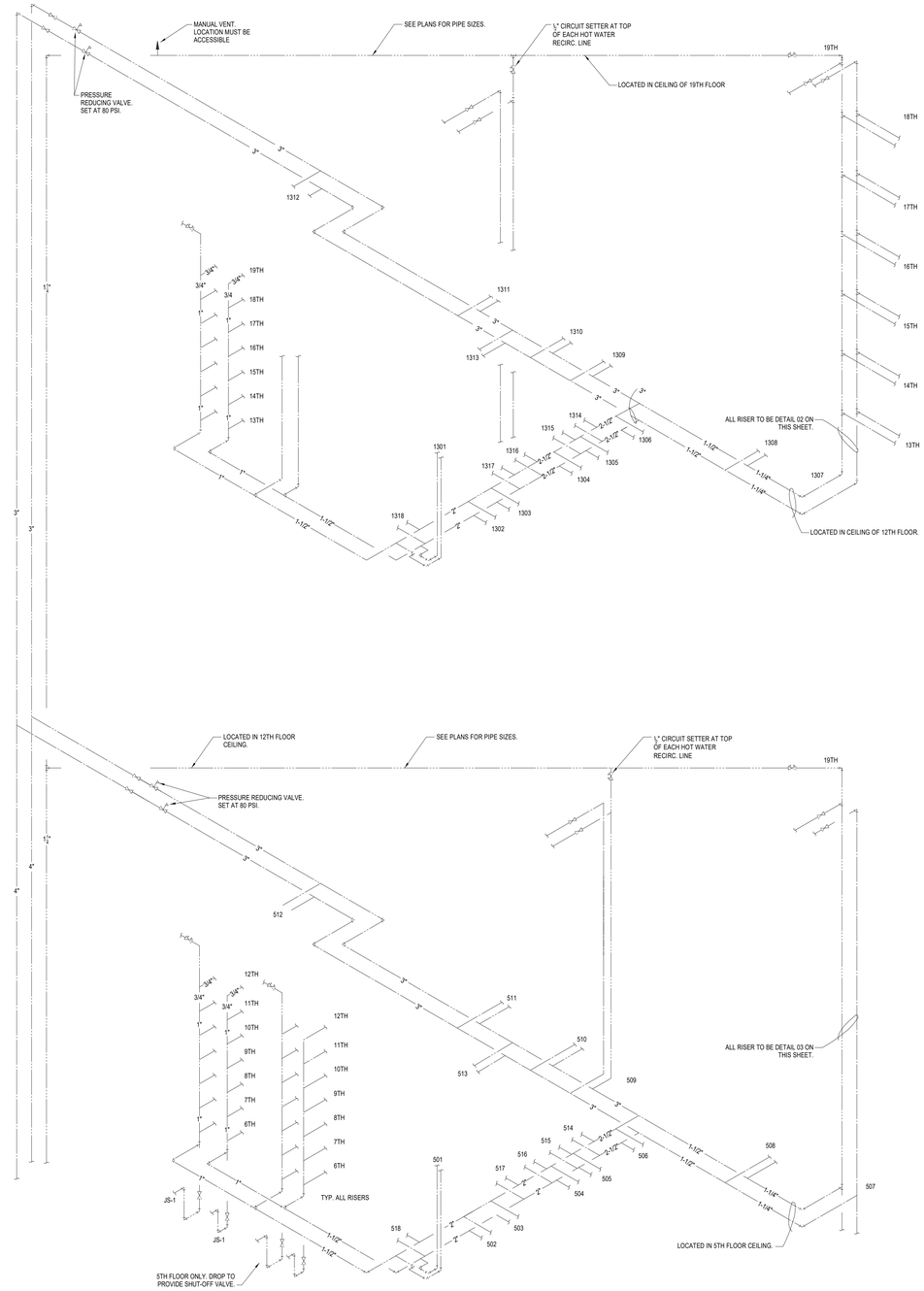

01 DOMESTIC WATER RISER
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Plumbing Risers

P5.01

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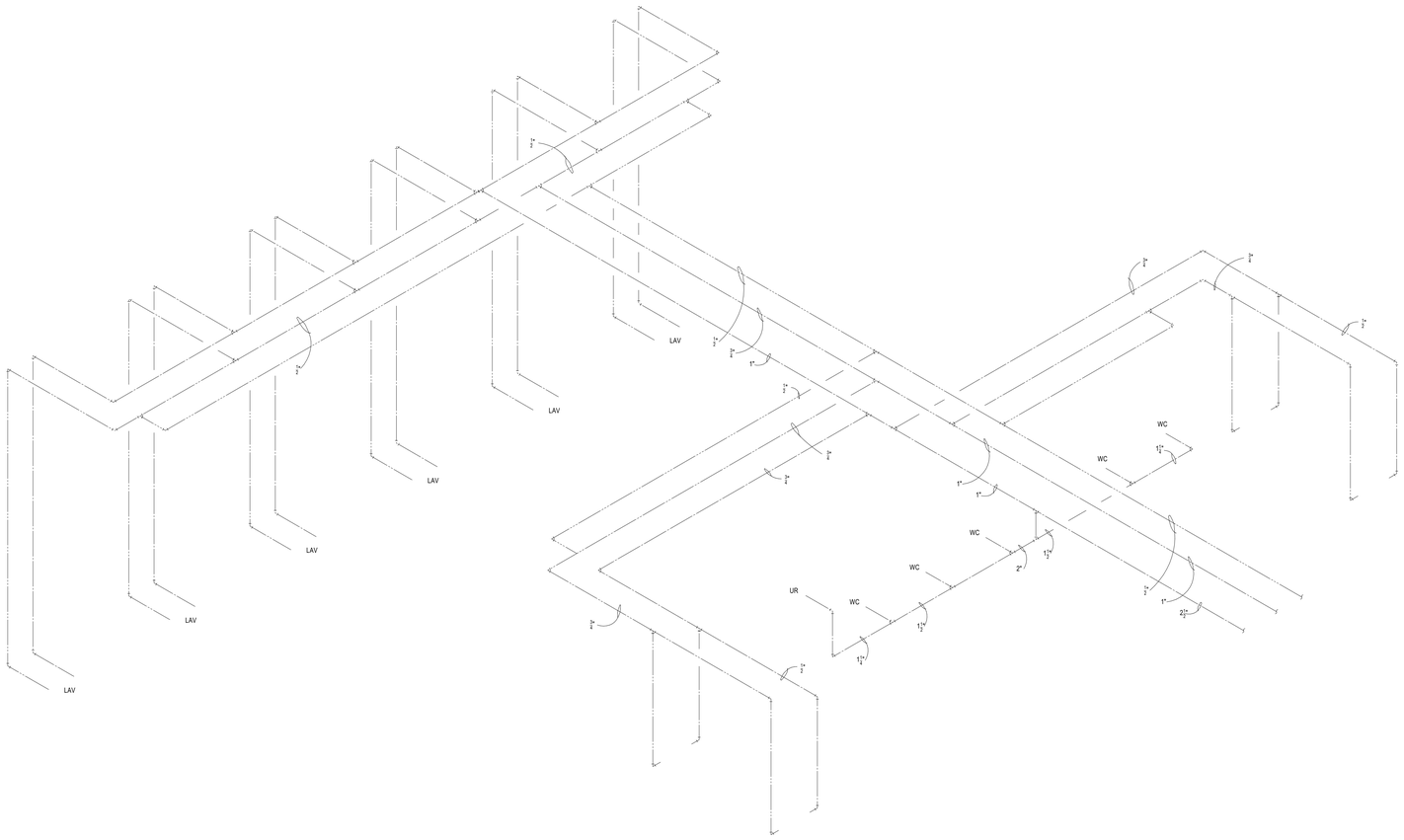

03 DOMESTIC WATER RISER - BASEMENT LOCKER ROOM

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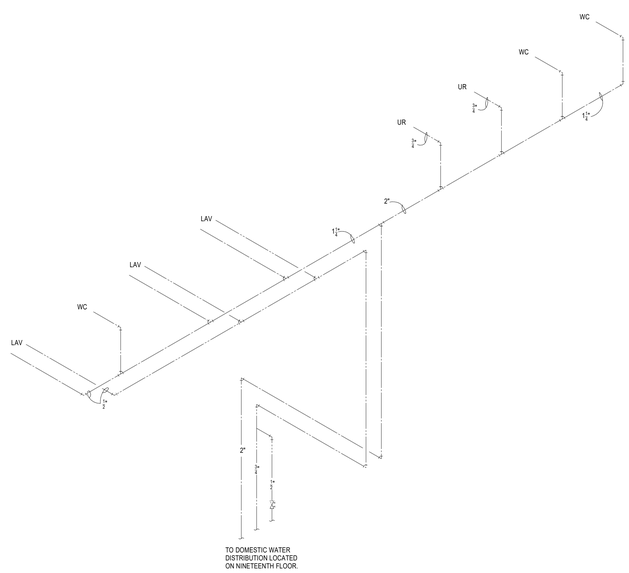

02 DOMESTIC WATER RISER - 20TH FLOOR MEN'S RESTROOM

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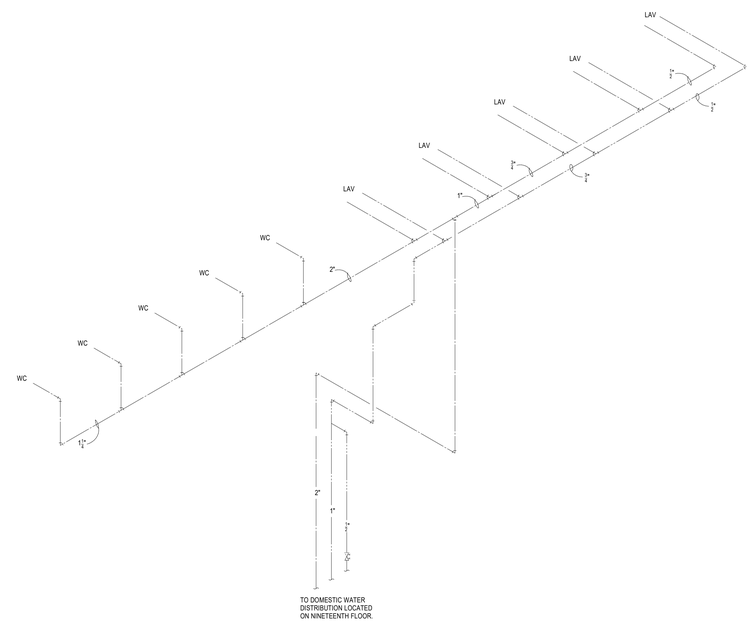

01 DOMESTIC WATER RISER - 20TH FLOOR WOMEN'S RESTROOM

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Plumbing Risers

P5.02

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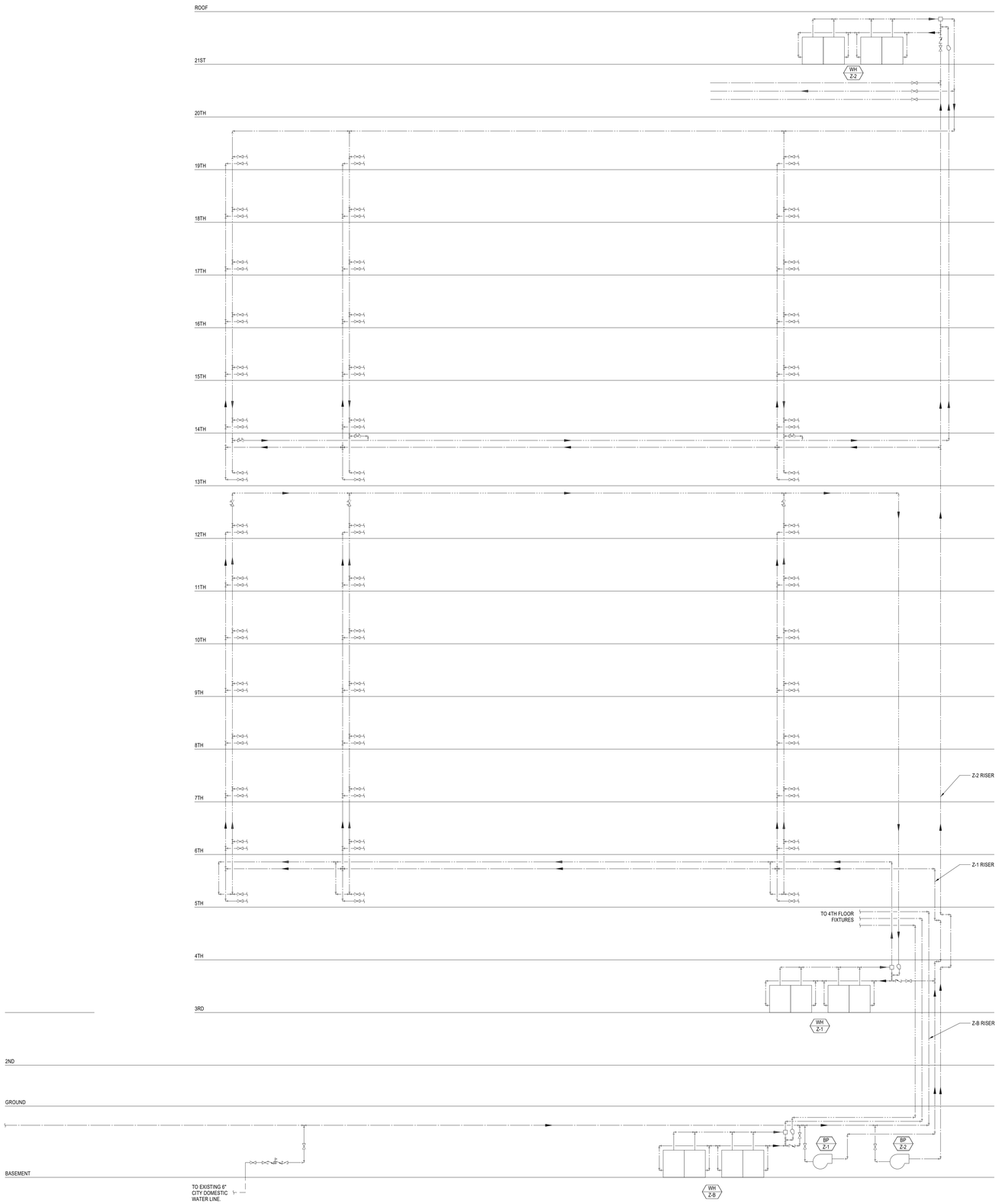

01 WATER SERVICE RISER

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Plumbing Risers

P5.03

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HOSS & BROWN

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H&B PROJECT NUMBER : 182063O

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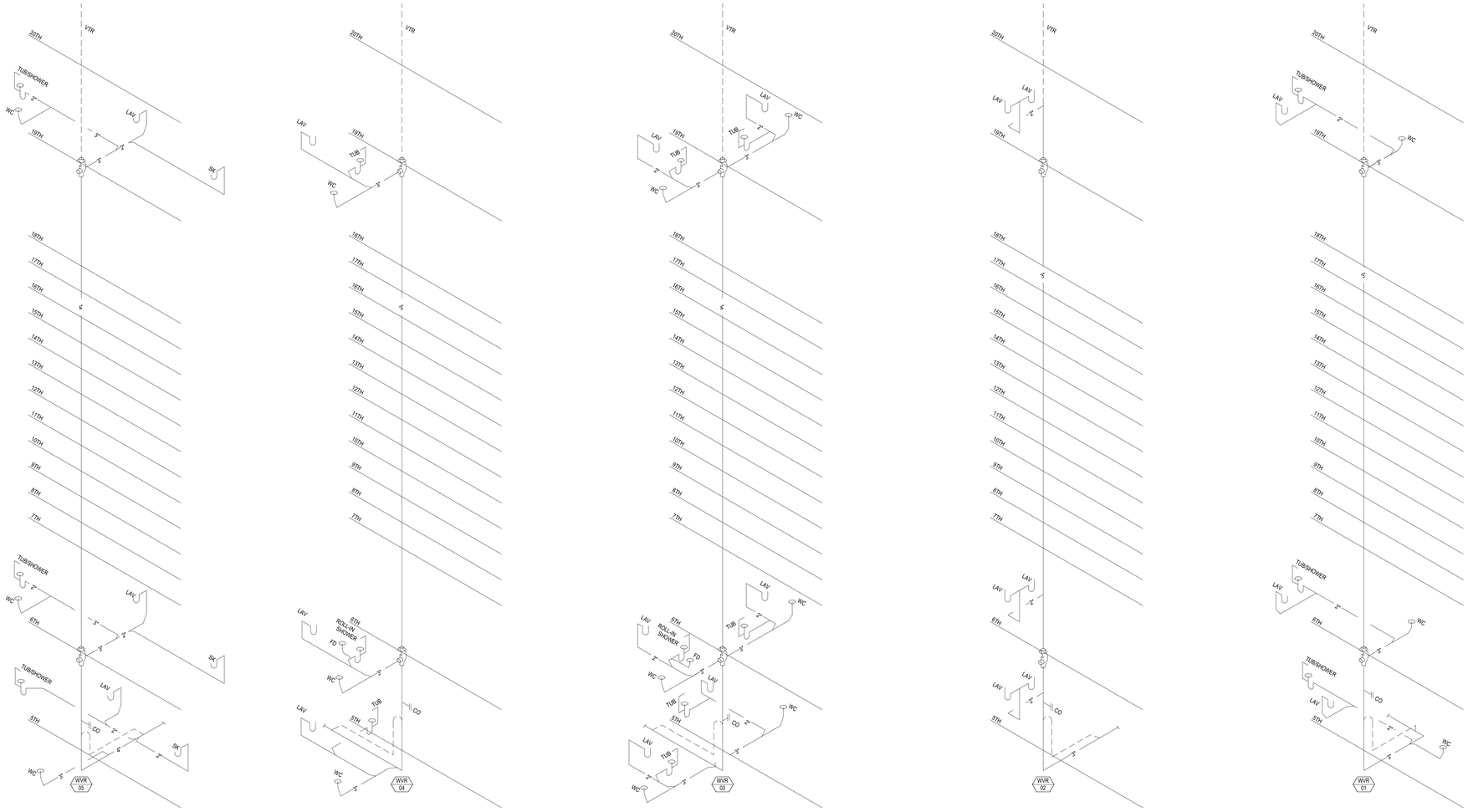

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03 Plumbing Riser #3
Scale: Not to Scale

02 Plumbing Riser #2
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01 Plumbing Riser #1
Scale: Not to Scale

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H&B PROJECT NUMBER : 1820630

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Plumbing Risers

P5.04

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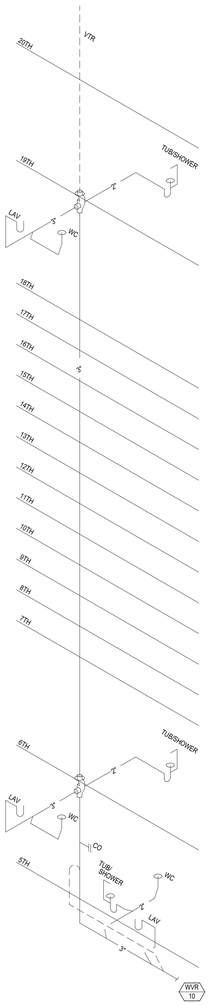

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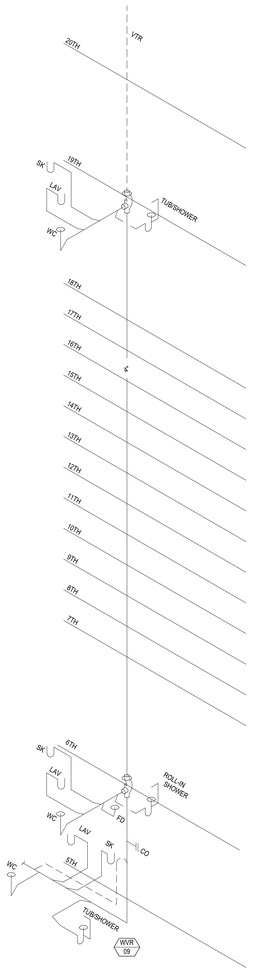

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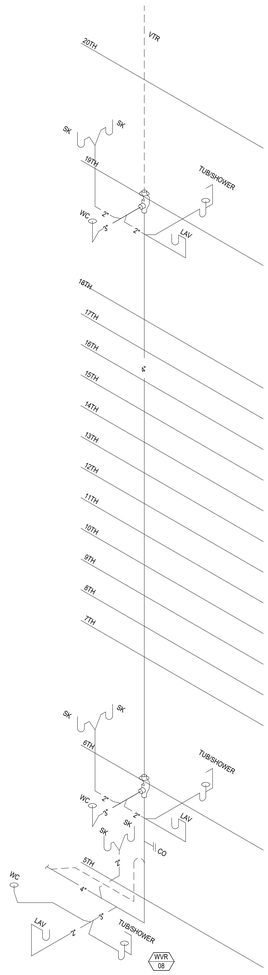

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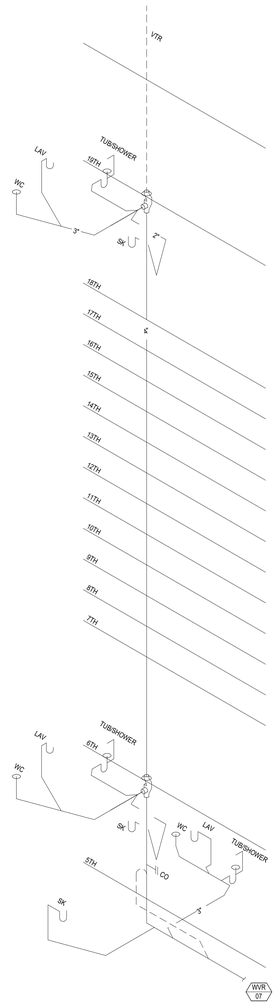

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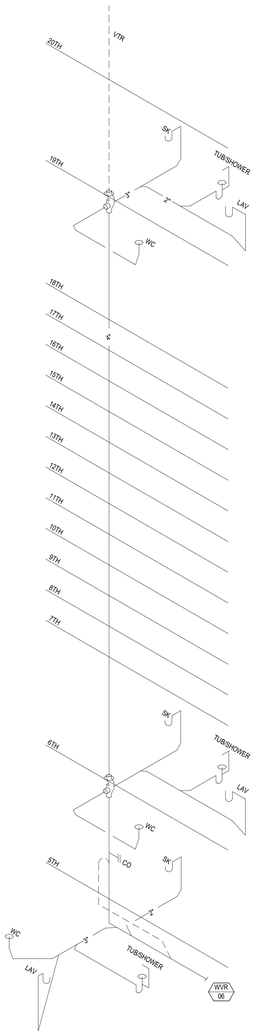

01 Plumbing Riser #6
Scale: Not to Scale

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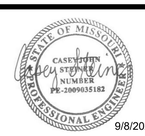

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

H&B ENGINEERS
HOSS & BROWN
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Shawnee, Kansas 66217
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H&B PROJECT NUMBER : 1820630

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Plumbing Risers

P5.05

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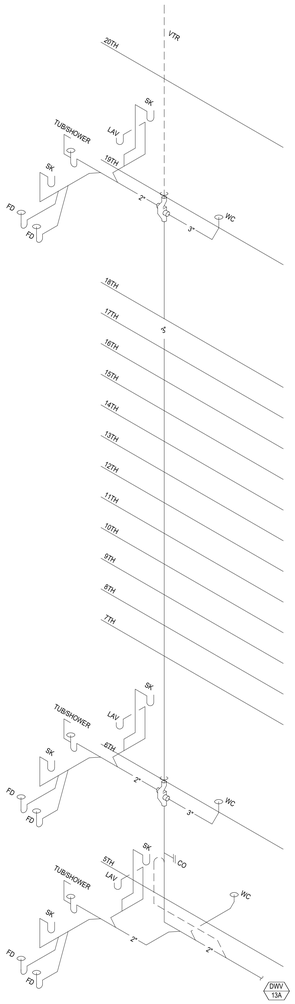

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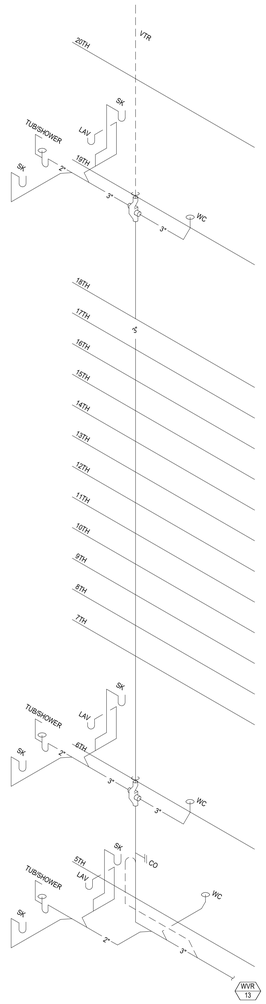

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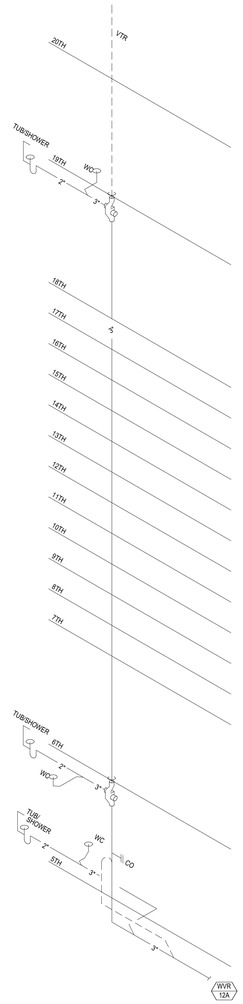

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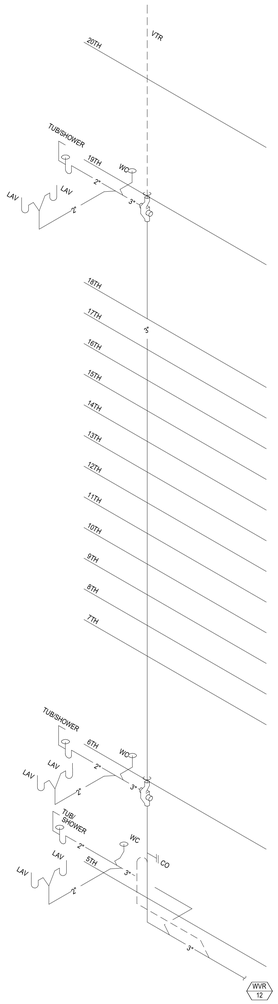

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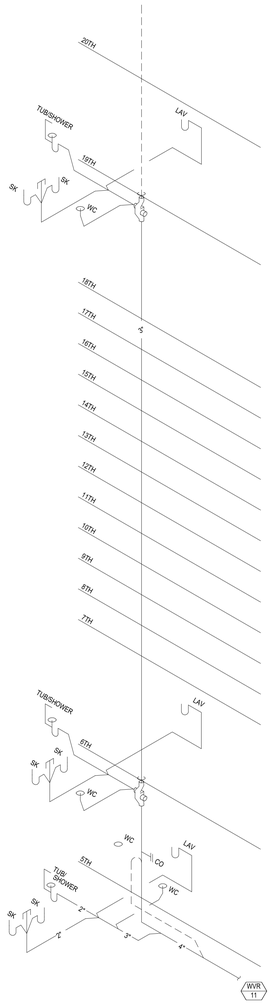

01 Plumbing Riser #11
Scale: Not to Scale

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
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H&B PROJECT NUMBER : 1820630

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Plumbing Risers

P5.06

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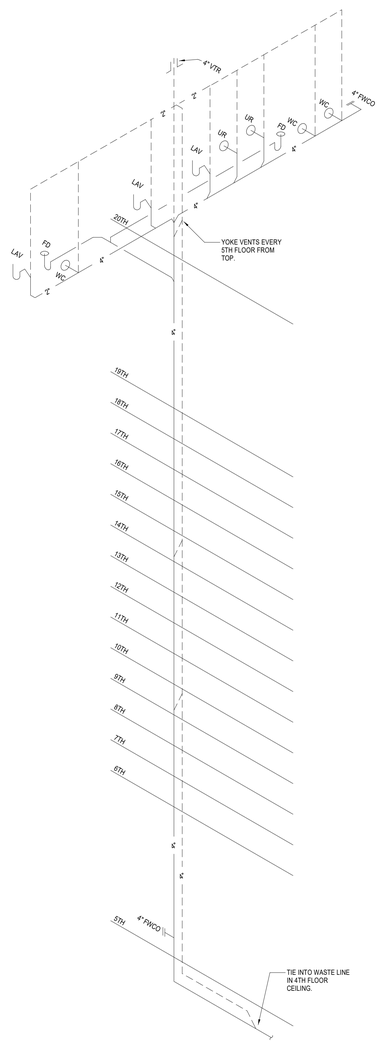

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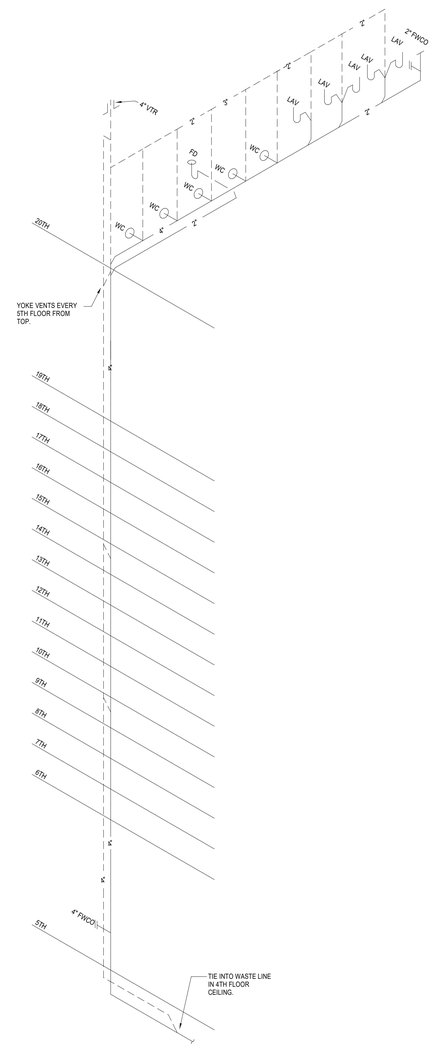

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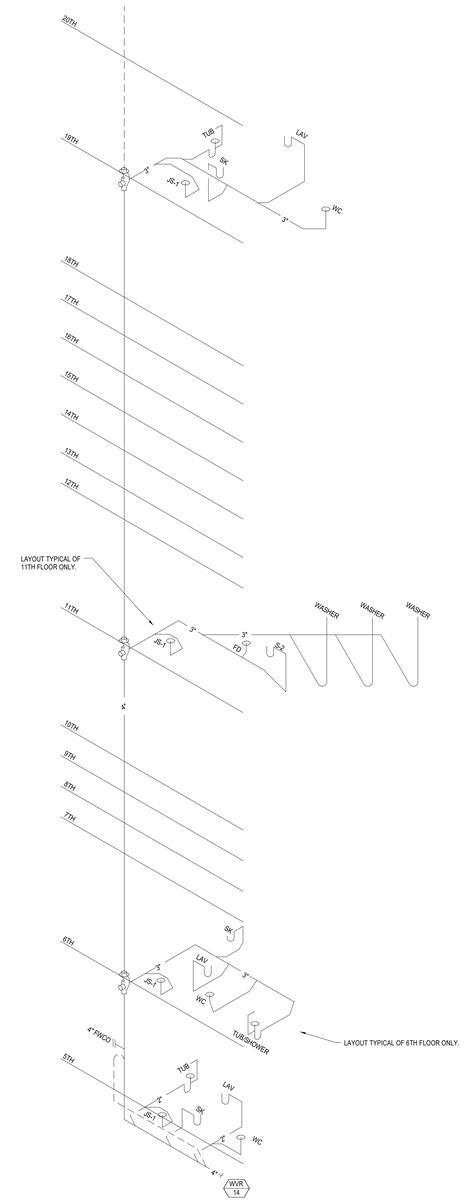

01 Plumbing Riser #14
Scale: Not to Scale

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STATE OF MISSOURI
CASEY JOHN STEINER
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Plumbing Risers

P5.07

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H&B PROJECT NUMBER : 1820630
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PLUMBING FIXTURE SCHEDULE - HOTEL ROOMS

NOTES:

1. FIXTURE IS ADA COMPLIANT. REFER TO ARCHITECTURAL DRAWINGS FOR ACTUAL MOUNTING HEIGHT.
2. FAUCET HOLES TO MATCH FAUCET SPECIFIED.
3. MOUNT WITH HANDICAPPED RECEIPTOR RIM 34" ABOVE FLOOR.
4. PIPE SIZE AS SHOWN ON DRAWING.
5. COORDINATE SPUD SIZE WITH FLUSH VALVE SUPPLIED.
6. EQUIVALENT CARRIER BY WADE.
7. FIXTURE ASSEMBLY MUST BE APPROVED BY AN INSTALLED PER ADA.
8. PROVIDE OPERATING ROD ASSEMBLY PER MANUFACTURER'S RECOMMENDATIONS BASED ON WALL THICKNESS.
9. PROVIDE SURESEAL SSX000V INLINE FLOOR DRAIN TRAP SEAL WITH ASSE 1072 RATING.
10. PROVIDE MANUFACTURER'S THERMOSTATIC MIXING VALVE MODEL 'G3603LF'.
11. PROVIDE MANUFACTURER'S THERMOSTATIC MIXING VALVE MODEL 'G3603LF'.

GENERAL NOTES:

A. PROVIDE INSULATION KIT ON ALL ADA FIXTURES WITH EXPOSED TRAP AND SUPPLIES.

MARK	DESCRIPTION	MANUFACTURER	MODEL	TRIM	CONNECTIONS				NOTES
					CW	HW	W	V	
WC-1	FLOOR MOUNTED FLUSH TANK WATER CLOSET	KOHLER	K-3754	KOHLER K-20454 SOFT CLOSE SEAT	1/2"	-	4"	2"	
L-1	RECTANGLE UNDERMOUNT LAVATORY	KOHLER	K-20000	FAUCET: F-1	-	-	2"	1-1/2"	
S-1	ADA SINGLE BOWL 18 GAUGE SELF RIM SINK	ELKAY	EELUH12FB	FAUCET: F-2	-	-	2"	1-1/2"	
S-2	LAUNDRY SINK	FIAT	FL1-A1	MOLDED STONE LAUNDRY SINK WITH FAUCET	1/2"	1/2"	2"	1-1/2"	
JS-1	MOLDED STONE JANITOR'S SINK	FIAT	MSB-2424		-	-	3"	1-1/2"	
F-1	ADA SINGLE LEVER LAVATORY FAUCET	AMERICAN STANDARD	RELIANT 7385.004	2.5 GPM, VANDAL RESISTANT, GRID DRAIN, 4" CENTERS	1/2"	1/2"	-	-	
F-1	SINGLE LEVER LAVATORY FAUCET	DELTA	574-CSMPU-DST	1.2 GPM, VANDAL RESISTANT, GRID DRAIN	1/2"	1/2"	-	-	
F-2	SINGLE LEVER SINK FAUCET	DELTA	1959LF	1.5 GPM, VANDAL RESISTANT, GRID DRAIN	1/2"	1/2"	-	-	
F-3	JANITOR'S SINK FAUCET	AMERICAN STANDARD	8344.112	VACUUM BREAKER, WALL BRACE, PAIL HOOK, 30" HOSE WITH WALL GRIP, MOP HANGER	3/4"	3/4"	-	-	
T-1	ADA CAST IRON BATHTUB	KOHLER	K-506	WHITE, SHOWER VALVE SV-1	-	-	1-1/2"	2"	
SH-1	SOLID SURFACE SHOWER BASE	BELSTONE	SS-32-60	32"x60", WHITE SHOWER VALVE SV-2	-	-	1-1/2"	2"	
SH-2	SOLID SURFACE ADA SHOWER BASE	MINCEY MARBLE	CUSTROLL-IN 30"x62"	32"x60", WHITE, GRAB BARS, SHOWER VAVLE SV-3	-	-	1-1/2"	2"	
SV-1	TUB/SHOWER VALVE & TRIM	DELTA	T14474-LHD/52684	CHROME FINISH	1/2"	1/2"	-	-	
SV-2	SHOWER VALVE & TRIM	DELTA	T14274-LHD/52684	CHROME FINISH	1/2"	1/2"	-	-	
SV-3	ADA SHOWER VALVE & TRIM	DELTA	T14274-LHD/52684/51799-PN	CHROM FINISH WITH DIVERTER & SLIDE BAR HAND SHOWER	1/2"	1/2"	-	-	
FD-1	7" ROUND FLOOR DRAIN	ZURN	Z-415	NICKEL BRONZE STRAINER DEEP, SEAL TRAP	-	-	-	-	
MV-1	POINT-OF-USE MIXING VALVE	LEONARD	270-LF	0.25-12 GPM FLOW, ASSE 1017 CERTIFIED, LOW FLOW	-	-	-	-	
IMB	ICE MAKER BOX	GUY GREY	BIM875	GALVANIZED STEEL BOX	1/2"	-	-	-	
GD-1	GARBAGE DISPOSAL	INSINKERATOR	BADGER 5	1/2 HP, 120V	-	-	-	-	
WMB	WASHING MACHINE CONNECTION BOX	GUY GRAY	B200	GALVANIZED STEEL BOX	1/2"	1/2"	2"	1-1/2"	

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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Plumbing Schedules

P6.01

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PLUMBING FIXTURE SCHEDULE - PUBLIC SPACES

NOTES:

1. FIXTURE IS ADA COMPLIANT. REFER TO ARCHITECTURAL DRAWINGS FOR ACTUAL MOUNTING HEIGHT.
2. FAUCET HOLES TO MATCH FAUCET SPECIFIED.
3. MOUNT WITH HANDICAPPED RECEPTOR RIM 34" ABOVE FLOOR.
4. PIPE SIZE AS SHOWN ON DRAWING.
5. COORDINATE SPUD SIZE WITH FLUSH VALVE SUPPLIED.
6. EQUIVALENT CARRIER BY WADE.
7. FIXTURE ASSEMBLY MUST BE APPROVED BY AN INSTALLED PER ADA.
8. PROVIDE OPERATING ROD ASSEMBLY PER MANUFACTURER'S RECOMMENDATIONS BASED ON WALL THICKNESS.
9. PROVIDE SURESEAL SSX000V INLINE FLOOR DRAIN TRAP SEAL WITH ASSE 1072 RATING.
10. PROVIDE MANUFACTURER'S THERMOSTATIC MIXING VALVE MODEL 'G3602LF'.
11. PROVIDE MANUFACTURER'S THERMOSTATIC MIXING VALVE MODEL 'G3802LF'.

GENERAL NOTES:

A. PROVIDE INSULATION KIT ON ALL ADA FIXTURES WITH EXPOSED TRAP AND SUPPLIES.

MARK	DESCRIPTION	MANUFACTURER	MODEL	TRIM	CONNECTIONS				NOTES
					CW	HW	W	V	
WC-2	WALL MOUNTED FLUSH VALVE WATER CLOSET	AMERICAN STANDARD	AFWALL 2257.103	FLUSH VALVE: FV__; CHURCH 9500C OPEN FRONT SEAT	1-1/4"	-	4"	2"	
WC-3	ADA WALL MOUNTED FLUSH VALVE WATER CLOSET	AMERICAN STANDARD	AFWALL 2257.103	FLUSH VALVE: FV__; CHURCH 9500C OPEN FRONT SEAT	1-1/4"	-	4"	2"	
UR-1	WALL MOUNTED URINAL	AMERICAN STANDARD	TRIMBROOK 6561.017	FLUSH VALVE: FV__; CARRIER: C__	3/4"	-	2"	1-1/2"	
UR-2	ADA WALL MOUNTED URINAL	AMERICAN STANDARD	TRIMBROOK 6561.017	FLUSH VALVE: FV__; CARRIER: C__	3/4"	-	2"	1-1/2"	
FV-1	WATER CLOSET FLUSH VALVE	SLOAN	ROYAL 111	-	-	-	-	-	
FV-2	URINAL FLUSH VALVE	SLOAN	ROYAL 186	-	-	-	-	-	
FV-3	BATTERY POWERED SENSOR WATER CLOSET FLUSH VALVE	SLOAN	OPTIMA 8111	1.6 GALLONS PER FLUSH	-	-	-	-	
FV-4	BATTERY POWERED SENSOR URINAL FLUSH VALVE	SLOAN	OPTIMA 8186-1.0	1.0 GALLONS PER FLUSH	-	-	-	-	
FV-5	HARD-WIRED SENSOR WATER CLOSET FLUSH VALVE	SLOAN	OPTIMA 8111 ES-S	PROVIDE WITH EL-154 120V-24V TRANSFORMER, 1.6 GALLONS PER FLUSH	-	-	-	-	
L-2	OVAL COUNTERTOP LAVATORY	AMERICAN STANDARD	AQUALYN 0476.028	FAUCET: F__; MIXING VALVE: MV__	-	-	2"	1-1/2"	
L-3	WALL HUNG LAVATORY	AMERICAN STANDARD	LUCERNE 0355.012	FAUCET: F__; 20X18 BASIN, CONCEALED ARM CARRIER, MIXING VALVE: MV__	-	-	2"	1-1/2"	
DF-1	WALL HUNG BI-LEVEL WATER COOLER	ELKAY	ERHPA28C	-	1/2"	-	2"	1-1/2"	
F-5	ADA SINGLE LEVER LAVATORY FAUCET	AMERICAN STANDARD	RELIANT 7385.004	2.5 GPM, VANDAL RESISTANT, GRID DRAIN, 4" CENTERS	1/2"	1/2"	-	-	
F-6	ADA TWO-HANDLE LAVATORY FAUCET	AMERICAN STANDARD	MONTERREY 5502.170	2.5 GPM, VANDAL RESISTANT, GRID DRAIN, 4" CENTERS, WRIST BLADE HANDLES	1/2"	1/2"	-	-	
F-7	HANDS FREE LAVATORY FAUCET	TOTO	TEL105-D10E	0.5 GPM, SELF-GENERATING BATTERY, THERMOSTATIC MIXING VALVE, GRID STRAINER, COVERPLATE	1/2"	1/2"	-	-	
SH-3	SINGLE LEVER COVERWALL SHOWER	BRADLEY	WS-1WCA	18 GA. STAINLESS STEEL WITH STAINLESS STEEL SOAP DISH	1/2"	1/2"	-	-	
SH-4	ADA SINGLE LEVER COVERALL SHOWER	BRADLEY	WS-1WCA-BF	18 GA. STAINLESS STEEL WITH SOAP DISH, HAND SHOWER	1/2"	1/2"	-	-	
FD-2	7" ROUND FLOOR DRAIN	ZURN	Z-415	NICKEL BRONZE STRAINER DEEP, SEAL TRAP	-	-	-	-	
MV-2	POINT-OF-USE MIXING VALVE	LEONARD	270-LF	0.25-12 GPM FLOW, ASSE 1017 CERTIFIED, LOW FLOW	-	-	-	-	
C-1	HORIZONTAL WATER CLOSET	ZURN	Z-1203-N	-	-	-	-	-	
C-2	VERTICAL WATER CLOSET	ZURN	Z-1204	-	-	-	-	-	
C-3	VERTICAL WATER CLOSET	ZURN	Z-1221	-	-	-	-	-	

DOMESTIC BOOSTER PUMP SCHEDULE

MARK	MANUFACTURER	MODEL	INLET PSI	DISCH. PSI	TOTAL GPM	PUMPS	HP (EACH)	V/PH	NOTES
BP-Z1	BELL & GOSSETT	1SSV3-GH4F60	50	116	170	3	7.5	480/3	1,2
BP-Z2	BELL & GOSSETT	1SSV6-GK4F60	50	177	195	3	15	480/3	1,2

NOTES:

1. PROVIDE PTA-125V, 60 GALLON ACCUMULATOR TANK WITH 40 GALLON ACCEPTANCE VOLUME. PRECHARGED TO 10 psi LESS THAN DISCHARGE PRESSURE
2. EACH PUMP IS SIZED FOR 50% OF THE REQUIRED SYSTEM CAPACITY PLUS ONE STANDBY

GENERAL NOTES (APPLIES TO ALL):

A. PUMPS SHALL BE NON-OVERLOADING AT ANY POINT ALONG THE PUMP CURVE.
B. HEADERS SHALL NOT EXCEED 10 FPS.
C. CONTROLS AND WIRING SHALL ALLOW ALL PUMPS TO RUN SIMULTANEOUSLY.
D. PUMP SETS PROVIDED WITH BACnet MS/TP INTERFACE

WATER HEATER SCHEDULE

MARK	MANUFACTURER	MODEL	CAPACITY (GAL)	INPUT (Mbh)	RECOVERY (GPH)	V/PH	NOTES
WH-BZ	AERCO	4-1350	60	4050	5238	120/1	1,4
WH-Z1	AERCO	4-1350	60	4050	5238	120/1	2,4
WH-Z2	AERCO	4-1350	60	4050	5238	120/1	3,4

NOTES:

1 WATER HEATER SERVES FLOORS 1-4 INLCUDING KITCHEN AND LAUNDRY
2 WATER HEATER SERVES FLOORS 5-12
3 WATER HEATER SERVES FLOOR 13-20
4 CAPACITY LISTED IS FOR WATER HEATER PLANT AS A TOTAL. ALL PLANTS ARE SIZED AS N+1 AND AS SUCH THE WATER HEATER PLANT TOTAL CAPACITY LISTED WITH THREE OF THE FOUR HEATERS OPERATING

GENERAL NOTES (APPLIES TO ALL ABOVE):

A. PROVIDE ASME PRESSURE AND TEMPERATURE RELIEF VALVE SET AT 150 PSI FOR Z-1 AND Z-2, 100 psi FOR ZB
B. PROVIDE DIELECTRIC CONNECTIONS AT WATER HEATER.
C. ALL WATER HEATERS 200 MBH OR LARGER SHALL HAVE ASME RATING AND FM GAS CONTROLS
D. WATER HEATER RECOVERY BASED ON 90 DEGREE TEMPERATURE RISE.
E. WATER HEATERS COMPRISED OF 4 HEATERS TOTAL, TWO SIDE BY SIDE WITH COMMON GAS PIPING. AT THE CONTRACTORS OPTION, AND IF ABLE TO BE INSTALLED IN THE SPACE USING THE FREIGHT ELEVATOR, A PACKAGED SKID MOUNTED AND PRE-PIPED ARRANGMENT WILL BE ACCEPTABLE
F. TURNDOWN RATIO OF EACH HEATER SHALL BE NO LESS THAN 27:1
G. PROVIDE EACH WATER HEATER SYSTEM WITH CONDENSATE TREATMENT KITS

PUMP SCHEDULE

MARK	MANUFACTURER	MODEL	GPM	HEAD	RPM	BHP	HP	V/PH	NOTES
Z-B	Bell and Gossett	ecocirc XL 55-45	10	35	3747	.291	.5	208/1	5,6
Z-1	Bell and Gossett	ecocirc XL 95-160	20	60	3027	1.14	2.0	208/3	5,6
Z-2	Bell and Gossett	ecocirc XL 95-160	20	60	3027	1.14	2.0	208/3	5,6

NOTES:

1. PROVIDE 3-1/2" HIGH CONCRETE HOUSEKEEPING PAD.
2. PROVIDE VIBRATION ISOLATION INERTIA BASE WITH DRAIN PAN. EXTEND DRAIN TO NEAREST FLOOR DRAIN.
3. FLUID IS 30% ETHYLENE GLYCOL.
4. PUMP SPEED WILL BE MODULATED USING A VARIABLE FREQUENCY DRIVE. PROVIDE INVERTER DUTY MOTOR.
5. USING THE INTERNAL TEMPERATURE SENSOR, PUMP SHALL CONTROL SPEED TO MAINTAIN THE 110 F TEMPERATURE SETPOINT
6. PUMP CAN BE MONITORED BY THE BAS SYSTEM (BACnet)

GENERAL NOTES: (APPLY ALL TO ABOVE)

A. UNLESS NOTED ABOVE, FLUID IS WATER.
B. UNLESS NOTED ABOVE, PUMP SHALL OPERATE AT CONSTANT SPEED.
C. ALL PUMPS SHALL BE NON-OVERLOADING.

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CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Plumbing Schedules

P6.02

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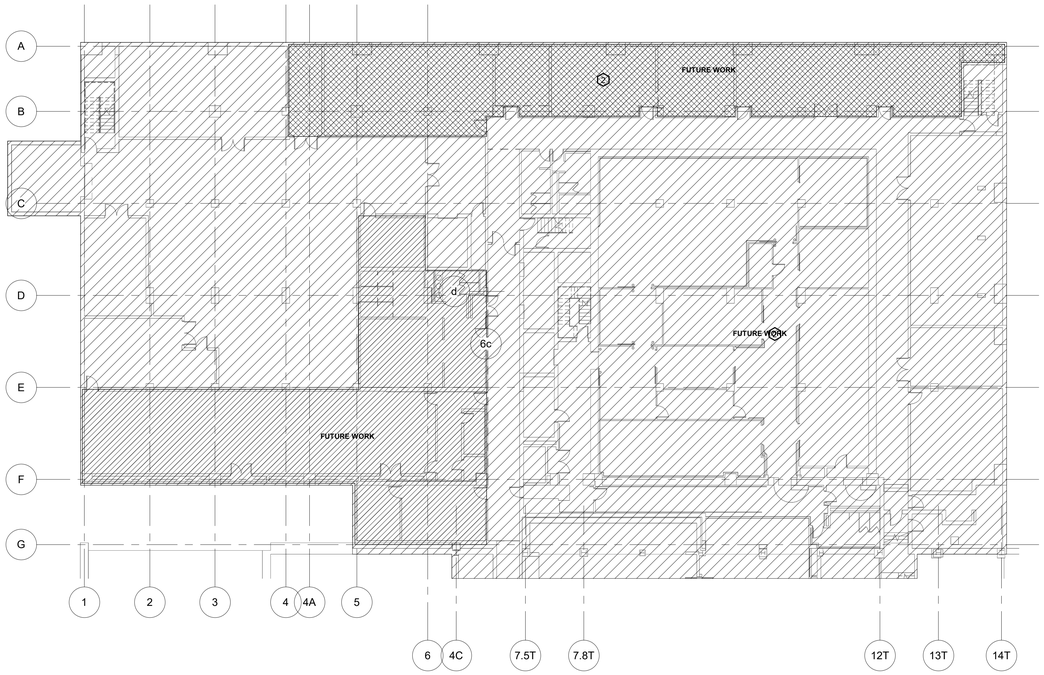
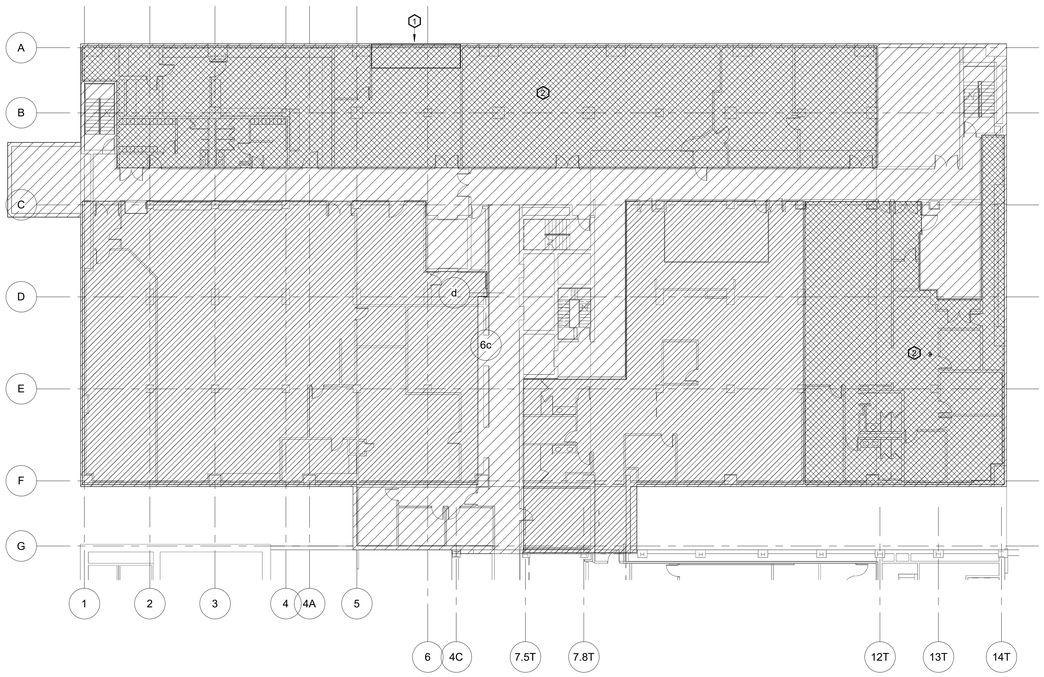


1 GARAGE BASEMENT FIRE PROTECTION PLAN

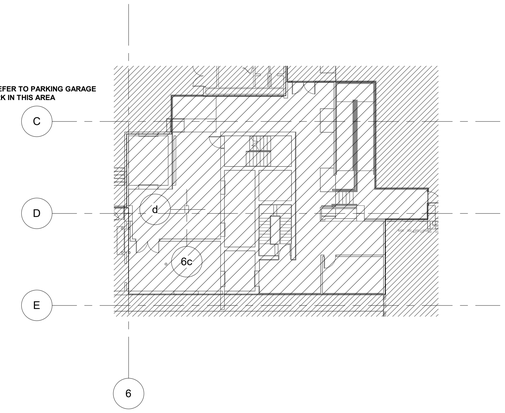
Scale: 1/16" = 1'-0"



2 GARAGE GROUND FIRE PROTECTION PLAN

Scale: 1/16" = 1'-0"

PARKING GARAGE: REFER TO PARKING GARAGE PLANS FOR MEP WORK IN THIS AREA



3 GARAGE DOCK FIRE PROTECTION PLAN

Scale: 1/16" = 1'-0"

GENERAL NOTES:

A. PROVIDE NEW FIRE PROTECTION SYSTEM COMPLETE, PER APPLICABLE CODES, PER NFPA, AND PER REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION.

B. INCLUDE ALL PIPING, OFFSETS, FITTINGS, DRAINS, VALVES, SUPPORTS, HEADS, ETC. AS REQUIRED FOR A COMPLETE OPERABLE SYSTEM.

C. SPRINKLER HEADS SHALL BE WHITE SEMI-RECESSED FOR AREAS WITH FINISHED CEILINGS. SPRINKLER HEADS SHALL BE ROUGH BRASS FOR AREAS WITH EXPOSED STRUCTURE. SPRINKLER HEADS IN CEILINGS, UNLESS FUNCTIONALLY IMPOSSIBLE, SHALL BE CENTERED WITH AND BETWEEN ROWS OF LIGHT FIXTURES. SPRINKLER HEADS IN MACHINE ROOMS SHALL BE 212F TEMPERATURE ACTIVATED.

D. PIPING IN AREAS HAVING FINISHED CEILINGS SHALL BE CONCEALED. SPRINKLER PIPING 2-1/2" AND LARGER MAY BE SCHEDULE 10 BLACK STEEL. SPRINKLER PIPING 2" AND SMALLER SHALL BE SCHEDULE 40 BLACK STEEL. MINIMUM PIPE SIZE SHALL BE 1".

E. PROVIDE AND INSTALL BACKFLOW PREVENTION EQUIPMENT AS REQUIRED BY LOCAL CODES. PROVIDE AND INSTALL FULL FLOW FIRE METER OR DETECTOR CHECK METER IF REQUIRED.

F. THE SYSTEMS SHALL BE DESIGNED BY A LICENSED FIRE PROTECTION ENGINEER AND INSTALLED BY A LICENSED SPRINKLER CONTRACTOR.

G. COORDINATE ALL SCHEDULING AND WORK WITH OTHER TRADES SO AS TO PREVENT CONFLICTS, AND TO ENSURE ORDERLY PROGRESS OF THE WORK, WITH A MINIMUM OF DELAYS. WHERE SPRINKLER PIPING IS INSTALLED WITHOUT COORDINATING WITH OTHER TRADES AND CONFLICTS OCCUR, SPRINKLER PIPING SHALL BE RELOCATED AS REQUIRED AT NO ADDITIONAL COST TO THE OWNER TO RESOLVE THE CONFLICTS.

H. THE SYSTEMS SHALL BE DESIGNED BY A LICENSED FIRE

I. PROTECTION ENGINEER AND INSTALLED BY A LICENSED SPRINKLER CONTRACTOR.

J. WHERE PIPING PASSES THROUGH WALLS, FLOORS, CEILINGS, OR OTHER BUILDING CONSTRUCTION, SLEEVES MUST BE USED. WHERE EXPOSED PIPING PASSES THROUGH FINISH WORK, CHROME PLATED OR OTHER FINISH ACCEPTABLE TO THE ARCHITECT, SPLIT WALL PLATES OR ESCUTCHEONS SHALL BE INSTALLED TO FIT SNUGLY AROUND THE PIPING. WHERE FINISH IS NOT A PROBLEM SUITABLE PLATES SHALL BE PROVIDED AT EACH HOLE TO ASSURE EFFECTIVENESS OF CONSTRUCTION AS A FIRE STOP

K. SEAL ALL FIRE PROTECTION FLOOR, WALL AND ROOF PENETRATIONS WATERTIGHT AND WEATHERTIGHT. CAULK AROUND FIRE PROTECTION PENETRATIONS WITH 3M CP-25 FIRE BARRIER CAULK (THICKNESS AS REQUIRED AND RECOMMENDED BY MANUFACTURER) TO MAINTAIN FIRE RESISTANCE RATING OF FIRE-RATED ASSEMBLIES.

L. PROVIDE WET TYPE FIRE PROTECTION SYSTEM FOR SINGLE HATCHED AREAS AS SHOWN AT LEFT.

M. ROUTE PIPING CONCEALED ABOVE CEILING OR IN WALLS WHERE POSSIBLE. HEAD LAYOUT AND BRANCH PIPING SHALL BE SUBMITTED IN SHOP DRAWINGS.

N. BRANCH PIPING SHALL NOT BE TAPPED FROM STANDPIPE.

PLAN NOTES:

1 LOCATION OF EXISTING GARAGE WET AND DRY TYPE SPRINKLER SYSTEM AND STANDPIPE. EXISTING SERVICE SHALL BE REUSED, WITH NEW DETECTOR CHECK BACKFLOW PREVENTER AND NEW WET PIPE SYSTEM PROVIDED THROUGHOUT LOWER LEVELS. DRY SYSTEM VALVE, ZONE VALVES AND ALL DRY SYSTEM PIPING SERVING PARKING DECK LEVELS SHALL BE REPLACED UNDER SEPARATE CONTRACT AS PART OF GARAGE MAINTENANCE PACKAGE.

2 MODIFICATIONS TO THE EXISTING WET SPRINKLER SYSTEM TO BE DEVELOPED IN FUTURE TENENT FINISH

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CASEY JOHN STEPHENS
NUMBER
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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Garage Fire Protection Plan

FP1.01-G1

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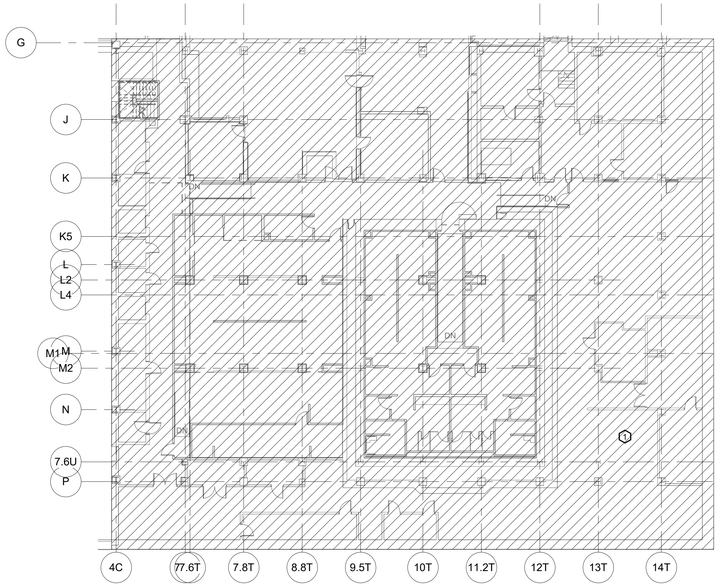
GENERAL NOTES:

A. REFERENCE SHEET FP1.01-G1 FOR FIRE PROTECTION GENERAL NOTES.

PLAN NOTES:

1 200 HP FIRE PUMP WITH DELTA WYE STARTER LOCATED HERE.



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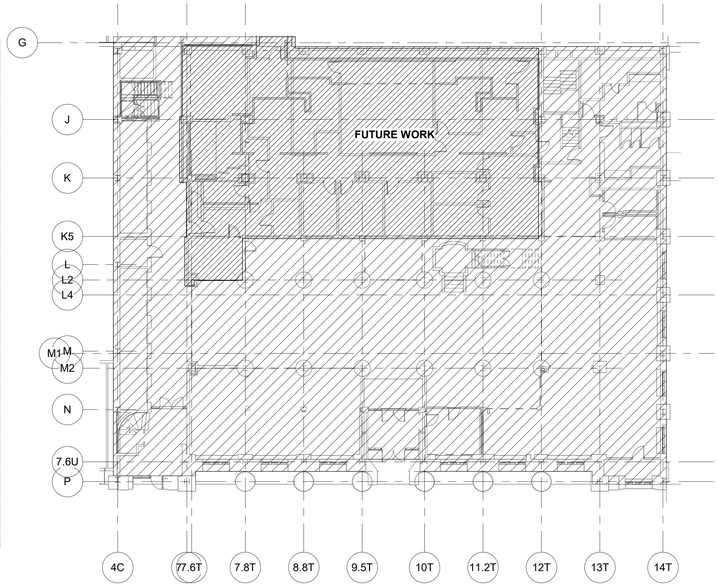
1 TOWER BASEMENT ZONE 1 FIRE PROTECTION PLAN

Scale: 1/16" = 1'-0"



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2 TOWER FIRST ZONE 1 FIRE PROTECTION PLAN

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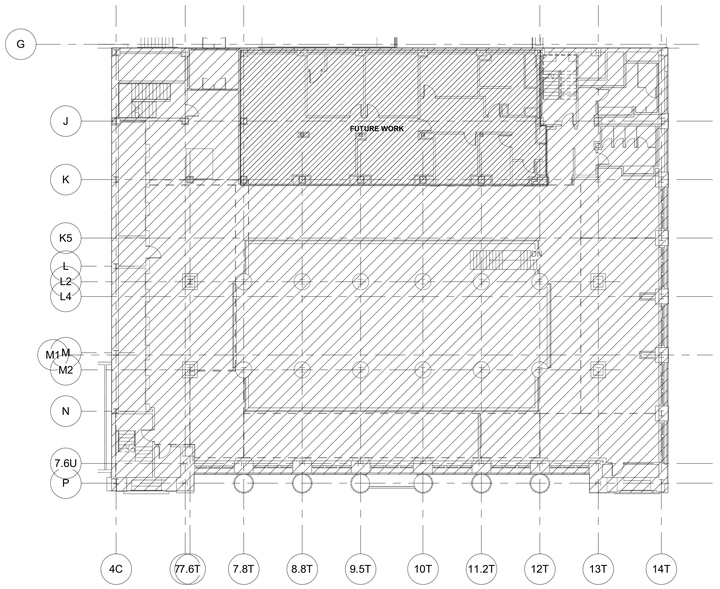

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3 TOWER SECOND ZONE 1 FIRE PROTECTION PLAN

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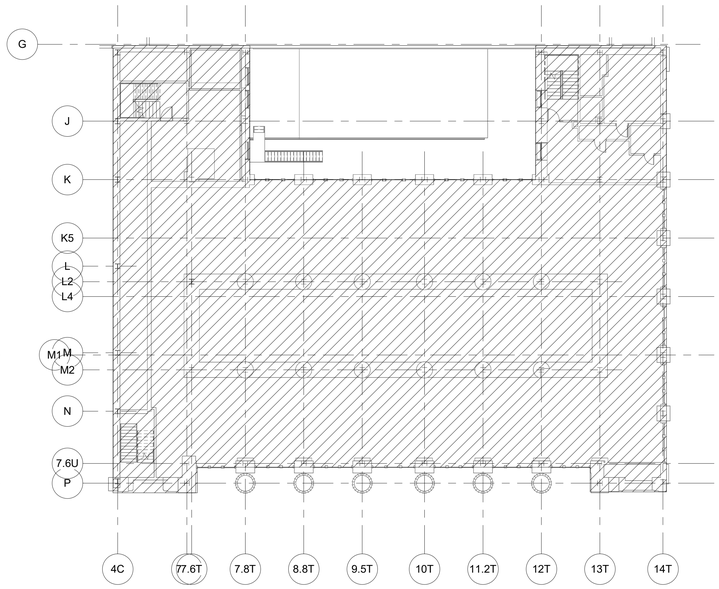

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4 TOWER THIRD 'B' ZONE 1 FIRE PROTECTION PLAN

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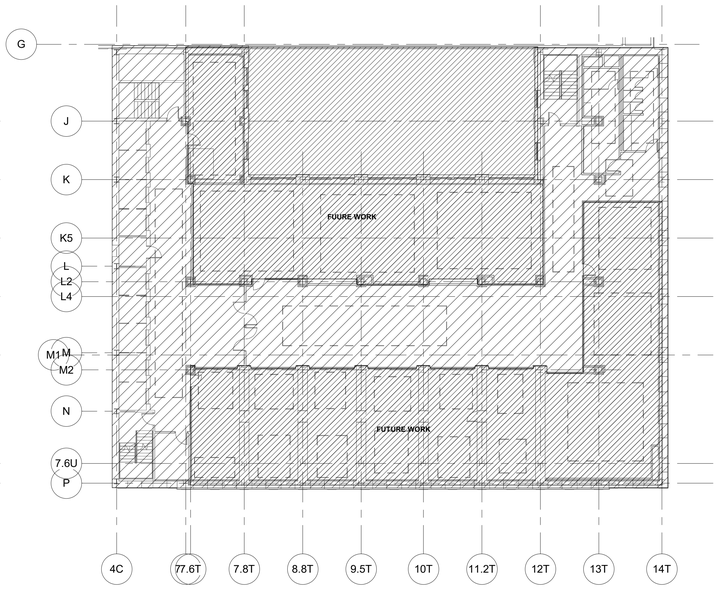

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5 TOWER FOURTH ZONE 1 FIRE PROTECTION PLAN

Scale: 1/16" = 1'-0"

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Tower - Fire Protection Plan

FP1.01-T

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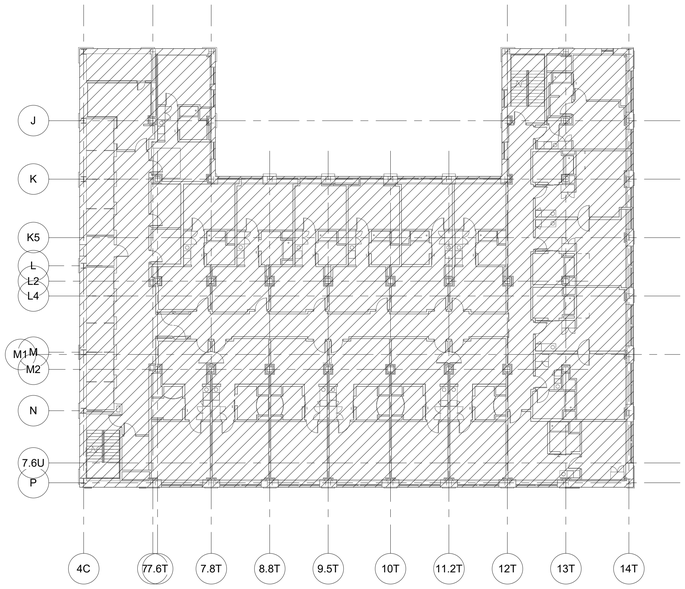
GENERAL NOTES:

A. REFERENCE SHEET FP1.01-G1 FOR FIRE PROTECTION GENERAL NOTES.

(F) PLAN NOTES:



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1 TOWER 5TH ZONE 2 FIRE PROTECTION PLAN

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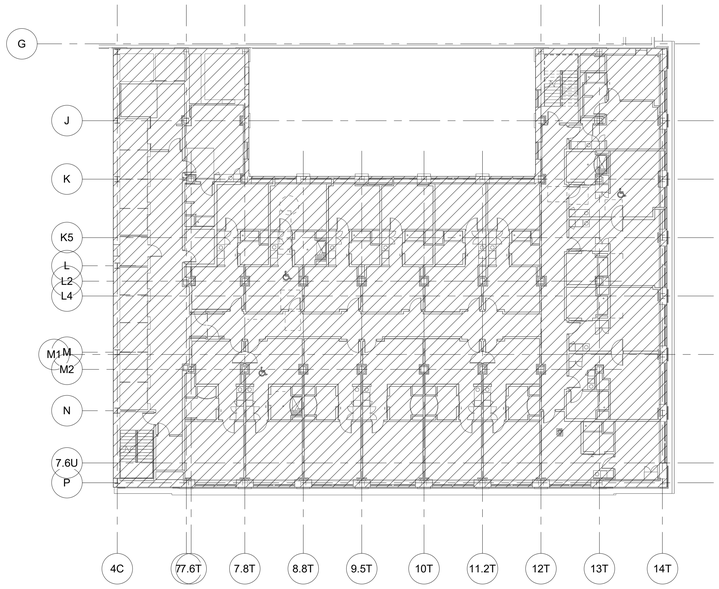

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2 TOWER 6TH-9TH ZONE 2 FIRE PROTECTION PLAN

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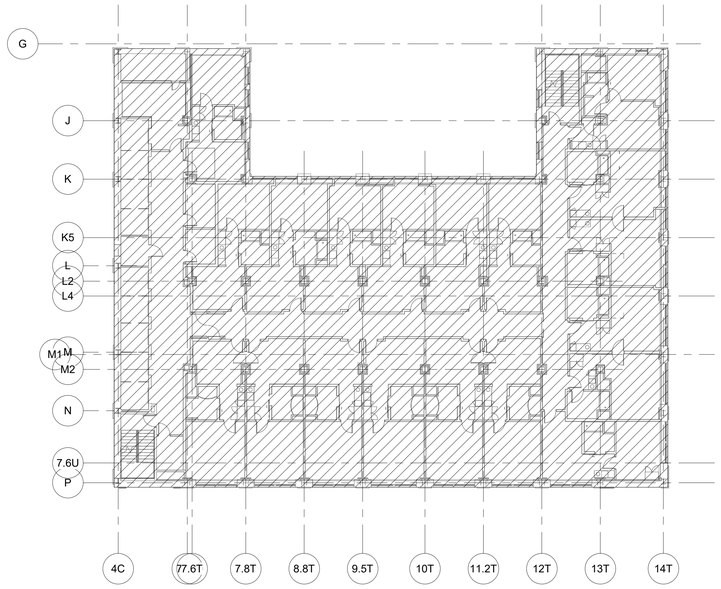

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3 TOWER 10TH ZONE 2 FIRE PROTECTION PLAN

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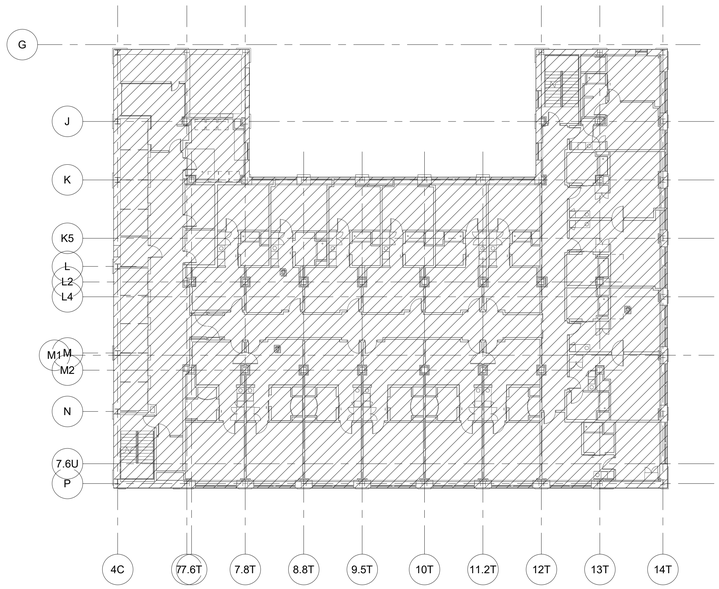

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4 TOWER 11TH ZONE 3 FIRE PROTECTION PLAN

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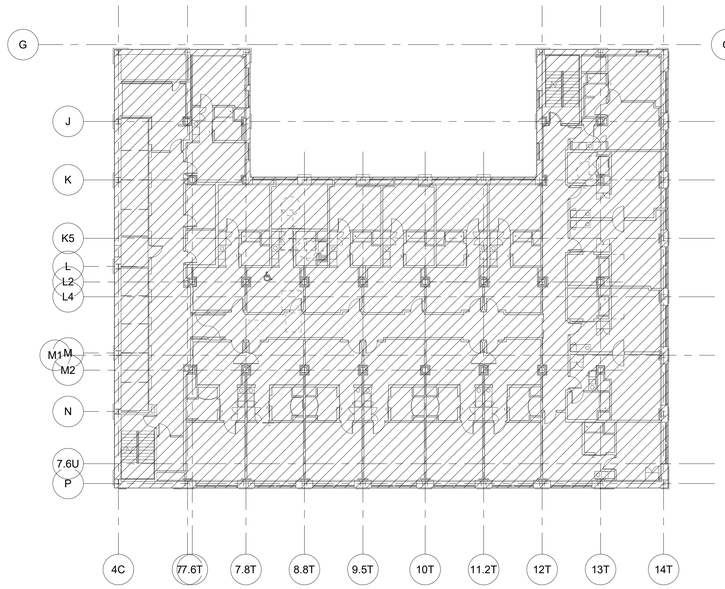

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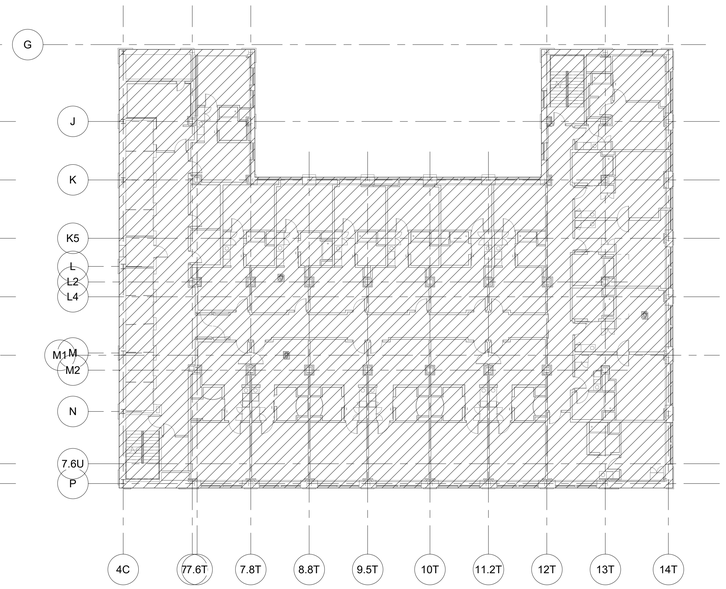
5 TOWER 12TH-16TH ZONE 3 FIRE PROTECTION PLAN

Scale: 1/16" = 1'-0"



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6 TOWER 17TH ZONE 3 FIRE PROTECTION PLAN

Scale: 1/16" = 1'-0"

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Issue Date: September 8, 2020

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Rev. #	Revision Description	Issue Date

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Shawnee, Kansas 66217
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H&B PROJECT NUMBER : 1820630

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Tower - Fifth- Nineteenth Floor Fire Protection Plan

FP1.01-T5

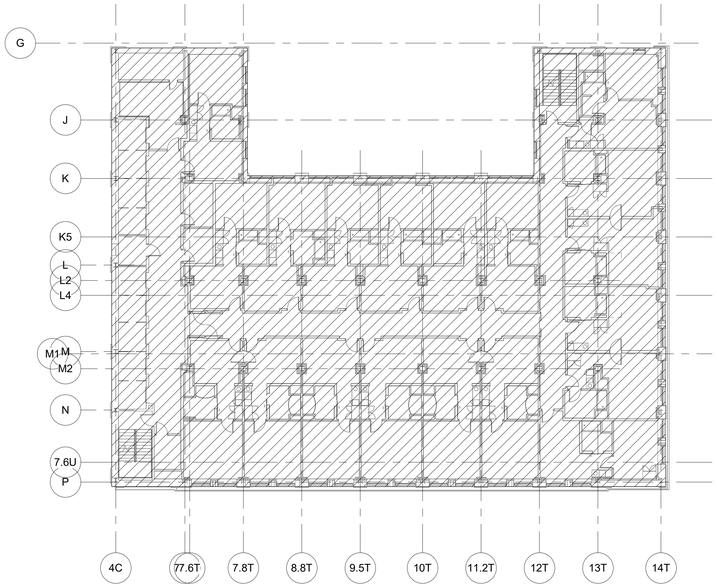
F:\1820630 - Grand Reserve Hotel\ Revit\Users\Raul\1820630_The Grand Reserve MPE_RCAB_R20.rvt

9/8/2020 11:38:07 AM

GENERAL NOTES:

A. REFERENCE SHEET FP1.01-G1 FOR FIRE PROTECTION GENERAL NOTES.

PLAN NOTES:



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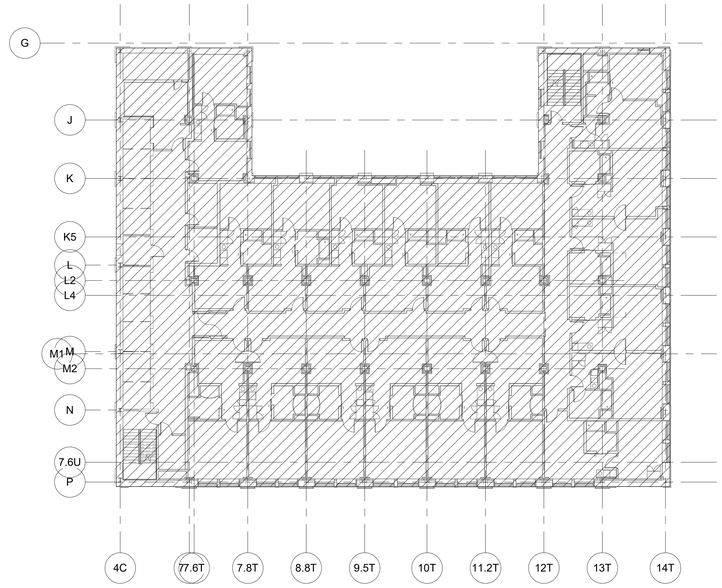
1 TOWER 18TH ZONE 4 FIRE PROTECTION PLAN

Scale: 1/16" = 1'-0"



N

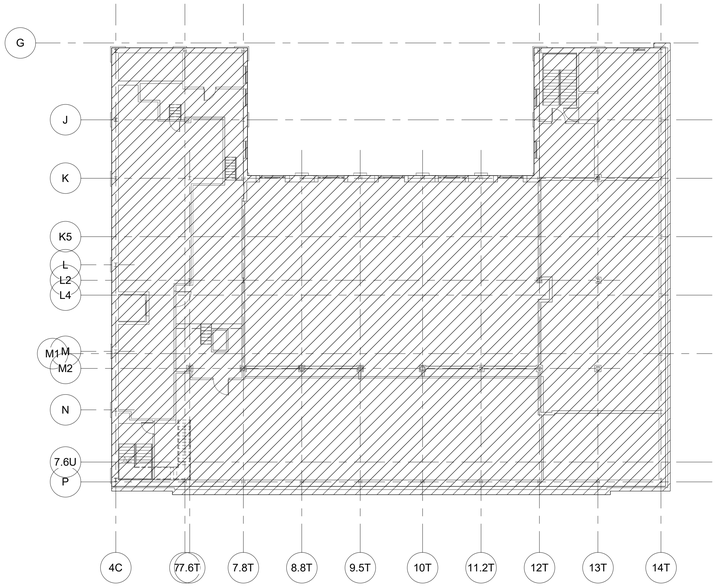
2 TOWER 19TH ZONE 4 FIRE PROTECTION PLAN

Scale: 1/16" = 1'-0"

N

3 TOWER 20TH ZONE 4 FIRE PROTECTION PLAN

Scale: 1/16" = 1'-0"



N

4 TOWER 21ST ZONE 4 FIRE PROTECTION PLAN

Scale: 1/16" = 1'-0"

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STATE OF MISSOURI
CASEY JOHN STONE
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Tower - Twentieth Floor Fire Protection Plan

FP1.01-T20

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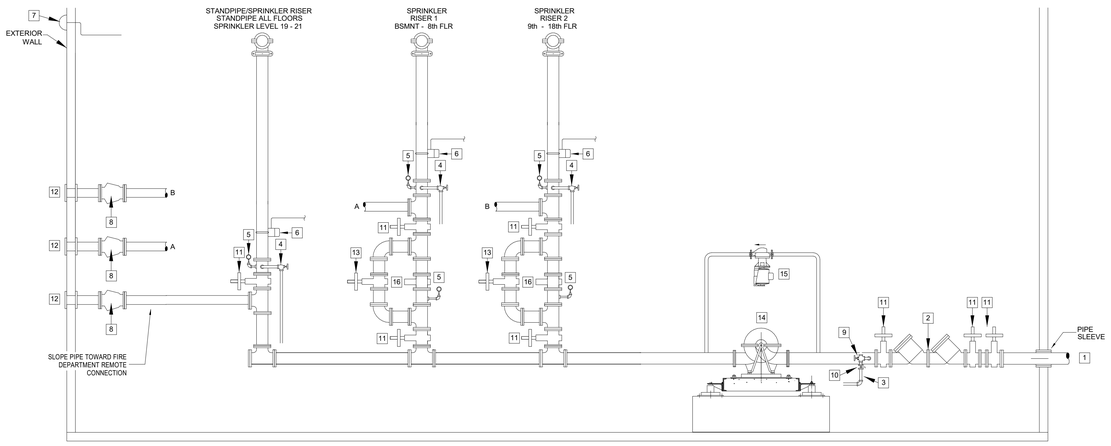
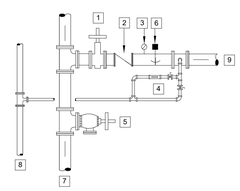


KEY:

1. 8" FIRE PROTECTION SERVICE
2. DOUBLE CHECK VALVE
3. MAIN DRAIN TO FLOOR DRAIN
4. TEST & DRAIN PRESSURE GAUGE. DRAIN TO FLOOR DRAIN
5. PRESSURE GAUGE
6. FLOW SWITCH CONNECTED TO FIRE ALARM SYSTEM
7. FIRE ALARM A/V UNIT
8. BALL DRIP CHECK VALVE
9. MAIN DRAIN VALVE
10. SHUT-OFF VALVE, TYP.
11. SUPERVIZED OS&Y VALVES
12. FIRE DEPARTMENT CONNECTION TWO PER ZONE PER NFPA 14, 7.12.2
13. NORMALLY CLOSED SUPERVISED OS&Y VALVE
14. FIRE PUMP
15. JOCKEY PUMP
16. UL/FM PRESSURE REDUCING VALVE WITH PRESSURE RELIEF VAVLE

03 Fire Protection Service Entrance

Scale: None

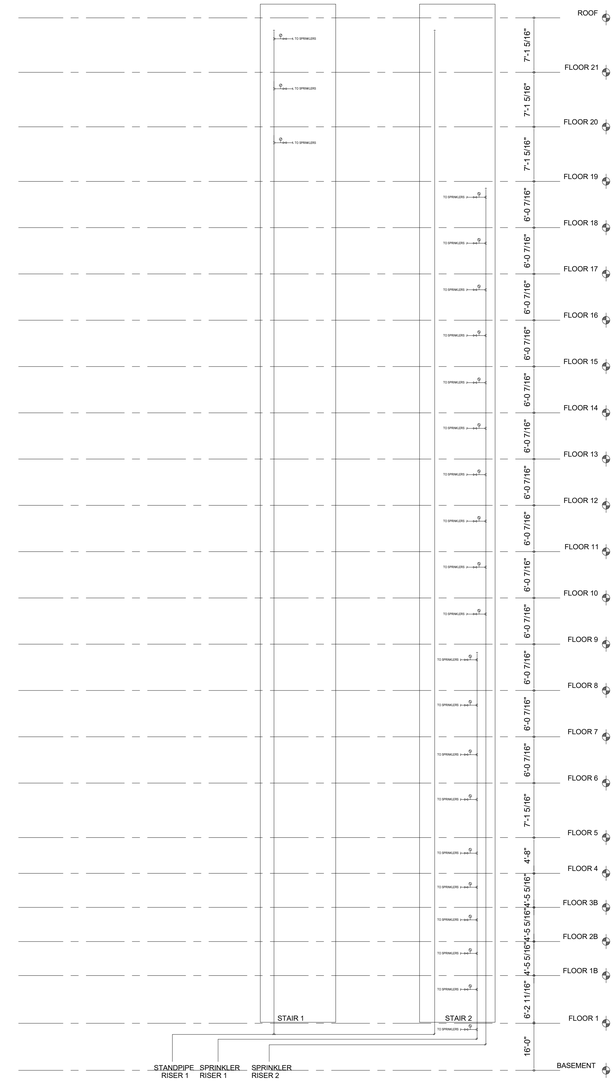


KEY:

1. INDICATING-TYPE FLOOR VALVE WITH SUPERVISORY SWITCH
2. CHECK VALVE
3. PRESSURE GUAGE
4. INSPECTORS TEST AND DRAIN CONNECTION
5. CLASS I FIRE HOSE VALVE - 2-1/2" VALVE WITH 1-1/2" REDUCER AND CAP
6. FLOW SWITCH CONNECTED TO FIRE ALARM SYSTEM
7. COMBINATION SPRINKLER/STANDPIPE OR SPRINKLER RISER
8. DRAIN RISER
9. TO FLOOR SPRINKLER SYSTEM

02 SPRINKLER RISER FLOOR BRANCH

Scale: None



01 SPRINKLER/STANDPIPE RISER

Scale: None

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Fire Protection Details

FP5.01

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9/8/2020 11:38:25 AM

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND INDICATE THE GENERAL EXTENT OF THE WORK. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL PULL BOXES, JUNCTION BOXES AND INCIDENTAL MATERIALS AND LABOR FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.

B. ELECTRICAL CONTRACTOR SHALL DERATE CONDUCTORS AS REQUIRED BY THE N.E.C. WHEN GROUPED IN COMMON RACEWAYS.

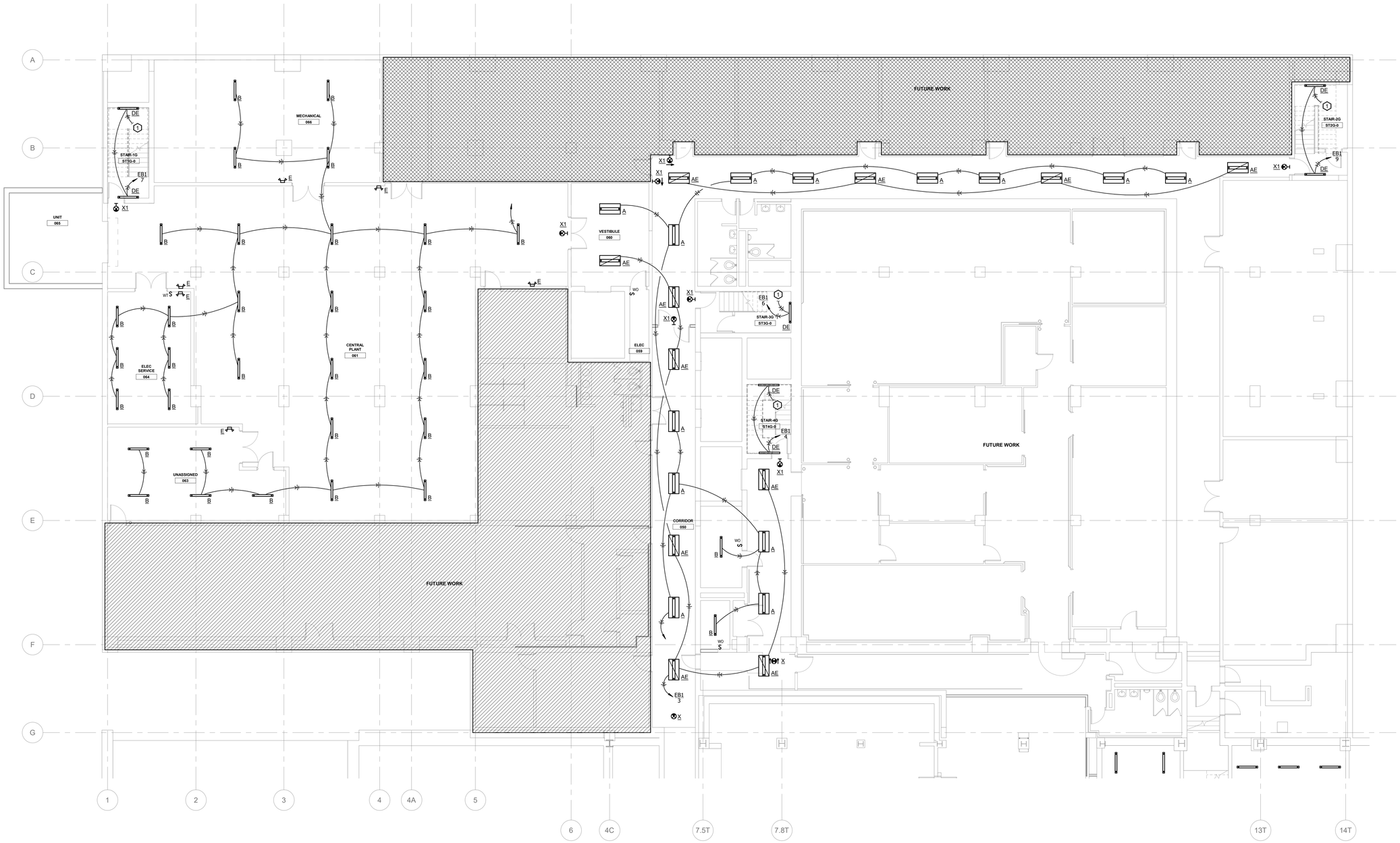
C. COORDINATE THE EXACT LIGHT FIXTURE LOCATIONS WITH THE ARCHITECTURAL DRAWINGS.

D. ALL WIRES RUN BELOW GRADE, IN CONCRETE THAT IS IN DIRECT CONTACT WITH THE EARTH, OR MASONRY THAT IS IN DIRECT CONTACT WITH THE EARTH SHALL BE WET LOCATION LISTED.

E. PROVIDE SEPARATE NEUTRALS FOR DIMMING CIRCUITS.

PLAN NOTES:

1 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.



1 GARAGE BASEMENT FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Garage Basement Floor Lighting Plan

E1.01-G

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9/8/2020 11:38:31 AM

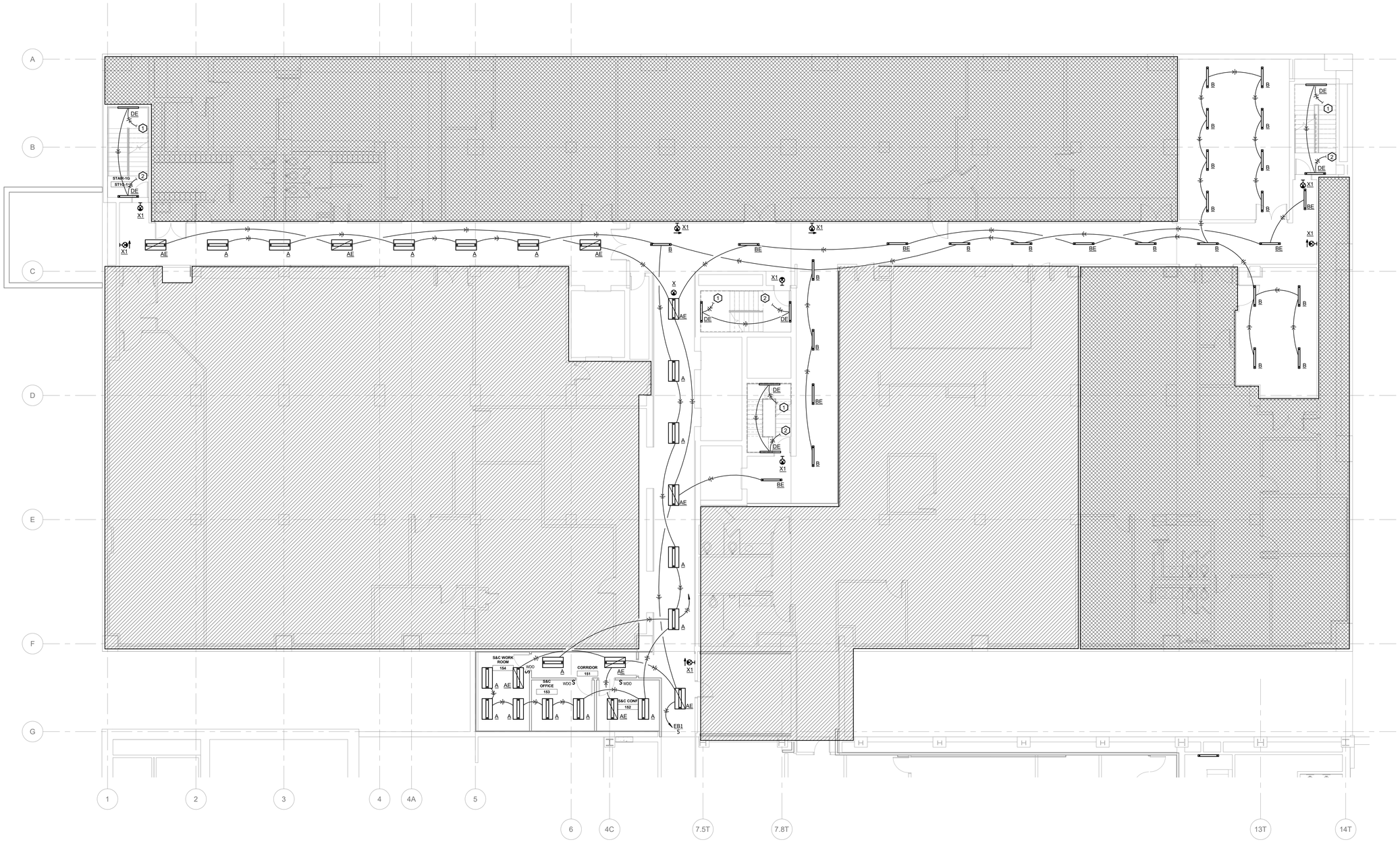
GENERAL NOTES:

A. REFERENCE SHEET E1.01-G FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

2 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW



1 GARAGE GROUND FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

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CERTIFICATION

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The Grand Reserve

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Garage Ground Floor Lighting Plan

E1.01-G1

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9/8/2020 11:38:36 AM

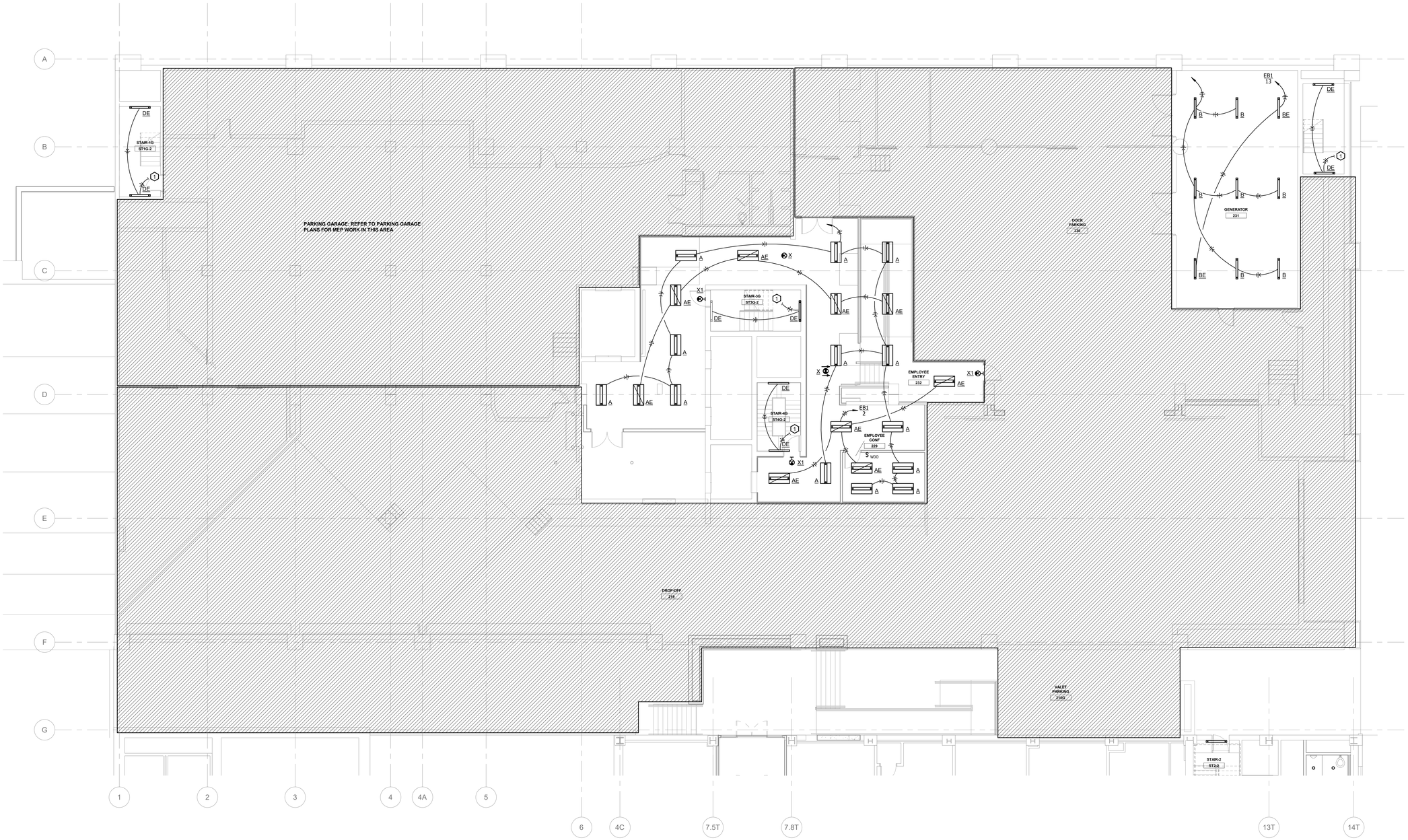
GENERAL NOTES:

A. REFERENCE SHEET E1.01-G FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

2 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW



1 GARAGE DOCK FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

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CASEY JOHN STEVENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Garage Dock Floor Lighting Plan

E1.01-G2

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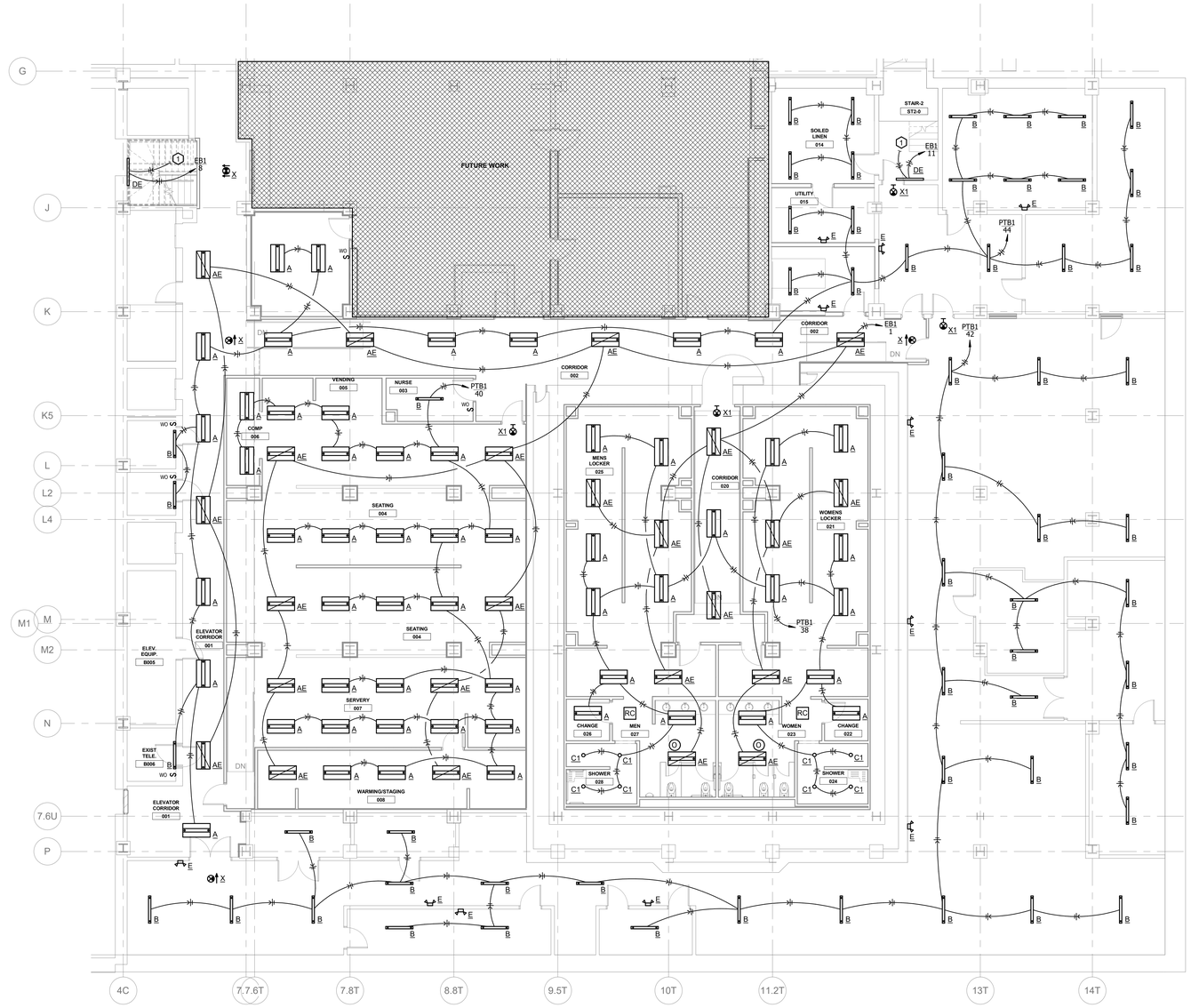
GENERAL NOTES:

A. REFERENCE SHEET E1.01-G FOR LIGHTING GENERAL NOTES.

PLAN NOTES:



1 TOWER BASEMENT FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

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9/8/2020

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Tower - Basement Floor Lighting Plan

E1.01-T

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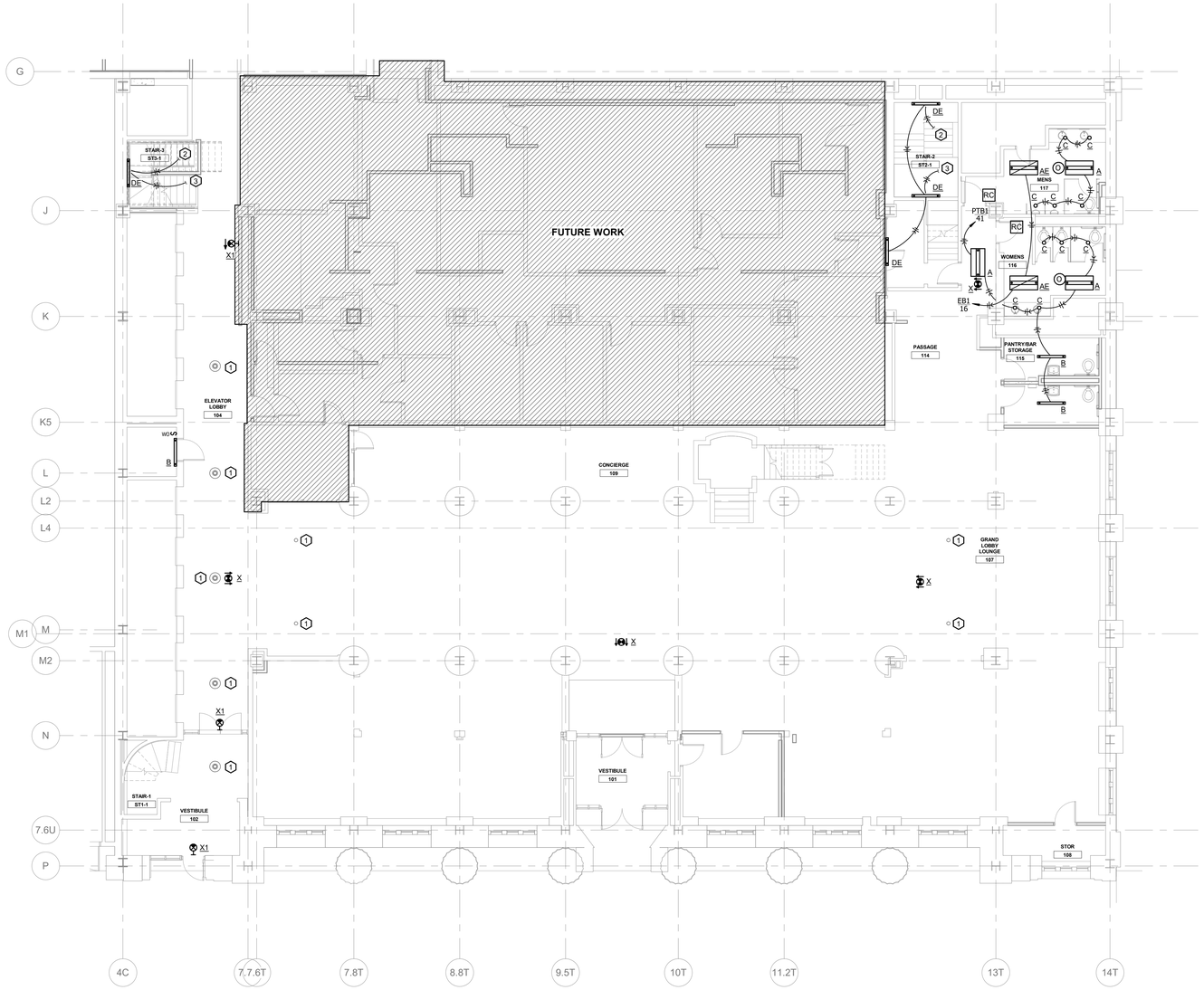

1 TOWER FIRST FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E1.01-G FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 EXISTING FIXTURES TO BE RETAINED. RECONNECT TO NEAREST AVAILABLE 277V PANELBOARD. TERMINATE ON A SPARE 20A, SINGLE POLE CIRCUIT BREAKER.

2 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

3 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW.

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CASEY JOHN STONE
NUMBER
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PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
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REVISION SCHEDULE		
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H&B PROJECT NUMBER : 182063

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Tower - First Floor Lighting Plan

E1.01-T1

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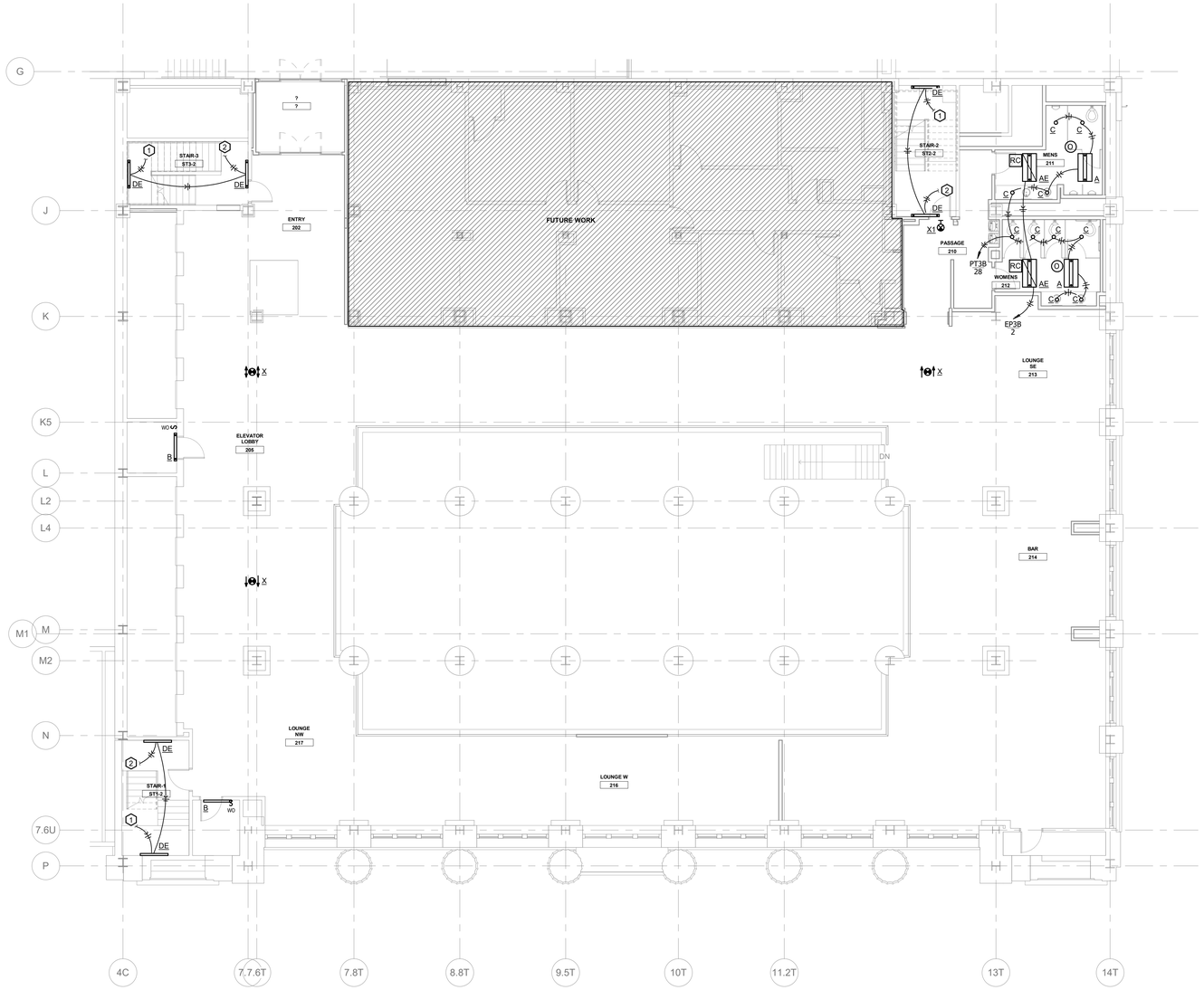

1 TOWER SECOND FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E1.01-G FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

2 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW.

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STATE OF MISSOURI
CASEY JOHN STEINER
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

H&B ENGINEERS
HOSS & BROWN

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913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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Tower - Second Floor Lighting Plan

E1.01-T2

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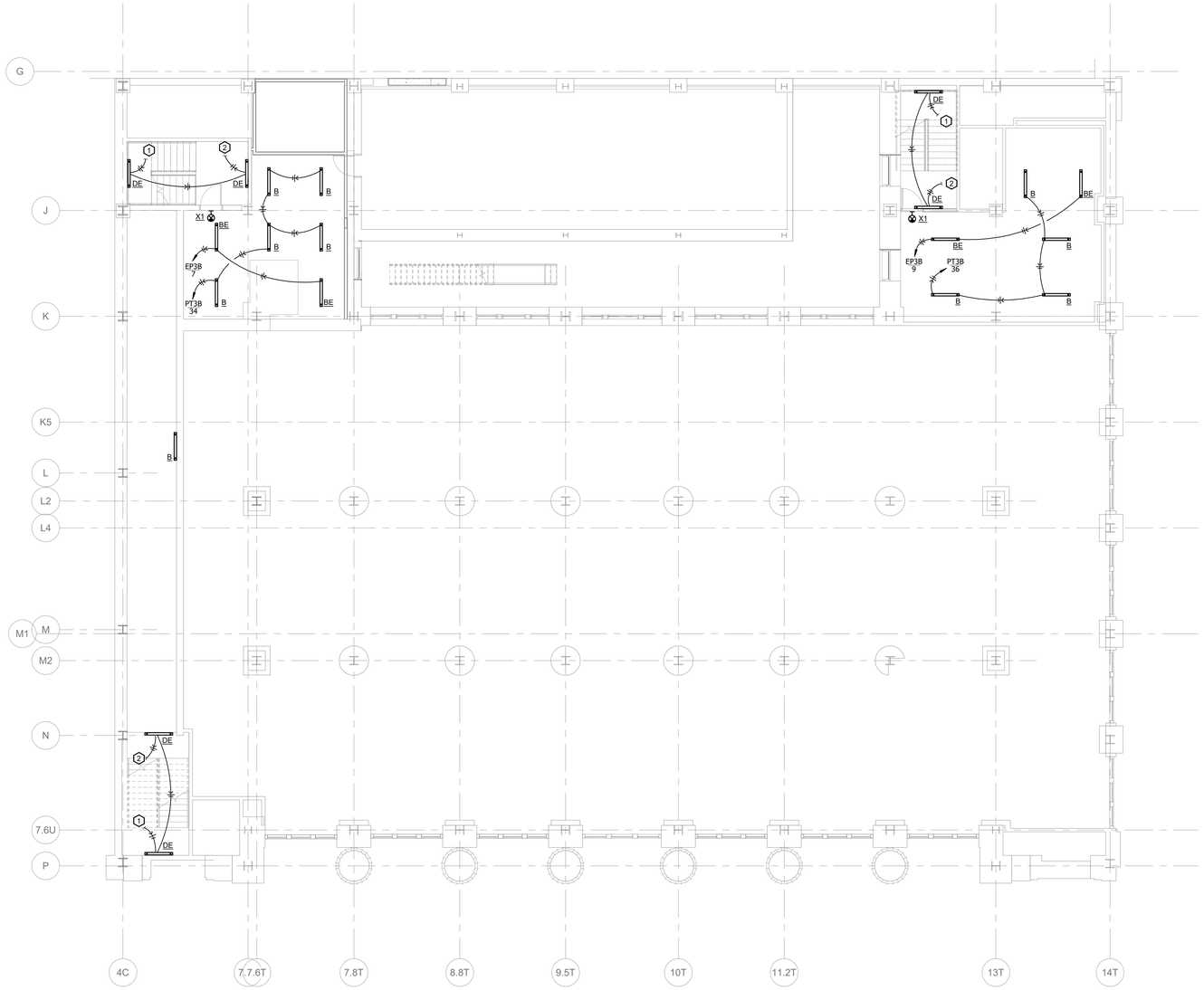

1 TOWER THIRD 'A' FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E1.01-G FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

2 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW

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STATE OF MISSOURI
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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

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REVISION SCHEDULE		
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Tower - Third A Floor Lighting Plan

E1.01-T3A

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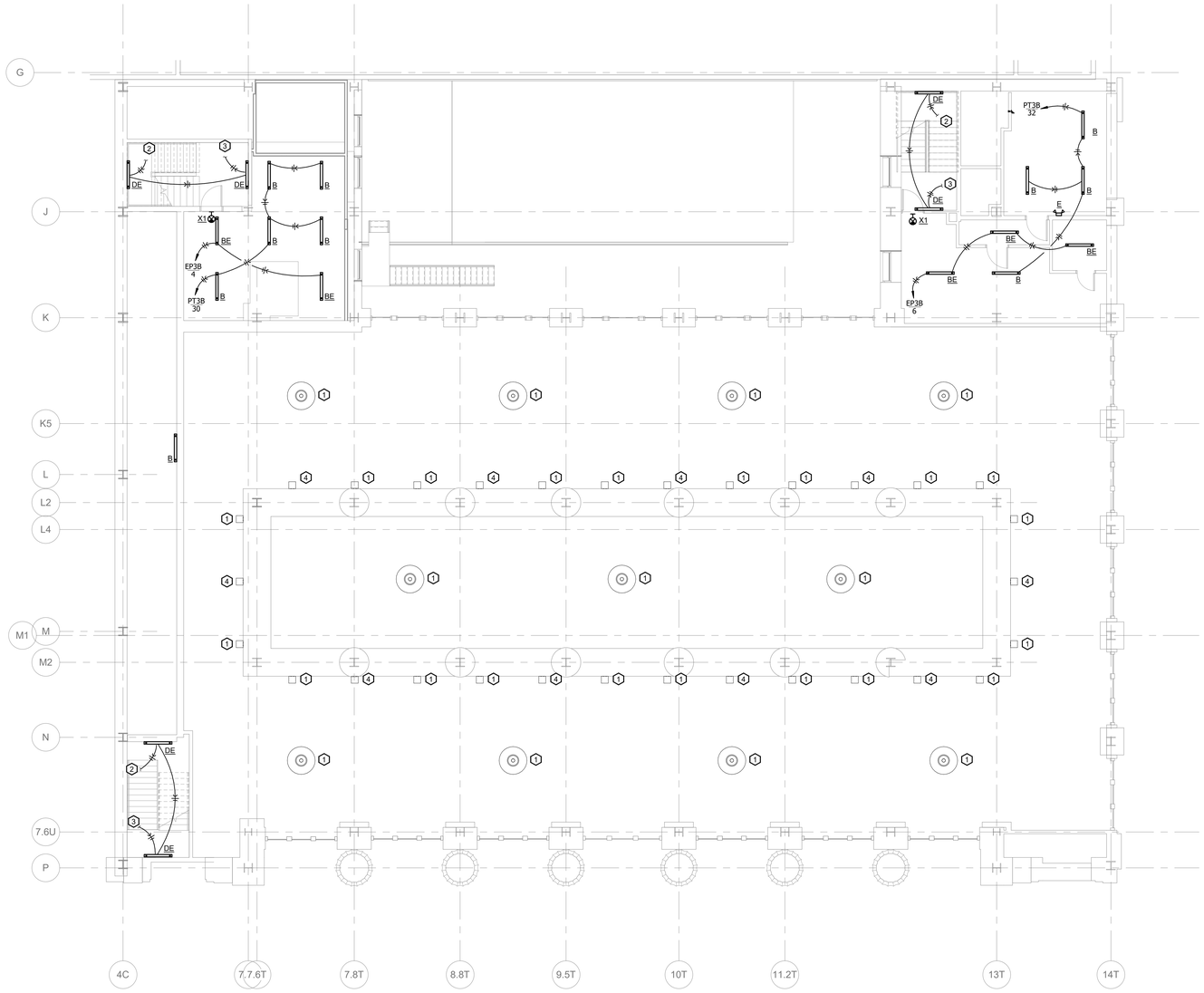

1 TOWER THIRD 'B' FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E1.01-G FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1. EXISTING FIXTURES TO BE RETAINED. RECONNECT TO NEAREST AVAILABLE 120V PANELBOARD. TERMINATE ON A SPARE 20A, SINGLE POLE CIRCUIT BREAKER.
2. CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.
3. CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW
4. EXISTING FIXTURES TO BE RETAINED. RECONNECT TO PANELBOARD 'EP3B AND TERMINATE ON A SPARE 20A, SINGLE POLE CIRCUIT BREAKER.

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
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Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
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Tower - Third B Floor Lighting Plan

E1.01-T3B

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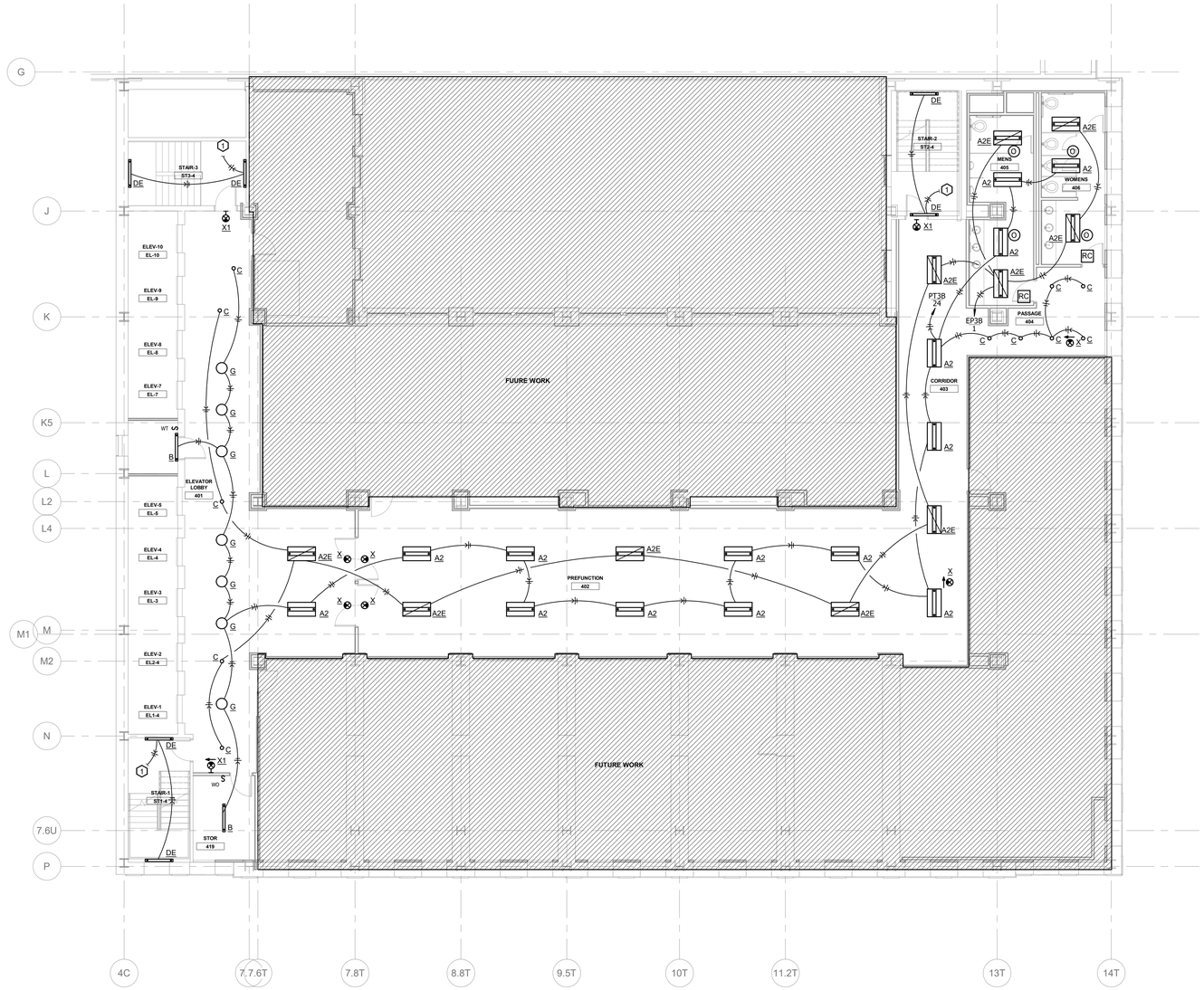

1 TOWER FOURTH FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E1.01-G FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW

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STATE OF MISSOURI
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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
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Tower - Fourth Floor Lighting Plan

E1.01-T4

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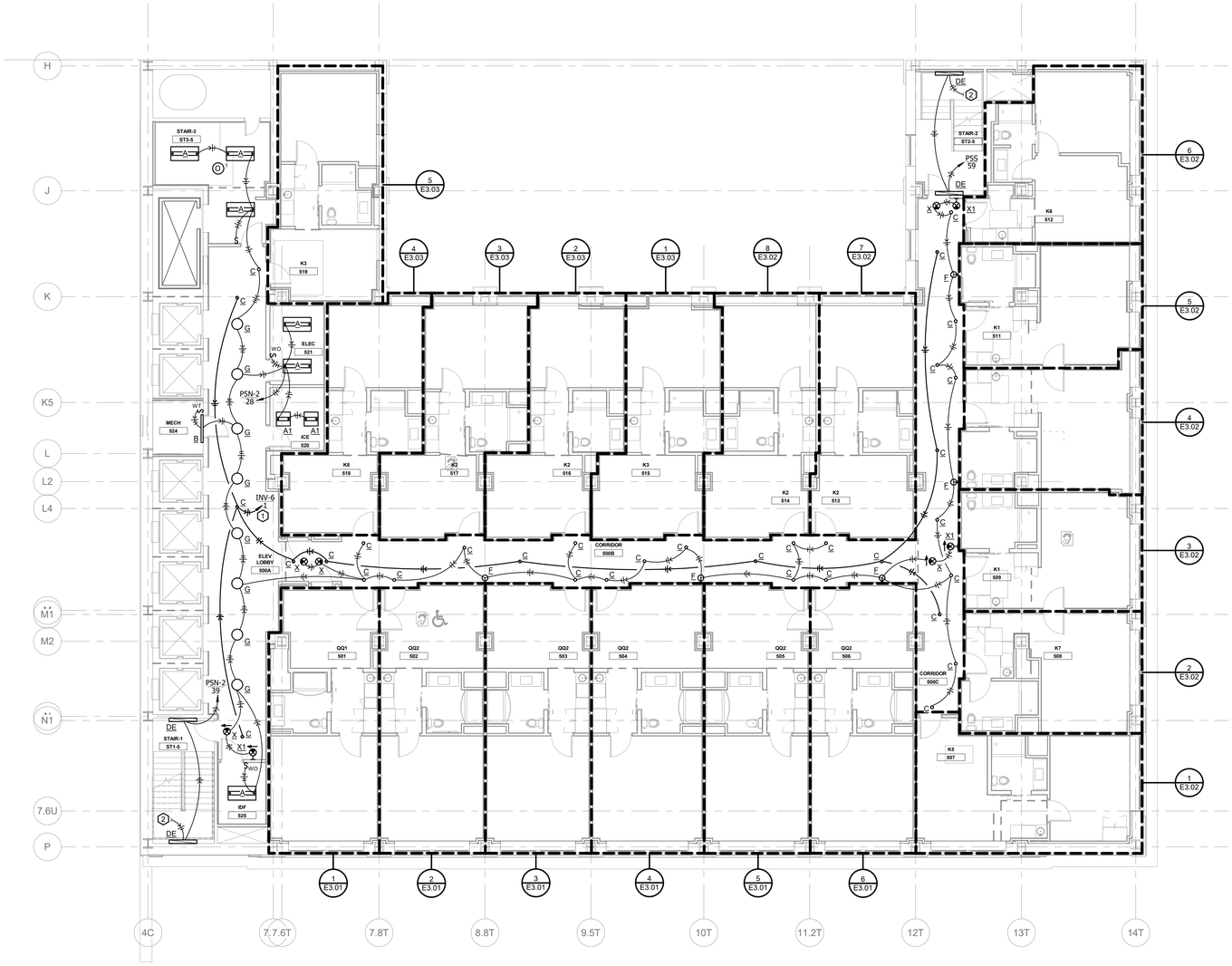

1 FIFTH FLOOR PLAN LIGHTING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND INDICATE THE GENERAL EXTENT OF THE WORK. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL PULL BOXES, JUNCTION BOXES AND INCIDENTAL MATERIALS AND LABOR FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.

B. ELECTRICAL CONTRACTOR SHALL DERATE CONDUCTORS AS REQUIRED BY THE N.E.C. WHEN GROUPED IN COMMON RACEWAYS.

C. COORDINATE THE EXACT LIGHT FIXTURE LOCATIONS WITH THE ARCHITECTURAL DRAWINGS.

D. ALL WIRES RUN BELOW GRADE, IN CONCRETE THAT IS IN DIRECT CONTACT WITH THE EARTH, OR MASONRY THAT IS IN DIRECT CONTACT WITH THE EARTH SHALL BE WET LOCATION LISTED.

E. PROVIDE SEPARATE NEUTRALS FOR DIMMING CIRCUITS.

PLAN NOTES:

1 ROUTE HOMERUN TO DESIGNATED INVERTER AND TERMINATE ON 20A/1P OUTPUT CIRCUIT BREAKER. REFERENCE SIXTH FLOOR PLAN LIGHTING FOR INVERTER LOCATION.

2 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
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Tower - Fifth Floor Plan Lighting

E1.01-T5

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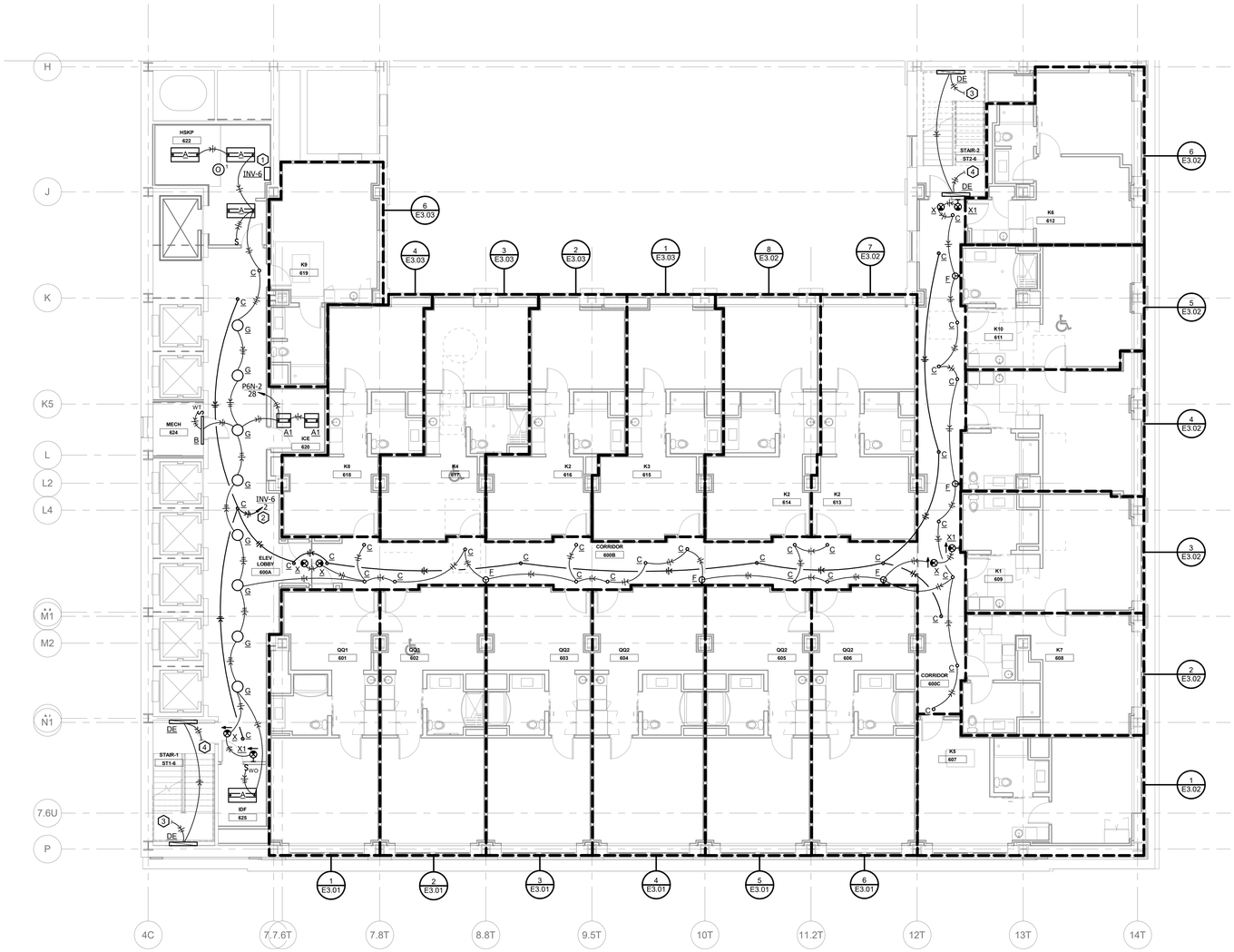

1 SIXTH FLOOR PLAN LIGHTING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E101 FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 PROVIDE 525VA, WALL MOUNTED EMERGENCY LIGHTING INVERTER EQUAL TO DUAL-LITE # DLS-525-120-A2004. INSTALL ON THIS FLOOR FOR EMERGENCY LIGHT FIXTURES ON FLOORS 5TH THROUGH 8TH.

2 ROUTE HOMERUN TO DESIGNATED INVERTER AND TERMINATE ON 20A/1P OUTPUT CIRCUIT BREAKER.

3 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

4 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW.

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
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Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
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Tower - Sixth Floor Plan Lighting

E1.01-T6

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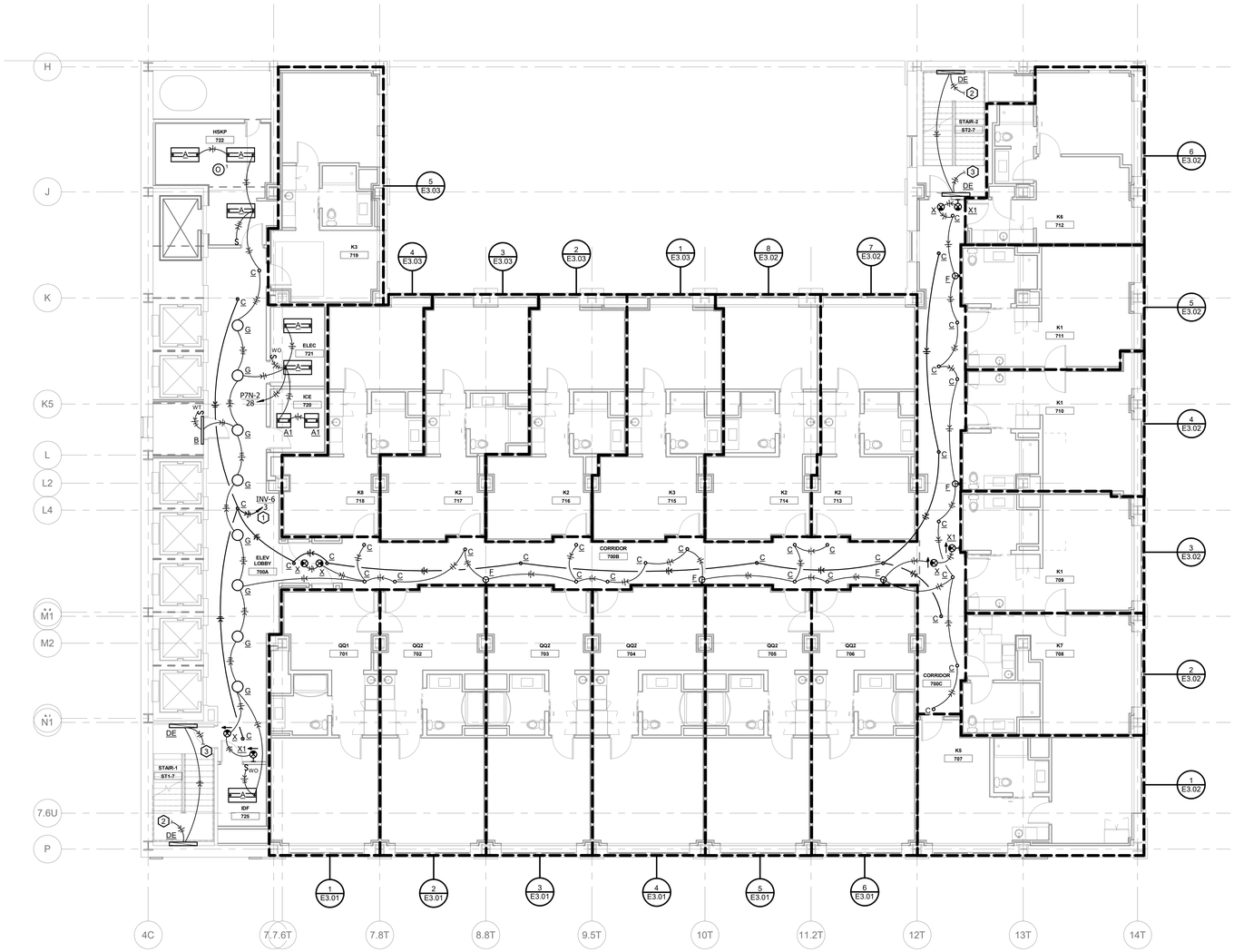

1 SEVENTH FLOOR PLAN LIGHTING (TYPICAL FLOOR 10,13,16,19)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E101 FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 ROUTE HOMERUN TO DESIGNATED INVERTER AND TERMINATE ON 20A/1P OUTPUT CIRCUIT BREAKER. REFERENCE SIXTH FLOOR PLAN LIGHTING FOR INVERTER LOCATION.

2 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

3 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW.

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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Tower - Seventh Floor Plan Lighting

E1.01-T7

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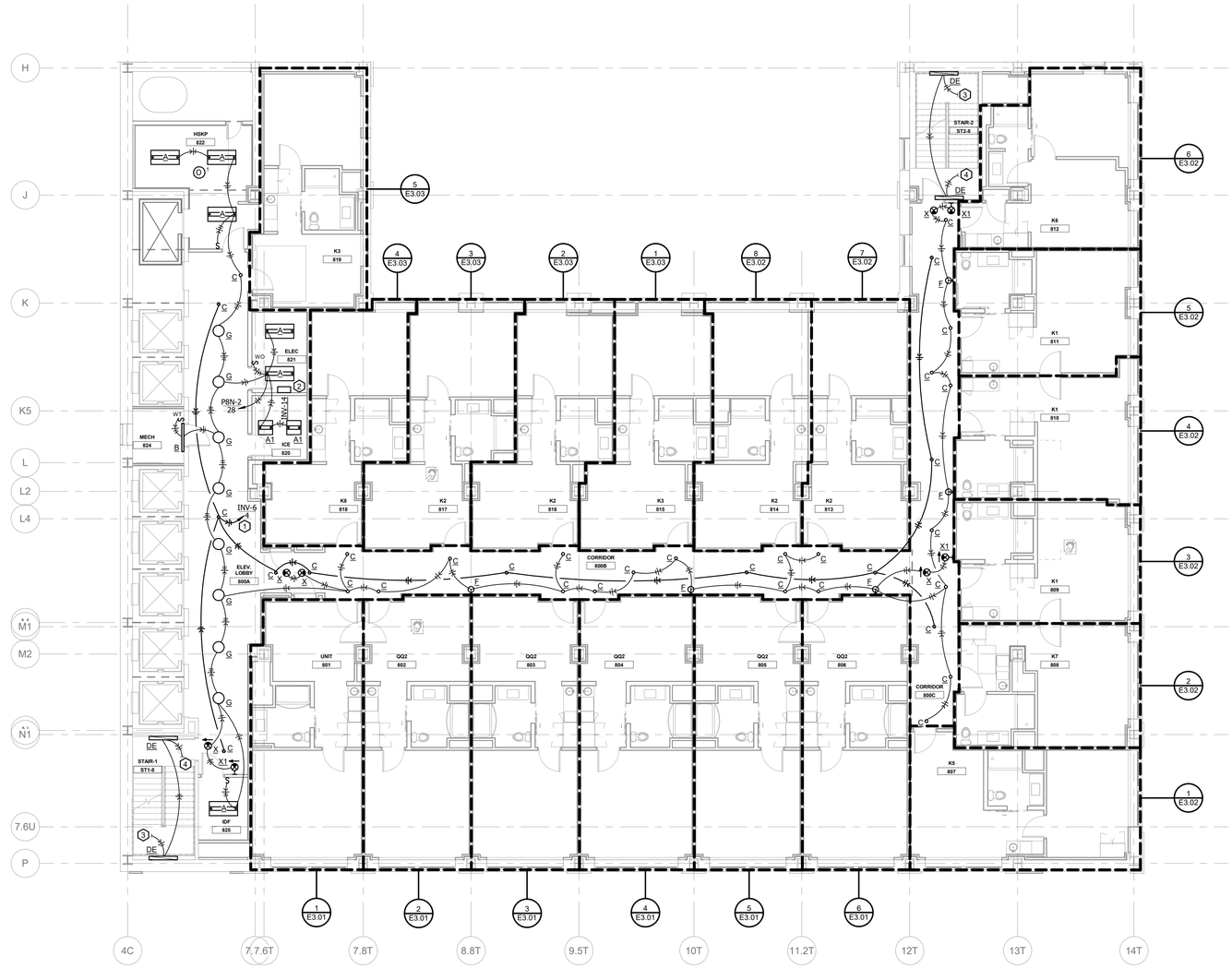

1 EIGHTH FLOOR PLAN LIGHTING (TYPICAL FLOOR 14,17)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E101 FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 ROUTE HOMERUN TO DESIGNATED INVERTER AND TERMINATE ON 20A/1P OUTPUT CIRCUIT BREAKER. REFERENCE SIXTH FLOOR PLAN LIGHTING FOR INVERTER LOCATION.

2 PROVIDE 525VA, WALL MOUNTED EMERGENCY LIGHTING INVERTER EQUAL TO DUAL-LITE # DLS-525-120-A2004. INSTALL ON 14TH FLOOR FOR EMERGENCY LIGHTING FIXTURES ON FLOORS 13TH THROUGH 16TH.

3 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

4 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW.

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CERTIFICATION

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The Grand Reserve

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Tower - Eighth Floor Plan Lighting

E1.01-T8

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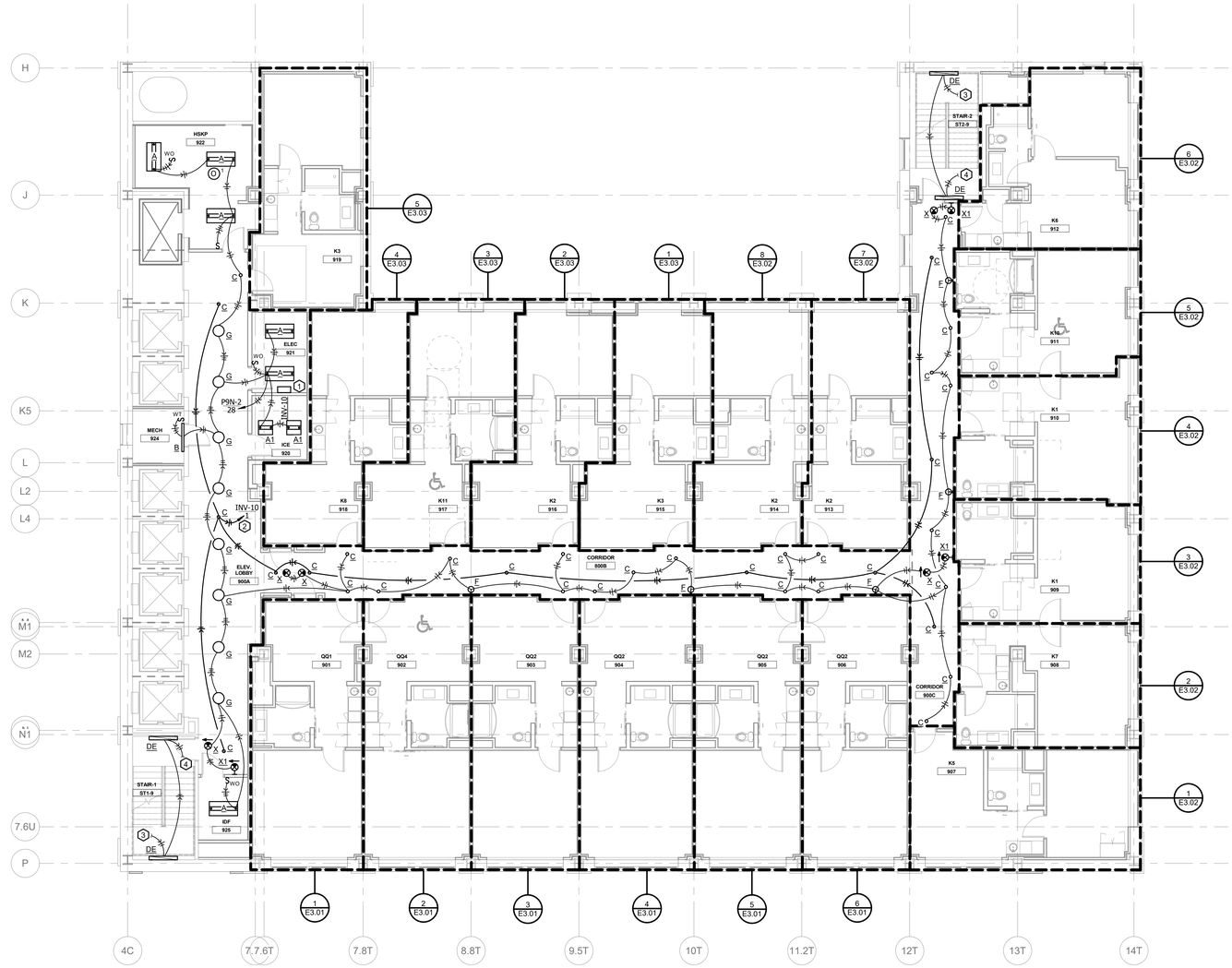

1 NINTH FLOOR PLAN LIGHTING (TYPICAL FLOOR 12,15)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E101 FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1. PROVIDE 525VA, WALL MOUNTED EMERGENCY LIGHTING INVERTER EQUAL TO DUAL-LITE # DLS-525-120-A200A. INSTALL ON 10TH FLOOR FOR EMERGENCY LIGHTING FIXTURES ON FLOORS 9TH THROUGH 12TH.
2. ROUTE HOMERUN TO DESIGNATED INVERTER AND TERMINATE ON 20A/1P OUTPUT CIRCUIT BREAKER. REFERENCE SIXTH FLOOR PLAN LIGHTING FOR INVERTER LOCATION.
3. CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.
4. CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW.

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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Tower - Ninth Floor Plan Lighting

E1.01-T9

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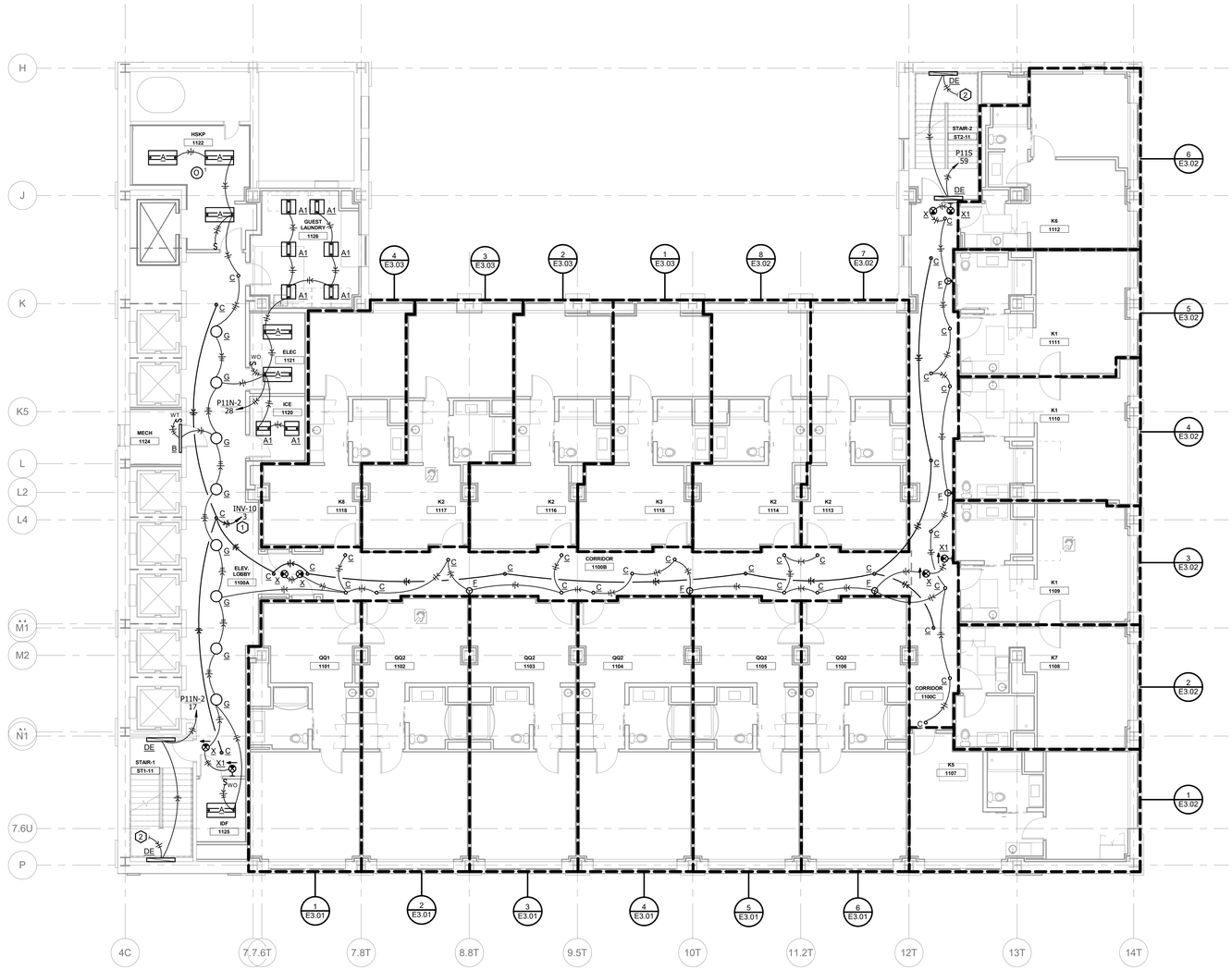

1 ELEVENTH FLOOR PLAN LIGHTING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E101 FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 ROUTE HOMERUN TO DESIGNATED INVERTER AND TERMINATE ON 20A/1P OUTPUT CIRCUIT BREAKER. REFERENCE SIXTH FLOOR PLAN LIGHTING FOR INVERTER LOCATION.

2 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

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STATE OF MISSOURI
CASEY JOHN STONE
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

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Tower - Eleventh Floor Plan Lighting

E1.01-T11

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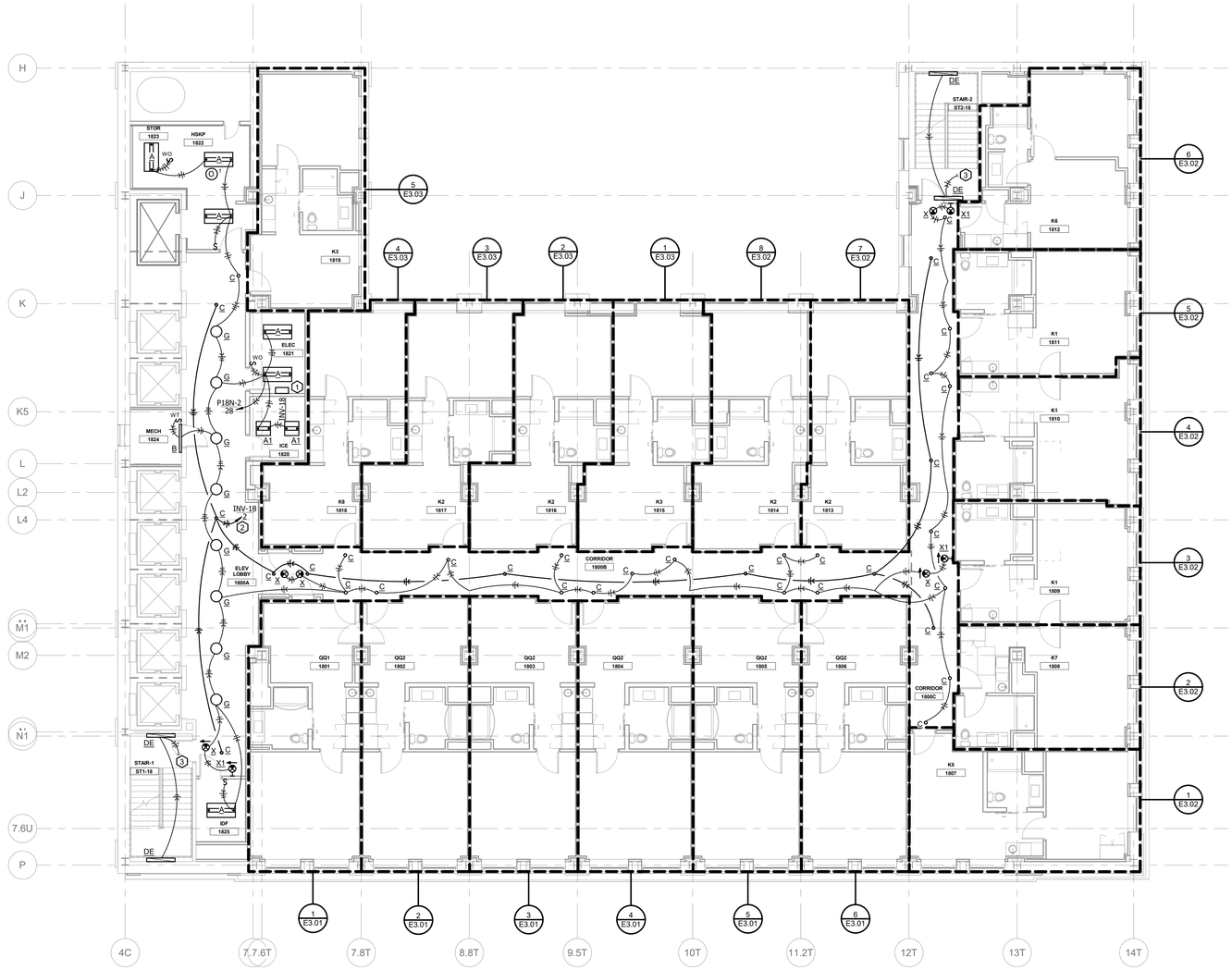

1 EIGHTEENTH FLOOR PLAN LIGHTING

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E101 FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 PROVIDE 525VA, WALL MOUNTED EMERGENCY LIGHTING INVERTER EQUAL TO DUAL-LITE # DLS-525-120-A2004. INSTALL ON THIS FLOOR FOR EMERGENCY LIGHTING FIXTURES ON FLOORS 17TH THROUGH 19TH.

2 ROUTE HOMERUN TO DESIGNATED INVERTER AND TERMINATE ON 20A/1P OUTPUT CIRCUIT BREAKER. REFERENCE SIXTH FLOOR PLAN LIGHTING FOR INVERTER LOCATION.

3 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW.

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9/8/2020

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Tower - Eighteenth Floor Plan Lighting

E1.01-T18

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1 TOWER TWENTIETH FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E1.01-G FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 CIRCUIT FROM STAIRWELL LIGHTING ON LEVEL ABOVE.

2 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW

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NUMBER
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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

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925 Grand Boulevard
Kansas City, MO 64198

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Tower - Twentieth Floor Lighting Plan

E1.01-T20

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1 TOWER TWENTY FIRST FLOOR LIGHTING PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E1.01-G FOR LIGHTING GENERAL NOTES.

PLAN NOTES:

1 CONNECT TO STAIRWELL LIGHTING ON LEVEL BELOW

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Tower - Twenty-First Floor Lighting Plan

E1.01-T21

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PLAN NOTES:

1. REFERENCE ENLARGED PLAN ON SHEET E3.04 FOR CENTRAL PLANT EQUIPMENT.
2. ELEVATOR RECALL - PROVIDE SMOKE DETECTOR FOR PURPOSE OF ELEVATOR RECALL IN ELEVATOR HOISTWAY.
3. ELEVATOR HEAT DETECTOR - PROVIDE A HEAT DETECTOR ROUTED TO THE SHUNT TRIP BREAKER SERVING THE ELEVATOR TO DISCONNECT MAIN ELEVATOR POWER IN THE EVENT OF AN ALARM. HEAT DETECTOR SHALL BE LOCATED WITHIN 2'-0" OF EACH SPRINKLER HEAD SERVING THE HOISTWAY.
4. ELEVATOR FLOW SWITCH - PROVIDE A FLOW SWITCH IN THE BRANCH SPRINKLER LINE SERVING ELEVATOR HOISTWAY. CONNECT INDICATOR TO ADJACENT RELAY AND INTERLOCK WITH SHUNT TRIP BREAKER TO DISCONNECT MAIN ELEVATOR POWER IF FLOW IS DETECTED.
5. ROUTE HOMERUN TO NEAREST AVAILABLE 120V PANELBOARD. TERMINATE ON A SPARE 20A, SINGLE POLE CIRCUIT BREAKER.

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND INDICATE THE GENERAL EXTENT OF THE WORK. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL PULL BOXES, JUNCTION BOXES AND INCIDENTAL MATERIALS AND LABOR FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.

B. ELECTRICAL CONTRACTOR SHALL DERATE CONDUCTORS AS REQUIRED BY THE N.E.C. WHEN GROUPED IN COMMON RACEWAYS.

C. VERIFY REQUIREMENTS OF ALL MECHANICAL EQUIPMENT WITH CONTRACTOR PROVIDED SUBMITTALS. NOTIFY ENGINEER OF ANY CONFLICTS BETWEEN THE SUBMITTALS AND ELECTRICAL DRAWINGS.

D. CONTRACTOR SHALL OFFSET OUTLET BOXES ON OPPOSITE SIDES OF A COMMON WALL TO PREVENT SOUND TRANSMISSION BETWEEN ADJOINING ROOMS. BOXES SHALL BE A MINIMUM OF 12" APART, AND MUST BE INSTALLED IN SEPARATE STUD CAVITIES.

E. ALL LOW VOLTAGE WIRES NOT ROUTED IN CONDUIT SHALL BE PROVIDED AS PLENUM RATED CABLES.

F. PROVIDE JUNCTION BOXES AND 3/4" CONDUIT WITH PULL-STRINGS UP TO ACCESSIBLE LOCATION IN PLENUM AT ALL VOICE AND DATA OUTLET LOCATIONS.

G. WHERE BOXES ARE INSTALLED IN CONCRETE BLOCK WALLS, THE BOX MOUNTING HEIGHT SHALL BE AT THE BLOCK JOINT AND THE DEVICES SHALL BE PROVIDED WITH A JUMBO COVERPLATE.

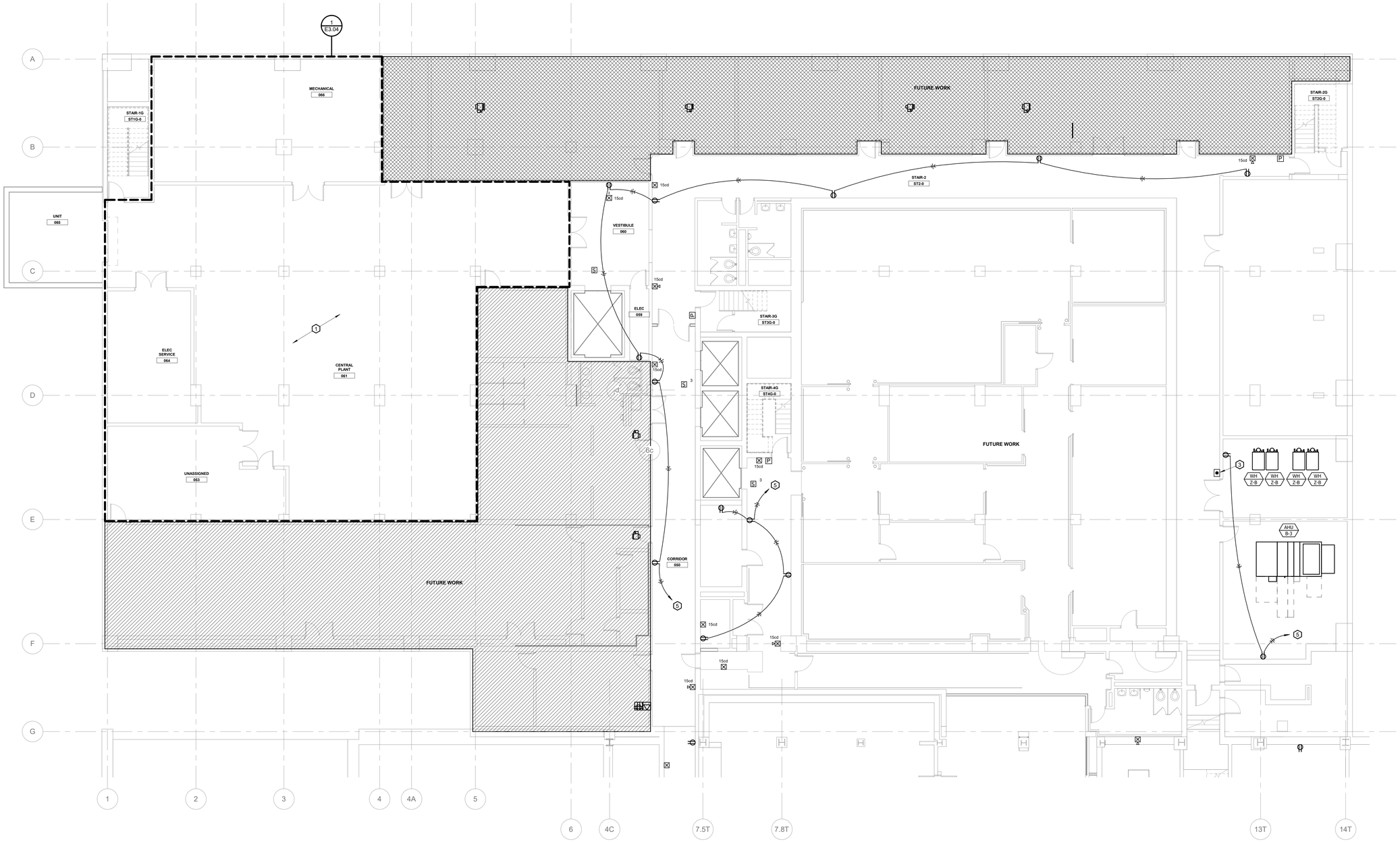
H. ALL WIRES RUN BELOW GRADE, IN CONCRETE THAT IS IN DIRECT CONTACT WITH THE EARTH, OR MASONRY THAT IS IN DIRECT CONTACT WITH THE EARTH SHALL BE WET LOCATION LISTED.

J. FURNITURE LAYOUTS ARE FOR REFERENCE ONLY. COORDINATE THE FINAL LOCATION OF ELECTRICAL DEVICES AND OUTLETS WITH ARCHITECT, OWNER AND FINAL FURNITURE PLANS PRIOR TO INSTALLATION.

K. PROVIDE LOCKING CLIPS ON ALL CIRCUIT BREAKERS SERVING TELECOMMUNICATION EQUIPMENT AND FIRE ALARM CONTROL PANELS.

L. REFERENCE MECHANICAL SHEETS FOR LOCATION OF SMOKE DAMPERS. PROVIDE 20A/120V POWER TO SMOKE DAMPERS AND INTERLOCK WITH FIRE ALARM RELAY(S). CIRCUIT SHALL ONLY SERVE SMOKE DAMPERS.

N. PROVIDE DUCT SMOKE DETECTORS IN RETURN AND SUPPLY AIR PATHS FOR AIR HANDLING EQUIPMENT 2000 CFM AND LARGER AND WHERE SHOWN ON PLANS. INTERLOCK WITH AIR HANDLING EQUIPMENT TO SHUT DOWN UNIT UPON SMOKE DETECTION.



1 GARAGE BASEMENT FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

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9/8/2020

CERTIFICATION

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The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

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Garage Basement Flr Power & Special Systems Plan

E2.01-G

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GENERAL NOTES:

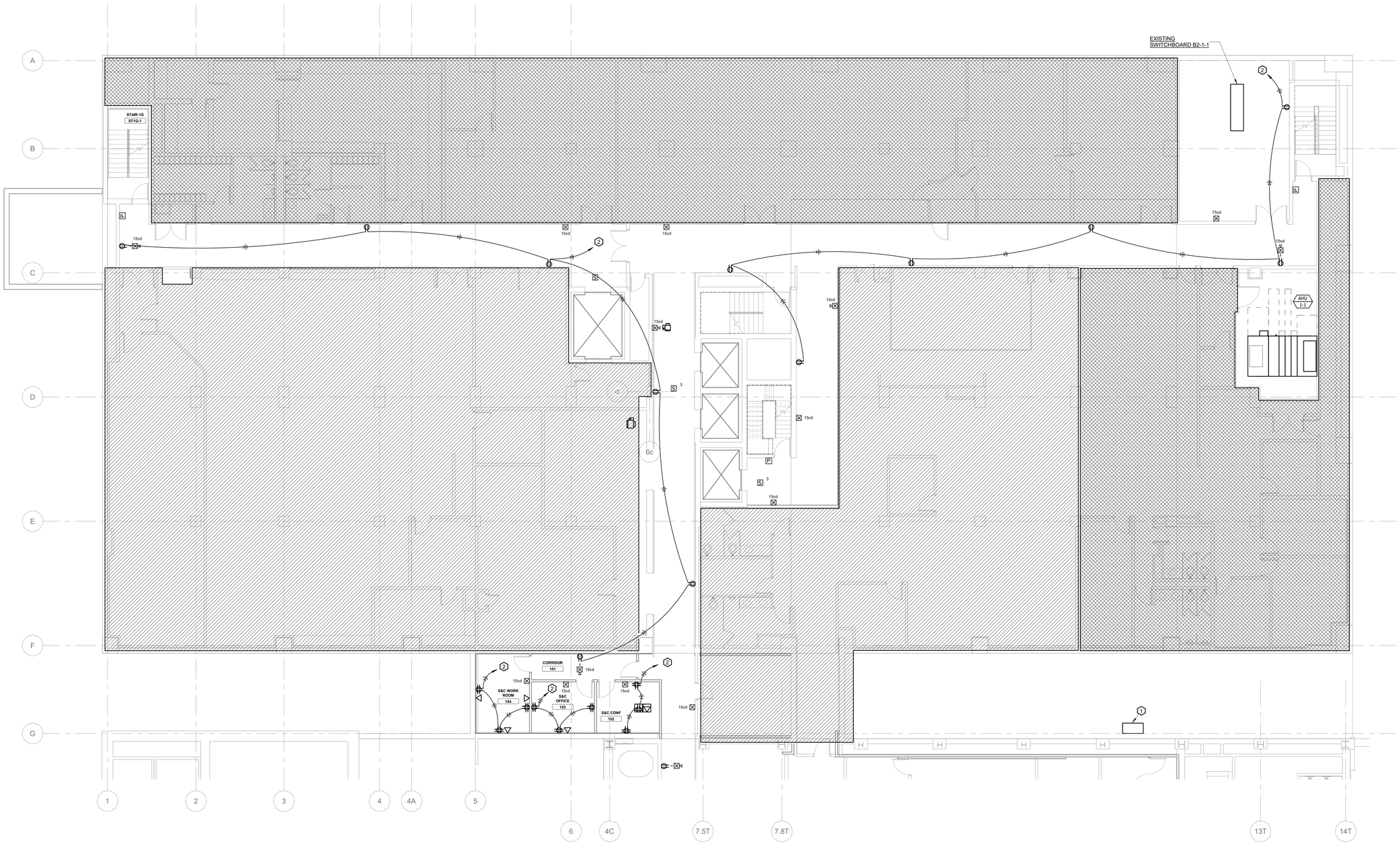
A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.

PLAN NOTES:

1 PROVIDE REMOTE FILL STATION EQUAL TO PRYCO, INC. FUEL DELIVERY SYSTEM. PROVIDE WITH WEATHERPROOF ENCLOSURE AND 2" FUEL LINE UP TO GENERATOR BASE TANK. COORDINATE ALL REQUIREMENTS WITH MANUFACTURER PRIOR TO INSTALLATION.

2 ROUTE HOMERUN TO NEAREST AVAILABLE 120V PANELBOARD. TERMINATE ON A SPARE 20A, SINGLE POLE CIRCUIT BREAKER.

3 BOILER EMERGENCY SHUTOFF. PROVIDE CONTINUOUS CONTACT RED MUSHROOM SWITCH AND LABEL AS "WATER HEATER SHUTDOWN". INTERLOCK SWITCH WITH ALL WATER HEATERS SO CONTROL POWER IS REMOVED WHEN BUTTON IS PUSHED. COMPLETE INSTALLATION SHALL MEET THE REQUIREMENTS OF CSD-1. INSTA



1 GARAGE GROUND FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

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Garage Ground Floor Power & Special Systems Plan

E2.01-G1

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GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.

PLAN NOTES:

1 ROUTE HOMERUN TO NEAREST AVAILABLE 120V PANELBOARD. TERMINATE ON A SPARE 20A, SINGLE POLE CIRCUIT BREAKER.

2 ELEVATOR RECALL - PROVIDE SMOKE DETECTOR FOR PURPOSE OF ELEVATOR RECALL IN ELEVATOR HOISTWAY.

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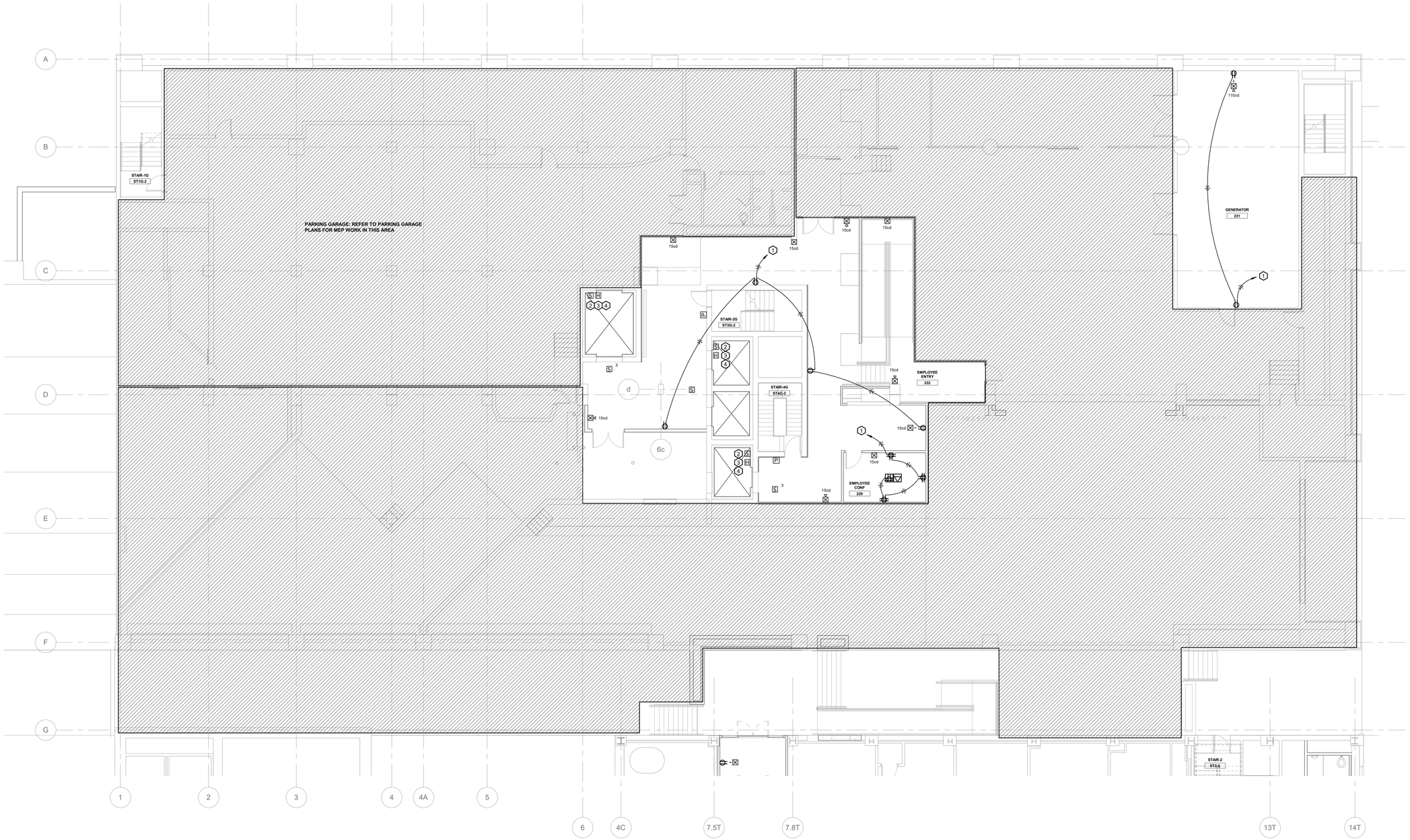

1 GARAGE DOCK FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

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Garage Dock Floor Power & Special Systems Plan

E2.01-G2

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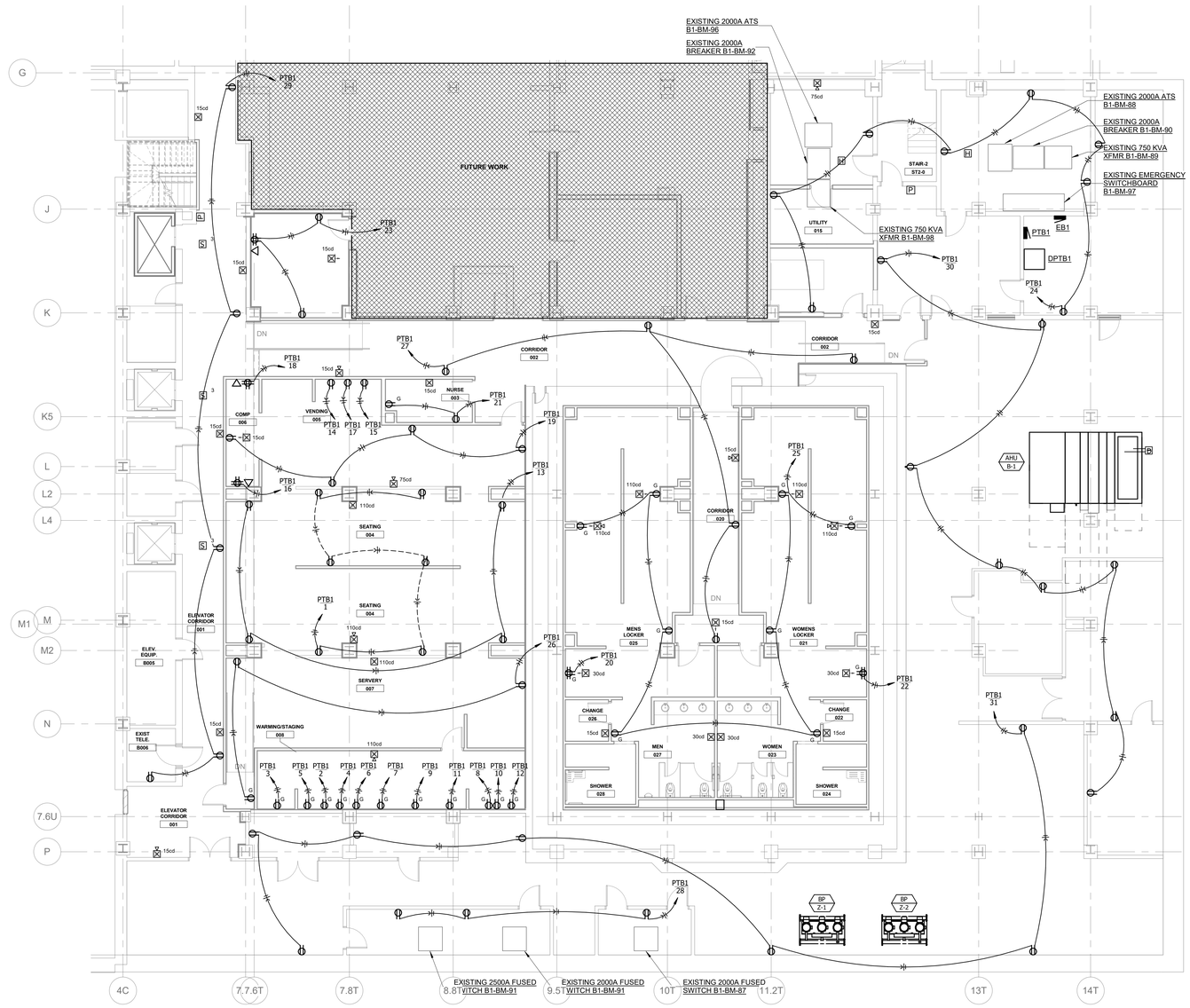

1 TOWER BASEMENT FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.

PLAN NOTES:

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STATE OF MISSOURI
CASEY JOHN STEVENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Tower - Basement Flr Power & Special Systems Plan

E2.01-T

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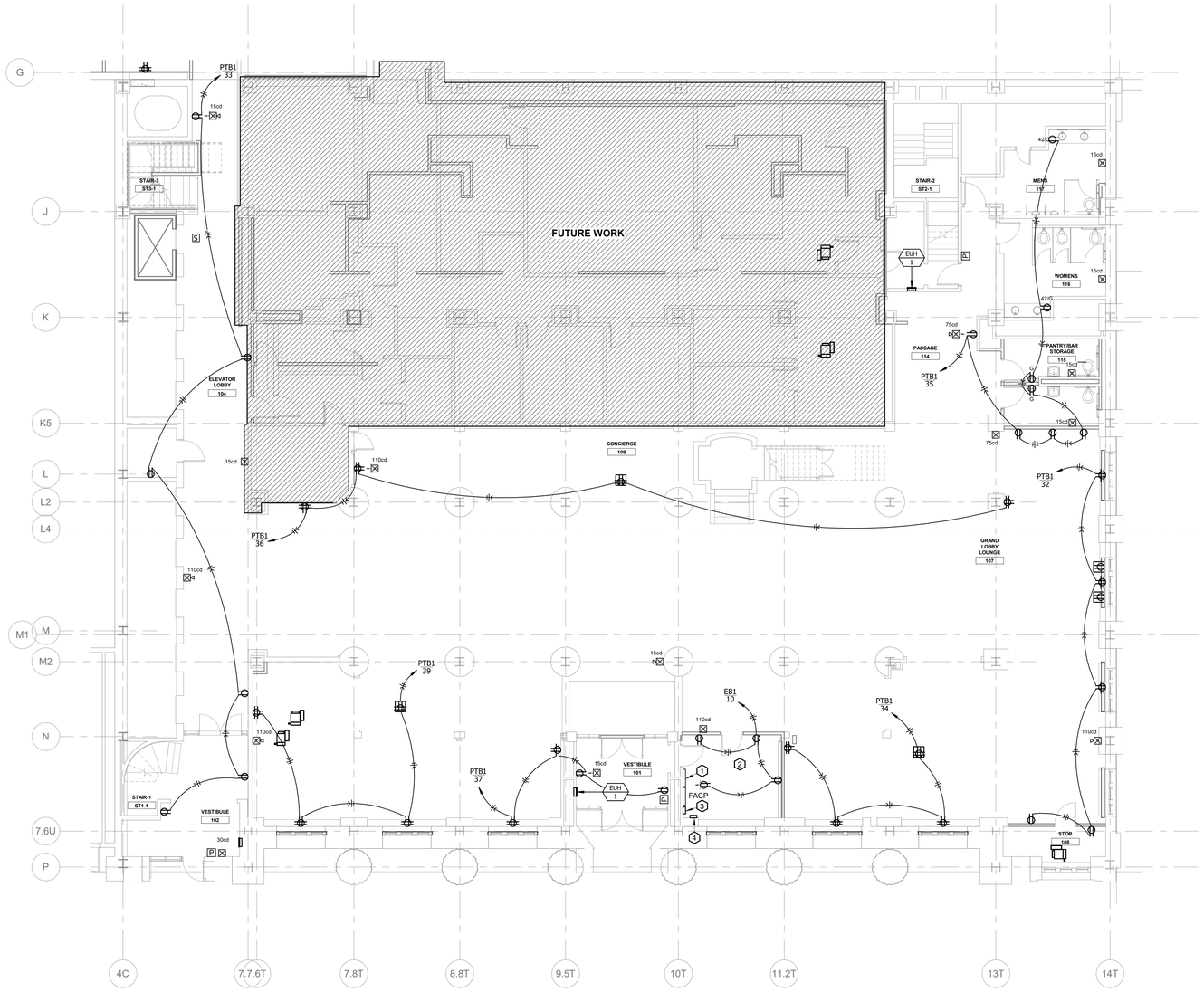

1 TOWER FIRST FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.

PLAN NOTES:

1. FIRE COMMAND ROOM TO CONTAIN FIRE DEPARTMENT TWO-WAY TELEPHONE COMMUNICATION SERVICE PANEL, ELEVATOR FIRE RECALL SWITCH AND FIRE PUMP STATUS INDICATORS. PROVIDE FIRE ALARM CONTROL PANEL WITH THE CAPABILITY OF START-UP FUNCTION DELAYS FOR LOW VOLTAGE CONTROL OF EACH ELEVATOR. ELEVATORS SHALL BE CONTROLLED WITH THE DELAYED FUNCTION TO START-UP AS STEP-2 AFTER THE FIRE PUMP AND SMOKE CONTROL FANS.
2. CONNECT TO UNSWITCHED HOT LEG OF LIGHTING CIRCUIT IN THIS ROOM. REFER TO LIGHTING PLAN.
3. PROVIDE GENERATOR REMOTE ANNUNCIATOR PANEL WITH MANUAL START AND TRANSFER CAPABILITIES.
4. PROVIDE CONTROL OVERRIDE PANEL FOR SHUTDOWN OF AIR HANDLING UNITS. COORDINATE WITH MECHANICAL CONTRACTOR.

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Tower - First Floor Power & Special Systems Plan

E2.01-T1

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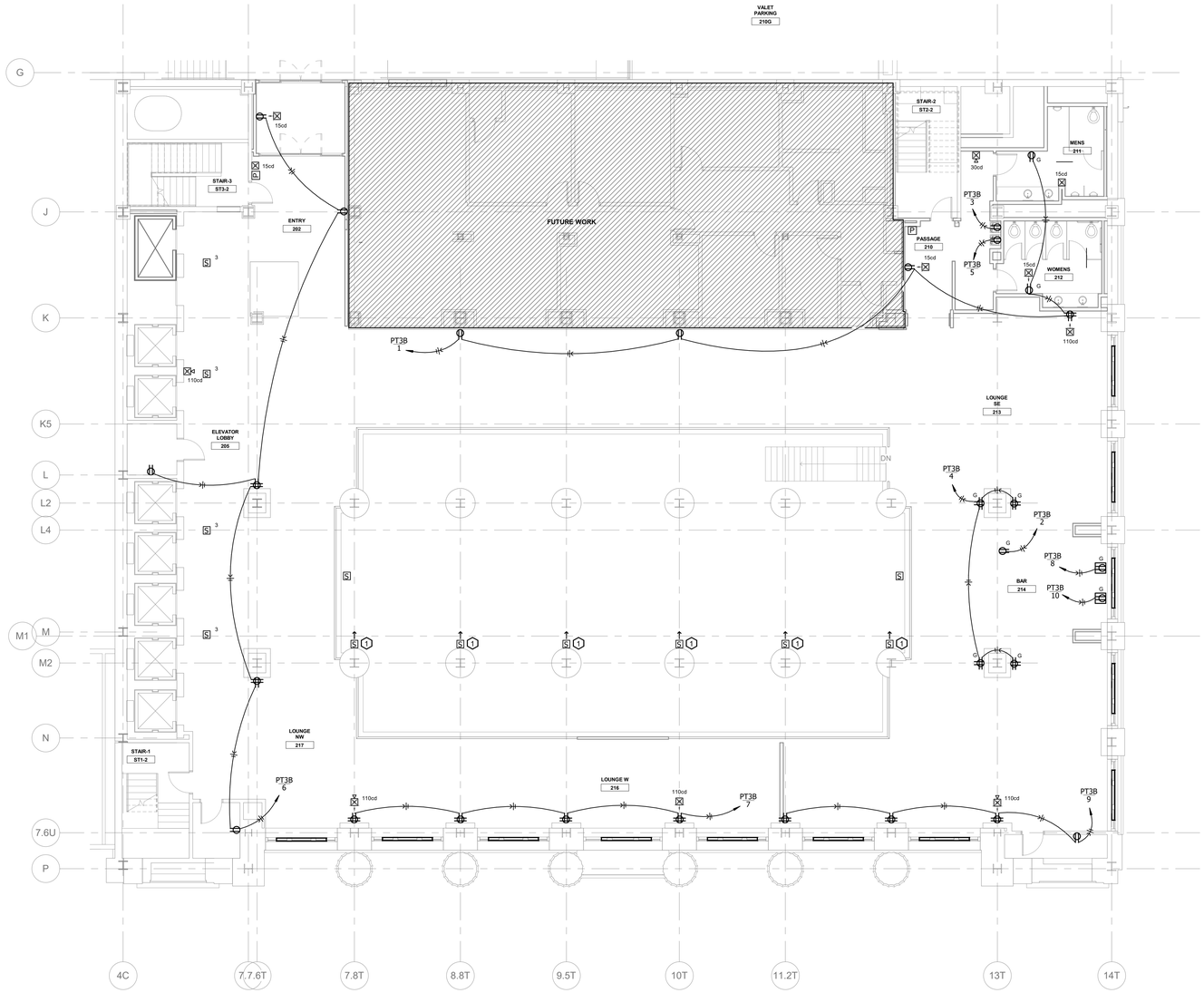

1 TOWER SECOND FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.

PLAN NOTES:

1 PROVIDE BEAM SMOKE DETECTORS. FIELD COORDINATE EXACT INSTALLATION LOCATION WITH EXISTING BUILDING STRUCTURES TO MAINTAIN HISTORIC FINISHES AS MUCH AS POSSIBLE. CONNECT TO SMOKE PRESSURIZATION SYSTEM.

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CERTIFICATION

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The Grand Reserve

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Tower - Second Floor Power & Special Systems Plan

E2.01-T2

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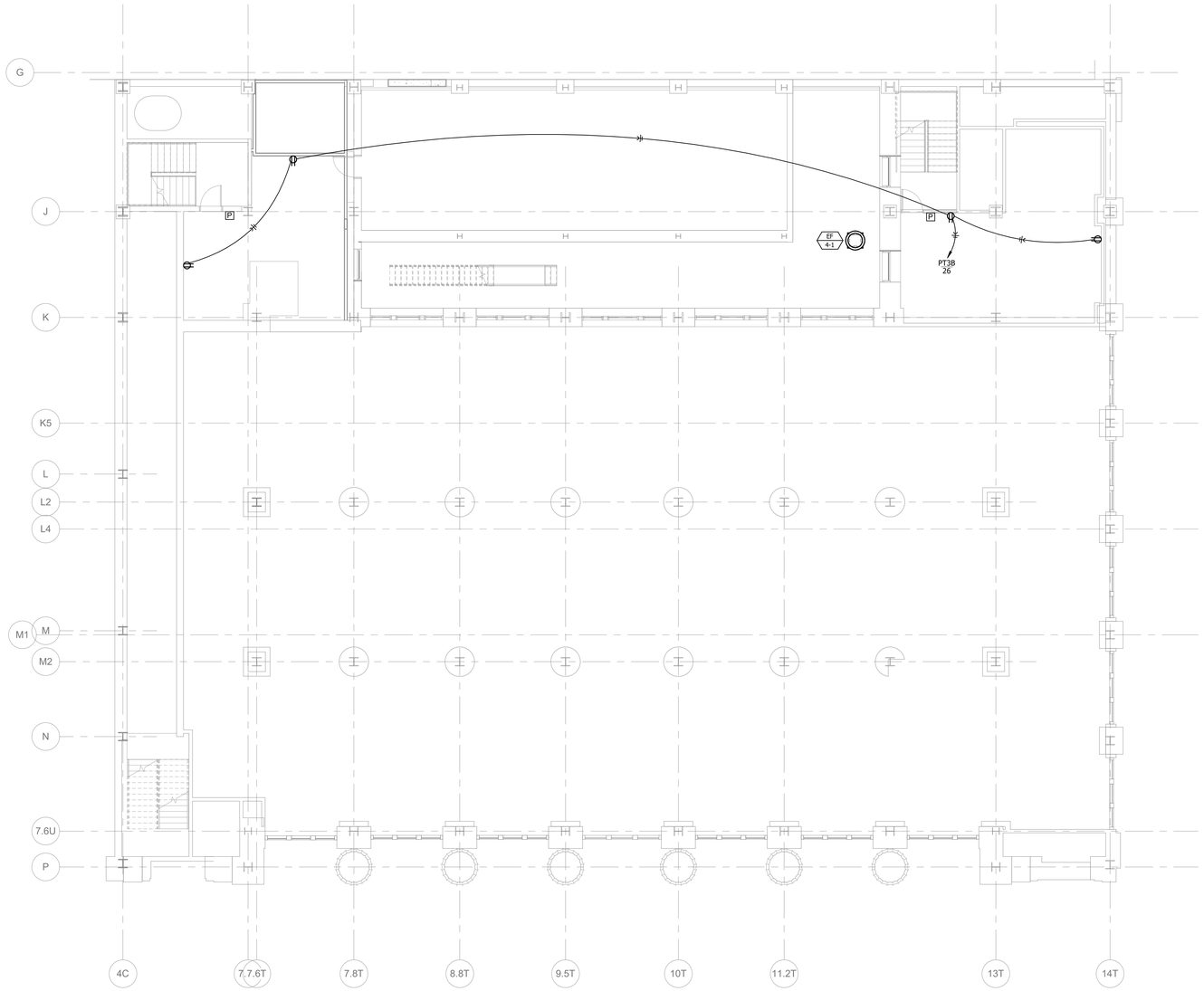
GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.



1 TOWER THIRD 'A' FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

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Tower - Third A Floor Power and Special Systems Plan

E2.01-T3A

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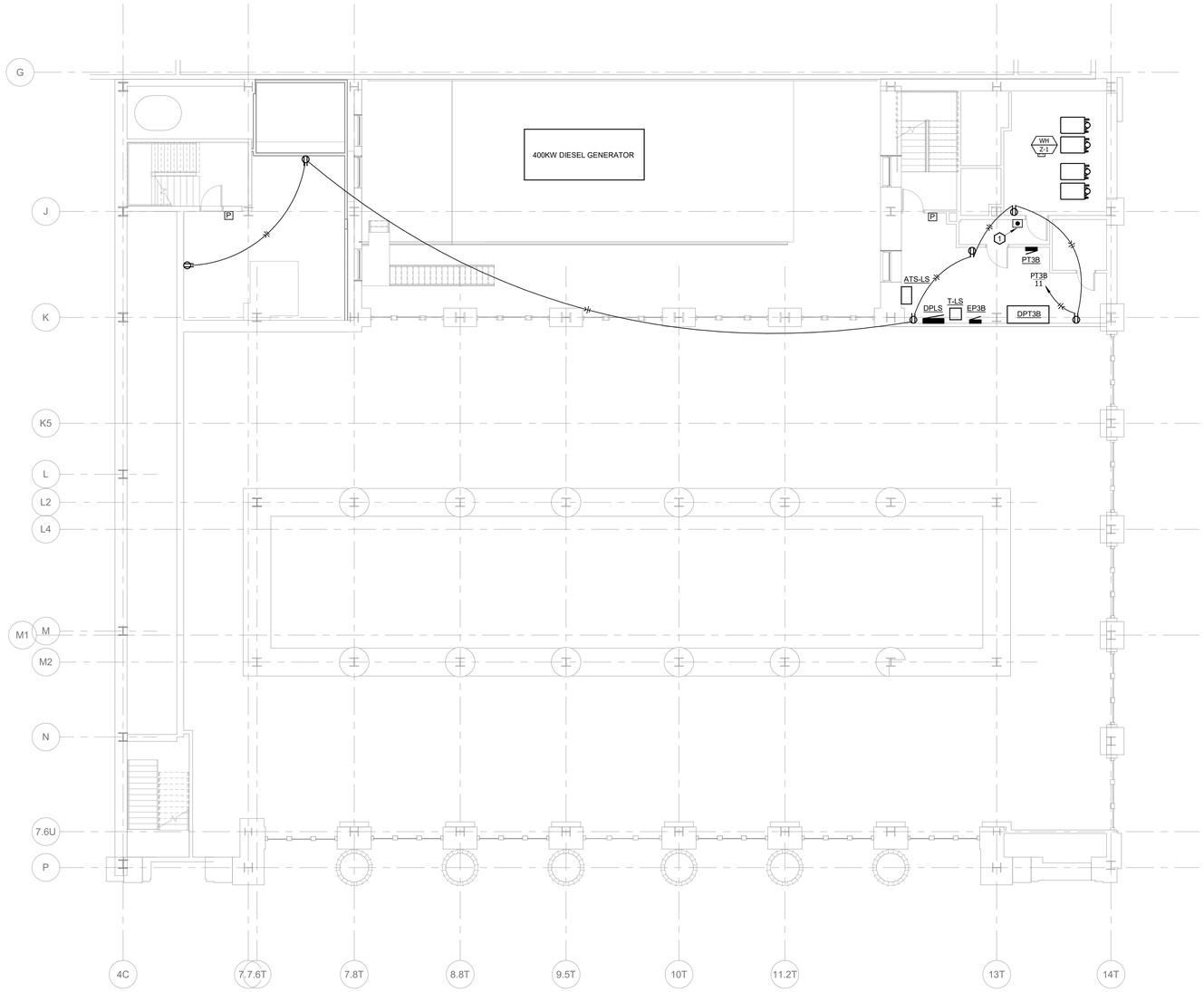

1 TOWER THIRD 'B' FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.

PLAN NOTES:

1 BOILER EMERGENCY SHUTOFF. PROVIDE CONTINUOUS CONTACT RED MUSHROOM SWITCH AND LABEL AS "WATER HEATER SHUTDOWN". INTERLOCK SWITCH WITH ALL WATER HEATERS SO CONTROL POWER IS REMOVED WHEN BUTTON IS PUSHED. COMPLETE INSTALLATION SHALL MEET THE REQUIREMENTS OF

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
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Tower - Third B Floor Power & Special Systems Plan

E2.01-T3B

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GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.

1 TOWER FOURTH FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

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The Grand Reserve

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Project No.: 18A023
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Tower - Fourth Floor Power & Special Systems Plan

E2.01-T4

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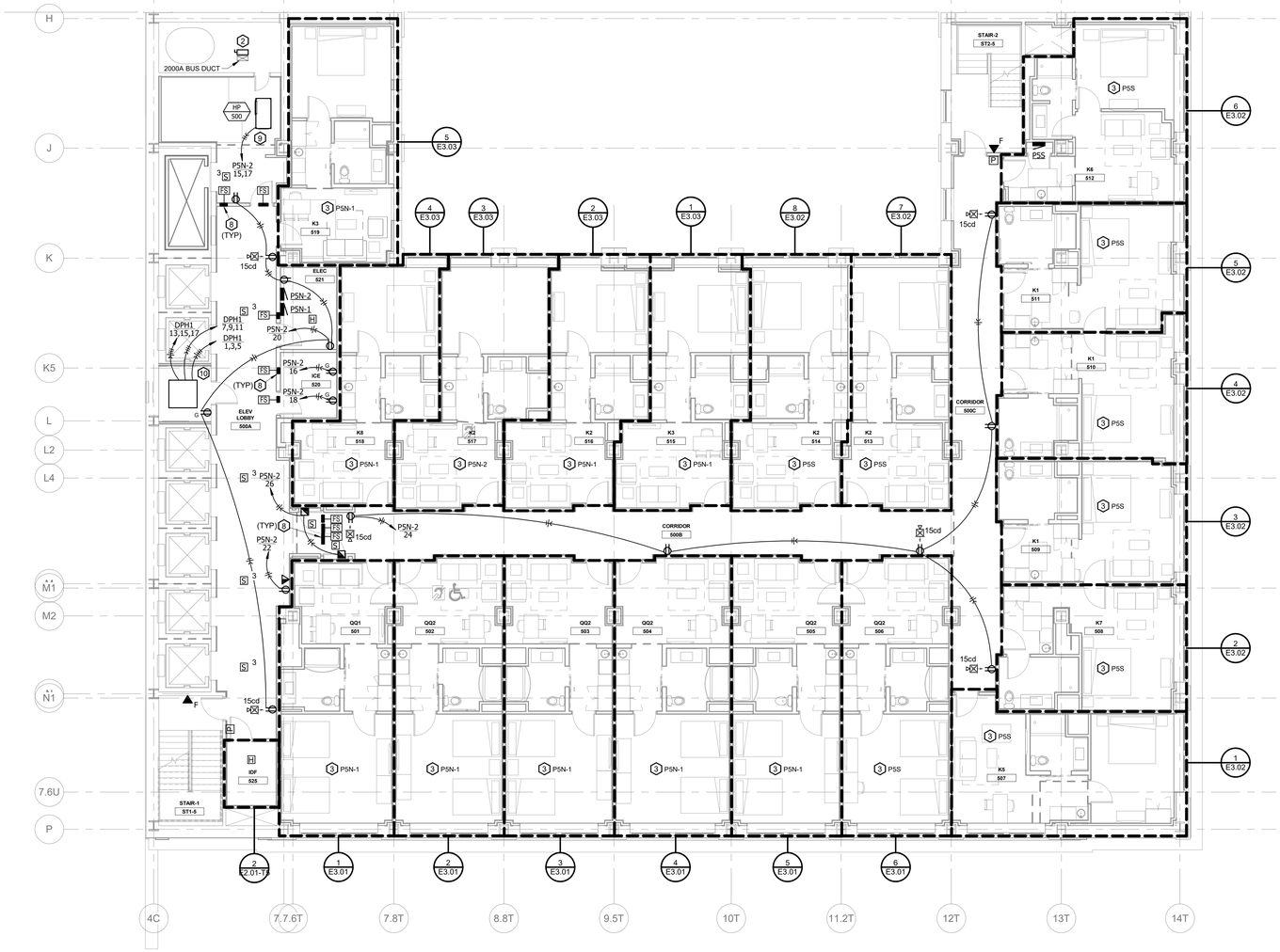
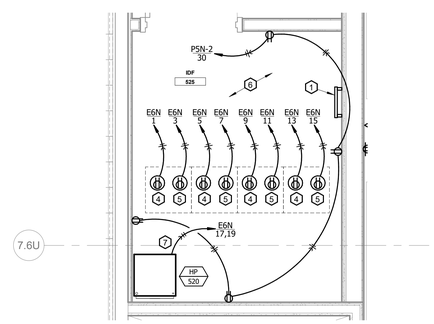


1 FIFTH FLOOR PLAN POWER & SPECIAL SYSTEMS

Scale: 1/8" = 1'-0"



2 ENLARGED POWER PLAN - IDF 525

Scale: 1/2" = 1'-0"

GENERAL NOTES:

A. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND INDICATE THE GENERAL EXTENT OF THE WORK. THE ELECTRICAL CONTRACTOR SHALL PROVIDE ALL PULL BOXES, JUNCTION BOXES AND INCIDENTAL MATERIALS AND LABOR FOR A COMPLETE AND FULLY FUNCTIONAL SYSTEM.

B. ELECTRICAL CONTRACTOR SHALL DERATE CONDUCTORS AS REQUIRED BY THE N.E.C. WHEN GROUPED IN COMMON RACEWAYS.

C. VERIFY REQUIREMENTS OF ALL MECHANICAL EQUIPMENT WITH CONTRACTOR PROVIDED SUBMITTALS. NOTIFY ENGINEER OF ANY CONFLICTS BETWEEN THE SUBMITTALS AND ELECTRICAL DRAWINGS.

D. CONTRACTOR SHALL OFFSET OUTLET BOXES ON OPPOSITE SIDES OF A COMMON WALL TO PREVENT SOUND TRANSMISSION BETWEEN ADJOINING ROOMS. BOXES SHALL BE A MINIMUM OF 12" APART, AND MUST BE INSTALLED IN SEPARATE STUD CAVITIES.

E. ALL LOW VOLTAGE WIRES NOT ROUTED IN CONDUIT SHALL BE PROVIDED AS PLENUM RATED CABLES.

F. PROVIDE JUNCTION BOXES AND 3/4" CONDUIT WITH PULL-STRINGS UP TO ACCESSIBLE LOCATION IN PLENUM AT ALL VOICE AND DATA OUTLET LOCATIONS.

G. WHERE BOXES ARE INSTALLED IN CONCRETE BLOCK WALLS, THE BOX MOUNTING HEIGHT SHALL BE AT THE BLOCK JOINT AND THE DEVICES SHALL BE PROVIDED WITH A JUMBO COVERPLATE.

H. ALL WIRES RUN BELOW GRADE, IN CONCRETE THAT IS IN DIRECT CONTACT WITH THE EARTH, OR MASONRY THAT IS IN DIRECT CONTACT WITH THE EARTH SHALL BE WET LOCATION LISTED.

I. FURNITURE LAYOUTS ARE FOR REFERENCE ONLY. COORDINATE THE FINAL LOCATION OF ELECTRICAL DEVICES AND OUTLETS WITH ARCHITECT, OWNER AND FINAL FURNITURE PLANS PRIOR TO INSTALLATION.

J. PROVIDE LOCKING CLIPS ON ALL CIRCUIT BREAKERS SERVING TELECOMMUNICATION EQUIPMENT AND FIRE ALARM CONTROL PANELS.

K. REFERENCE MECHANICAL SHEETS FOR LOCATION OF SMOKE DAMPERS. PROVIDE 20A/120V POWER TO SMOKE DAMPERS AND INTERLOCK WITH FIRE ALARM RELAY(S). CIRCUIT SHALL ONLY SERVE SMOKE DAMPERS.

L. REFERENCE MECHANICAL PLANS FOR LOCATION OF SMOKE DAMPERS. PROVIDE FIRE ALARM RELAY(S) TO CLOSE SMOKE DAMPERS UPON SMOKE DETECTION.

M. PROVIDE DUCT SMOKE DETECTORS IN RETURN AND SUPPLY AIR PATHS FOR AIR HANDLING EQUIPMENT 5 NOMINAL TONS AND LARGER AND WHERE SHOWN ON PLANS. INTERLOCK WITH AIR HANDLING EQUIPMENT TO SHUT DOWN UNIT UPON SMOKE DETECTION.

N PROVIDE CODE COMPLIANT EMERGENCY RESPONDER RADIO ANTENNA/REPEATER SYSTEM FOR EACH LEVEL. REFERENCE DIVISION 26 SPECIFICATIONS FOR DETAILED INFORMATION. ALL REQUIRED DEVICES INSTALLED WITHIN THE GUESTROOM CORRIDORS AND LOBBIES SHALL BE LOCATED IN A DISCRETE LOCATION OUT OF PUBLIC VIEW WHEREVER POSSIBLE. COORDINATE ALL DEVICE LOCATIONS WITH ARCHITECT PRIOR TO ROUGH-IN.

PLAN NOTES:

1 PROVIDE 'TGB' WITH GROUND WIRE TO BUILDING SERVICE GROUND.

2 200A BUS PLUG. REFERENCE ELECTRICAL DEMO AND NEW WORK RISER DIAGRAMS ON SHEETS ES.01 AND ES.02 FOR INFORMATION ON NEW, EXISTING TO REMAIN AND RELOCATED BUS PLUGS.

3 ROUTE FEEDERS IN THIS ROOM TO DESIGNATED PANELBOARD. REFERENCE ASSOCIATED ENLARGED PLAN AND PANELBOARD SCHEDULE FOR MORE INFORMATION.

4 PROVIDE NEMA L5-20P RECEPTACLE FOR DATA RACK POWER. COORDINATE EXACT LOCATION WITH LOW VOLTAGE CONTRACTOR PRIOR TO INSTALLATION.

5 PROVIDE TWIST LOCK PLUG AND RECEPTACLE FOR DATA RACK PLUG STRIP POWER. COORDINATE EXACT PLUG TYPE AND LOCATION WITH LOW VOLTAGE CONTRACTOR PRIOR TO INSTALLATION.

6 REFERENCE LOW VOLTAGE DRAWINGS (DV SERIES) FOR ALL CONDUITS, SLEEVES, ROUGH-INS AND POWER REQUIREMENTS TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR.

7 PROVIDE 20A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#12 & #12 GROUND WIRE IN A 1/2" CONDUIT.

8 PROVIDE AN IMC APPROVED SMOKE DETECTOR ACTIVATION METHOD FOR FIRE/SMOKE DAMPERS. PROVIDE ALL WORK AND REQUIRED DEVICES TO CLOSE DAMPERS UPON DETECTION OF SMOKE. CONNECT ALL FIRE SMOKE DAMPERS ON THIS LEVEL TO PANELBOARD P5N-2 CIRCUIT #19.

9 PROVIDE 30A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#10 & #10 GROUND WIRE IN A 3/4" CONDUIT. COORDINATION LOCATION OF DISCONNECT WITH MANUFACTURER AND INSTALL IN AN ACCESSIBLE LOCATIO

10 MAKE ELECTRICAL CONNECTIONS TO BLOWER COIL, DUCT HEATER AND ENERGY RECOVERY UNIT. REFERENCE MECHANICAL ROOM ENLARGED PLANS, SHEET M3.04 FOR UNIT LOCATIONS.

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Tower - Fifth Floor Plan
Power/Special Systems

E2.01-T5

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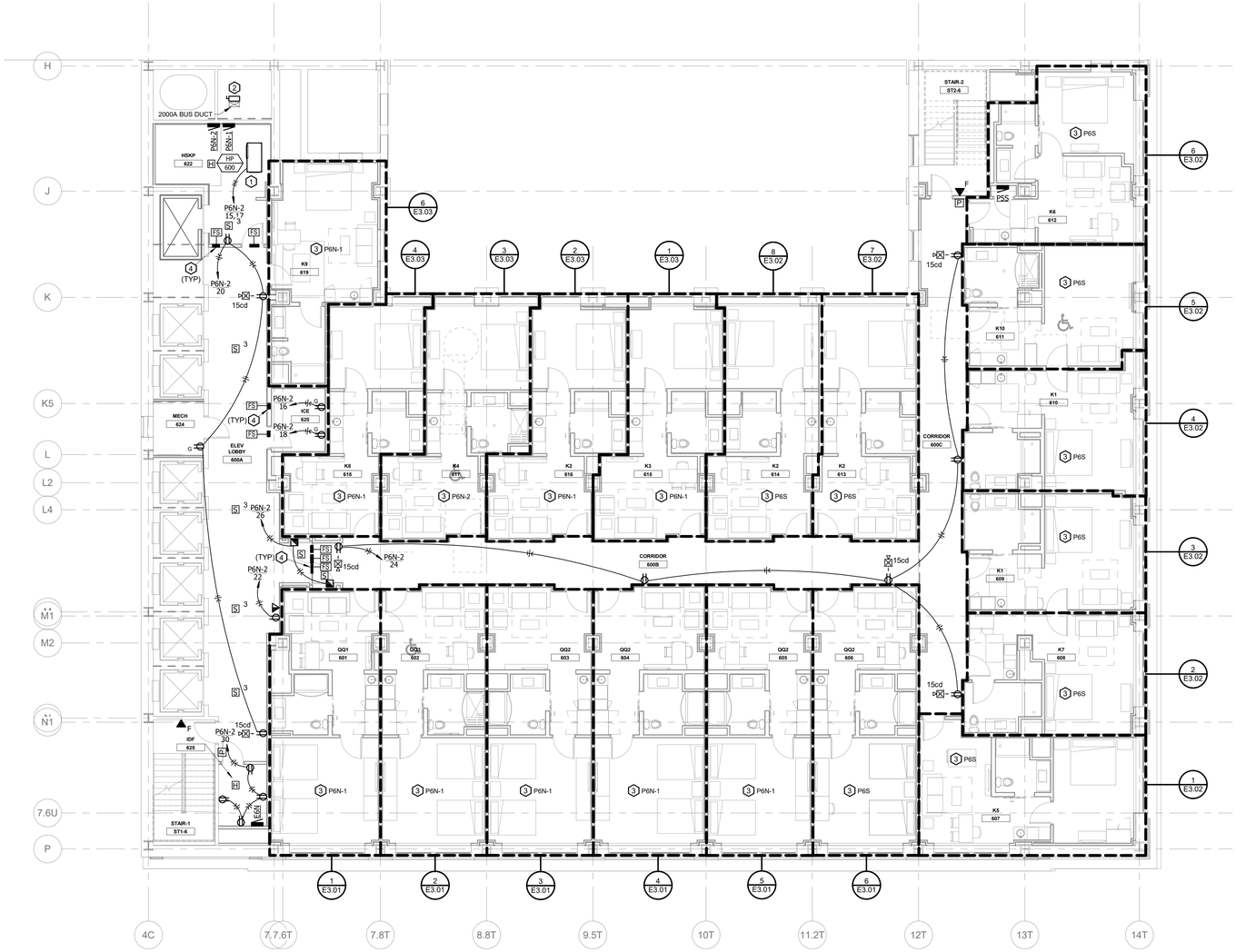

1 SIXTH FLOOR PLAN POWER & SPECIAL SYSTEMS

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E201 FOR POWER GENERAL NOTES.

PLAN NOTES:

1. PROVIDE 30A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#10 & #10 GROUND WIRE IN A 3/4" CONDUIT. COORDINATION LOCATION OF DISCONNECT WITH MANUFACTURER AND INSTALL IN AN ACCESSIBLE LOCATIO
2. 200A BUS PLUG. REFERENCE ELECTRICAL DEMO AND NEW WORK RISER DIAGRAMS ON SHEETS E5.01 AND E5.02 FOR INFORMATION ON NEW, EXISTING TO REMAIN AND RELOCATED BUS PLUGS.
3. ROUTE FEEDERS IN THIS ROOM TO DESIGNATED PANELBOARD. REFERENCE ASSOCIATED ENLARGED PLAN AND PANELBOARD SCHEDULE FOR MORE INFORMATION.
4. PROVIDE AN IMC APPROVED SMOKE DETECTOR ACTIVATION METHOD FOR FIRE/SMOKE DAMPERS. PROVIDE ALL WORK AND REQUIRED DEVICES TO CLOSE DAMPERS UPON DETECTION OF SMOKE. CONNECT ALL FIRE SMOKE DAMPERS ON THIS LEVEL TO PANELBOARD P6N-2 CIRCUIT #19.

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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MO Certificate of Authority 01022

Tower - Sixth Floor Plan
Power/Special Systems

E2.01-T6

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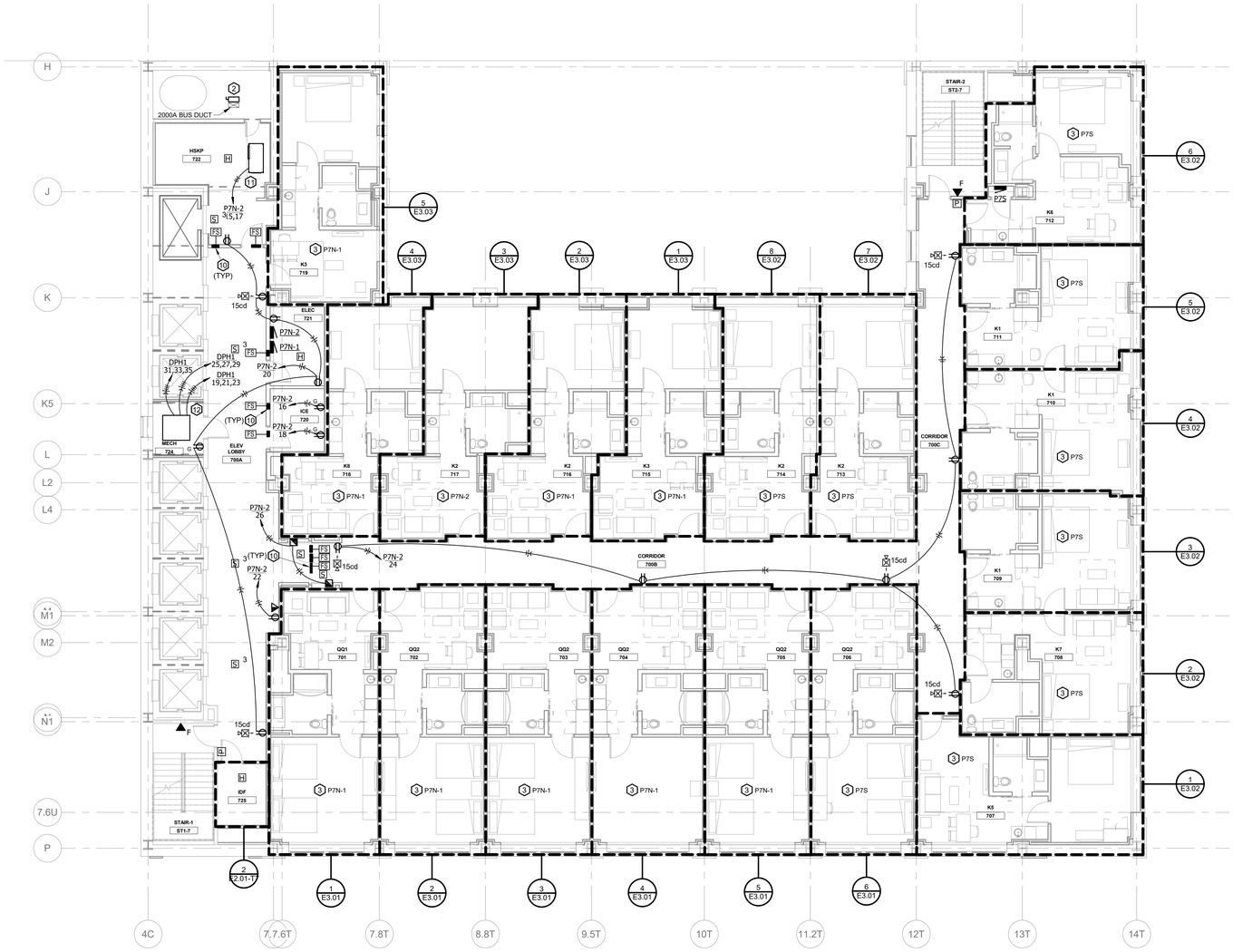
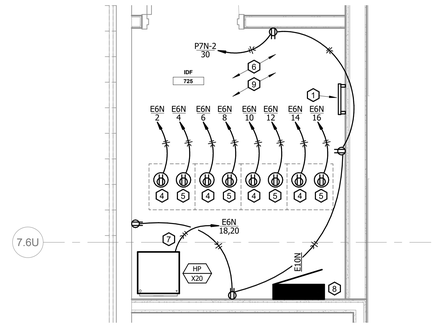


1 SEVENTH FLOOR PLAN POWER & SPECIAL SYSTEMS (TYPICAL FLOOR 10,13,16,19)

Scale: 1/8" = 1'-0"



2 ENLARGED POWER PLAN - IDF 725 (TYPICAL IDF-1325 & IDF-1925)

Scale: 1/2" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E201 FOR POWER GENERAL NOTES.

PLAN NOTES:

1. PROVIDE 'TGB' WITH GROUND WIRE TO BUILDING SERVICE GROUND.
2. 200A BUS PLUG. REFERENCE ELECTRICAL DEMO AND NEW WORK RISER DIAGRAMS ON SHEETS E5.01 AND E5.02 FOR INFORMATION ON NEW, EXISTING TO REMAIN AND RELOCATED BUS PLUGS.
3. ROUTE FEEDERS IN THIS ROOM TO DESIGNATED PANELBOARD. REFERENCE ASSOCIATED ENLARGED PLAN AND PANELBOARD SCHEDULE FOR MORE INFORMATION.
4. PROVIDE NEMA L5-20P RECEPTACLE FOR DATA RACK POWER. COORDINATE EXACT LOCATION WITH LOW VOLTAGE CONTRACTOR PRIOR TO INSTALLATION.
5. PROVIDE TWIST LOCK PLUG AND RECEPTACLE FOR DATA RACK PLUG STRIP POWER. COORDINATE EXACT PLUG TYPE AND LOCATION WITH LOW VOLTAGE CONTRACTOR PRIOR TO INSTALLATION.
6. REFERENCE LOW VOLTAGE DRAWINGS (DV SERIES) FOR ALL CONDUITS, SLEEVES, ROUGH-INS AND POWER REQUIREMENTS TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR.
7. PROVIDE 20A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#12 & #12 GROUND WIRE IN A 1/2" CONDUIT.
8. INSTALL PANELBOARD ON TENTH FLOOR ONLY.
9. REFERENCE PANELBOARD SCHEDULES E14N FOR IDF-1325 CIRCUITS AND E18N FOR IDF-1925 CIRCUITS.
10. PROVIDE AN IMC APPROVED SMOKE DETECTOR ACTIVATION METHOD FOR FIRE/SMOKE DAMPERS. PROVIDE ALL WORK AND REQUIRED DEVICES TO CLOSE DAMPERS UPON DETECTION OF SMOKE. CONNECT ALL FIRE SMOKE DAMPERS ON THIS LEVEL TO PANELBOARD P7N-2 CIRCUIT #19.
11. PROVIDE 30A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#10 & #10 GROUND WIRE IN A 3/4" CONDUIT. COORDINATION LOCATION OF DISCONNECT WITH MANUFACTURER AND INSTALL IN AN ACCESSIBLE LOCATIO
12. MAKE ELECTRICAL CONNECTIONS TO BLOWER COIL, DUCT HEATER AND ENERGY RECOVERY UNIT. REFERENCE MECHANICAL ROOM ENLARGED PLANS, SHEET M3.04 FOR UNIT LOCATIONS. TYPICAL FOR DOAU-13 AND DOAU-19.

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
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H&B PROJECT NUMBER : 1820630

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Tower - Seventh Floor Plan
Power/Special Systems

E2.01-T7

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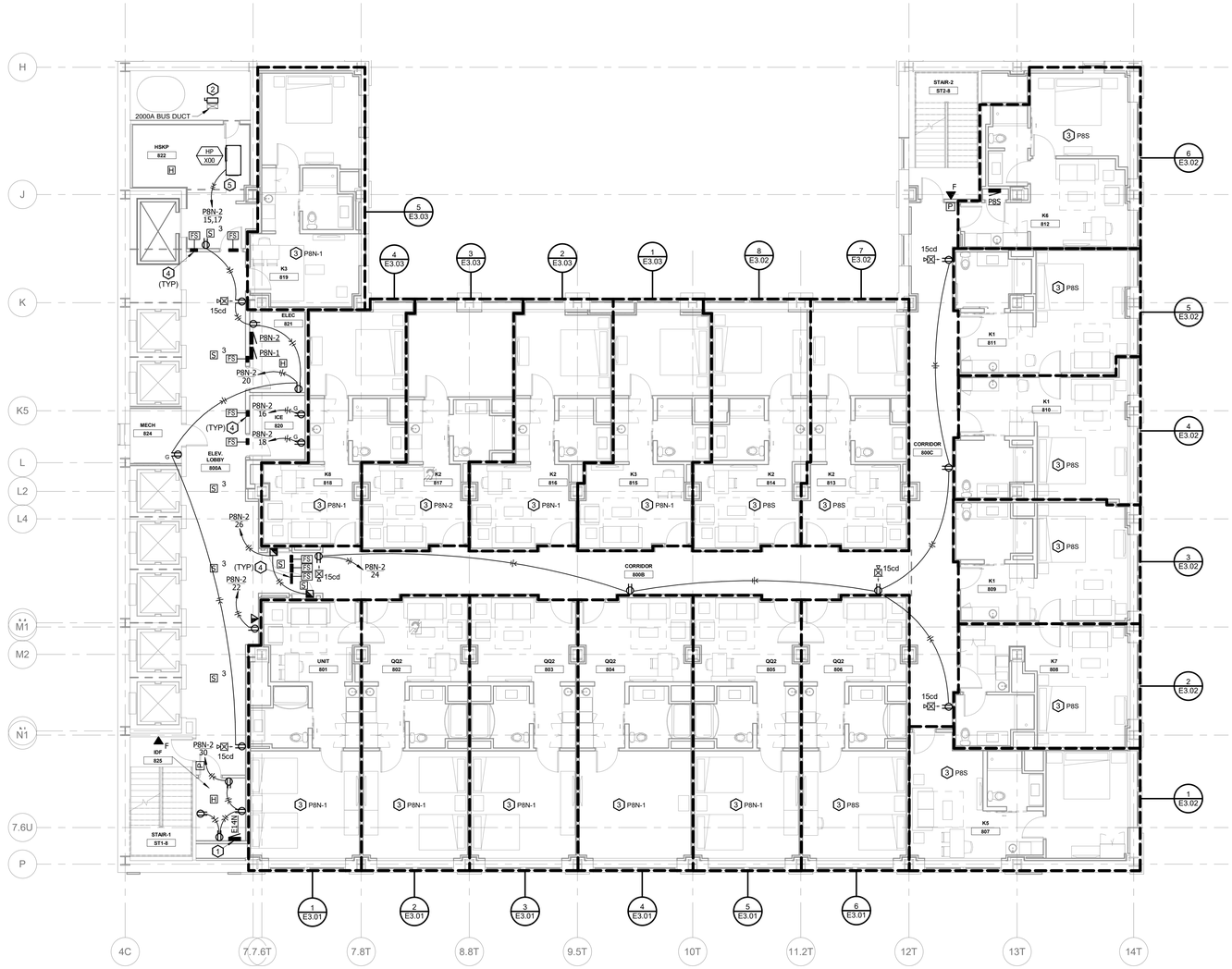

1 EIGHTH FLOOR PLAN POWER & SPECIAL SYSTEMS (TYPICAL FLOOR 14,17)

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E201 FOR POWER GENERAL NOTES.

PLAN NOTES:

1 INSTALL PANELBOARD ON FOURTEENTH FLOOR ONLY.

2 200A BUS PLUG. REFERENCE ELECTRICAL DEMO AND NEW WORK RISER DIAGRAMS ON SHEETS E5.01 AND E5.02 FOR INFORMATION ON NEW, EXISTING TO REMAIN AND RELOCATED BUS PLUGS.

3 ROUTE FEEDERS IN THIS ROOM TO DESIGNATED PANELBOARD. REFERENCE ASSOCIATED ENLARGED PLAN AND PANELBOARD SCHEDULE FOR MORE INFORMATION.

4 PROVIDE AN IMC APPROVED SMOKE DETECTOR ACTIVATION METHOD FOR FIRE/SMOKE DAMPERS. PROVIDE ALL WORK AND REQUIRED DEVICES TO CLOSE DAMPERS UPON DETECTION OF SMOKE. CONNECT ALL FIRE SMOKE DAMPERS ON THIS LEVEL TO PANELBOARD P8N-2 CIRCUIT #19.

5 PROVIDE 30A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#10 & #10 GROUND WIRE IN A 3/4" CONDUIT. COORDINATION LOCATION OF DISCONNECT WITH MANUFACTURER AND INSTALL IN AN ACCESSIBLE LOCATIO

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9/8/2020

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Tower - Eighth Floor Plan
Power/Special Systems

E2.01-T8

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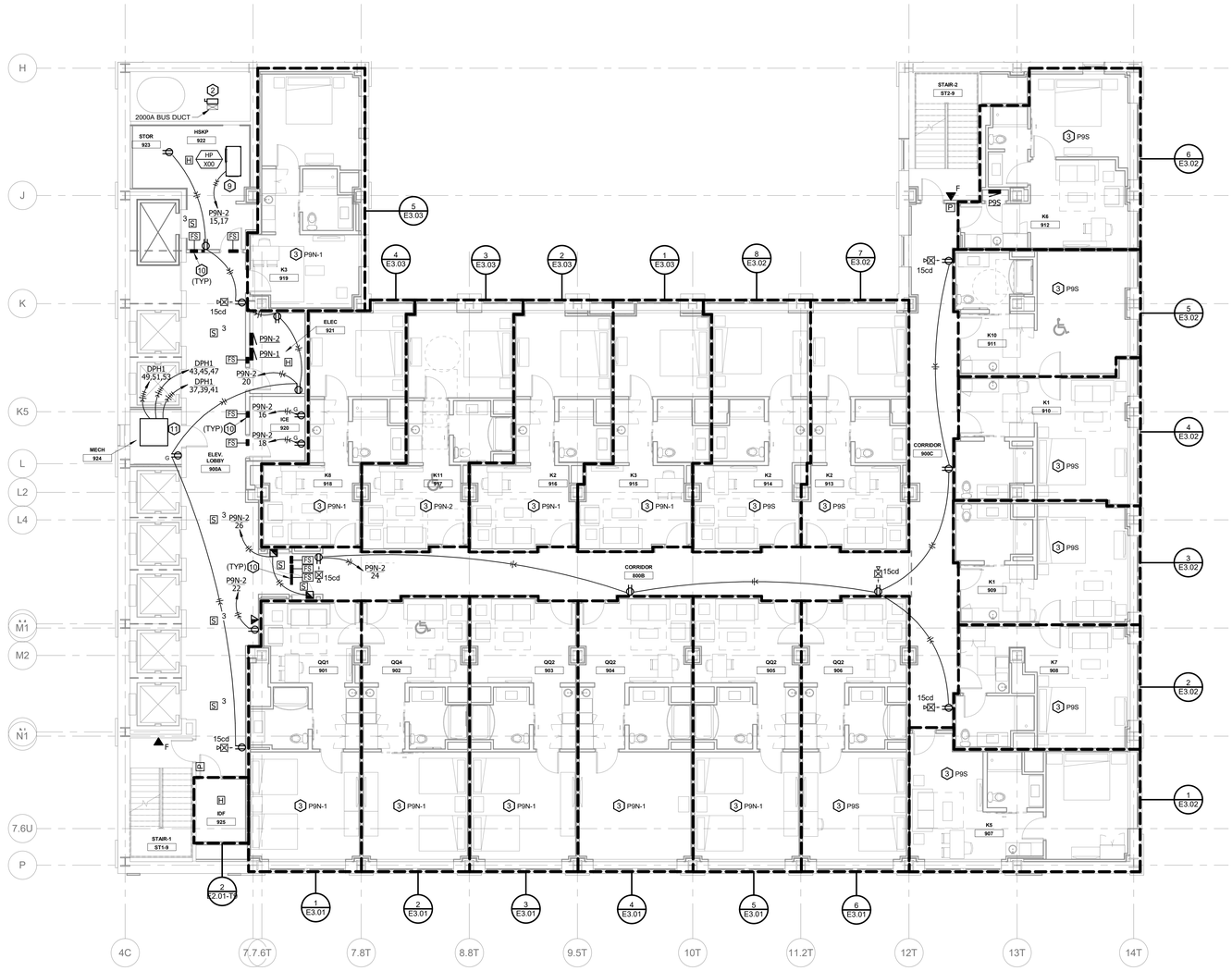
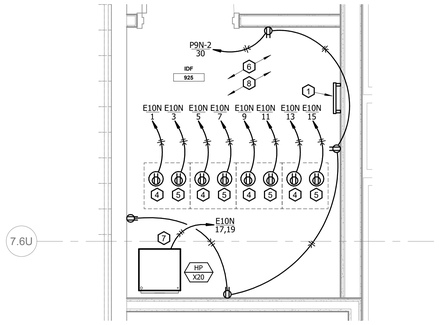


1 NINTH FLOOR PLAN POWER & SPECIAL SYSTEMS (TYPICAL FLOOR 12,15)

Scale: 1/8" = 1'-0"



2 ENLARGED POWER PLAN - IDF 925 (TYPICAL IDF-1525 & IDF-1725)

Scale: 1/2" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E201 FOR POWER GENERAL NOTES.

PLAN NOTES:

1. PROVIDE 'TGB' WITH GROUND WIRE TO BUILDING SERVICE GROUND.
2. 200A BUS PLUG. REFERENCE ELECTRICAL DEMO AND NEW WORK RISER DIAGRAMS ON SHEETS E5.01 AND E5.02 FOR INFORMATION ON NEW, EXISTING TO REMAIN AND RELOCATED BUS PLUGS.
3. ROUTE FEEDERS IN THIS ROOM TO DESIGNATED PANELBOARD. REFERENCE ASSOCIATED ENLARGED PLAN AND PANELBOARD SCHEDULE FOR MORE INFORMATION.
4. PROVIDE NEMA L5-20P RECEPTACLE FOR DATA RACK POWER. COORDINATE EXACT LOCATION WITH LOW VOLTAGE CONTRACTOR PRIOR TO INSTALLATION.
5. PROVIDE TWIST LOCK PLUG AND RECEPTACLE FOR DATA RACK PLUG STRIP POWER. COORDINATE EXACT PLUG TYPE AND LOCATION WITH LOW VOLTAGE CONTRACTOR PRIOR TO INSTALLATION.
6. REFERENCE LOW VOLTAGE DRAWINGS (DV SERIES) FOR ALL CONDUITS, SLEEVES, ROUGH-INS AND POWER REQUIREMENTS TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR.
7. PROVIDE 20A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#12 & #12 GROUND WIRE IN A 1/2" CONDUIT.
8. REFERENCE PANELBOARD SCHEDULES E14N FOR IDF-1525 CIRCUITS AND E18N FOR IDF-1725 CIRCUITS.
9. PROVIDE 30A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#10 & #10 GROUND WIRE IN A 3/4" CONDUIT. COORDINATION LOCATION OF DISCONNECT WITH MANUFACTURER AND INSTALL IN AN ACCESSIBLE LOCATIO
10. PROVIDE AN IMC APPROVED SMOKE DETECTOR ACTIVATION METHOD FOR FIRE/SMOKE DAMPERS. PROVIDE ALL WORK AND REQUIRED DEVICES TO CLOSE DAMPERS UPON DETECTION OF SMOKE. CONNECT ALL FIRE SMOKE DAMPERS ON THIS LEVEL TO PANELBOARD P9N-2 CIRCUIT #19.
11. MAKE ELECTRICAL CONNECTIONS TO BLOWER COIL, DUCT HEATER AND ENERGY RECOVERY UNIT. REFERENCE MECHANICAL ROOM ENLARGED PLANS, SHEET M3.04 FOR UNIT LOCATIONS. TYPICAL FOR DOAU-15 AND DOAU-17.

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NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Tower - Ninth Floor Plan
Power/Special Systems

E2.01-T9

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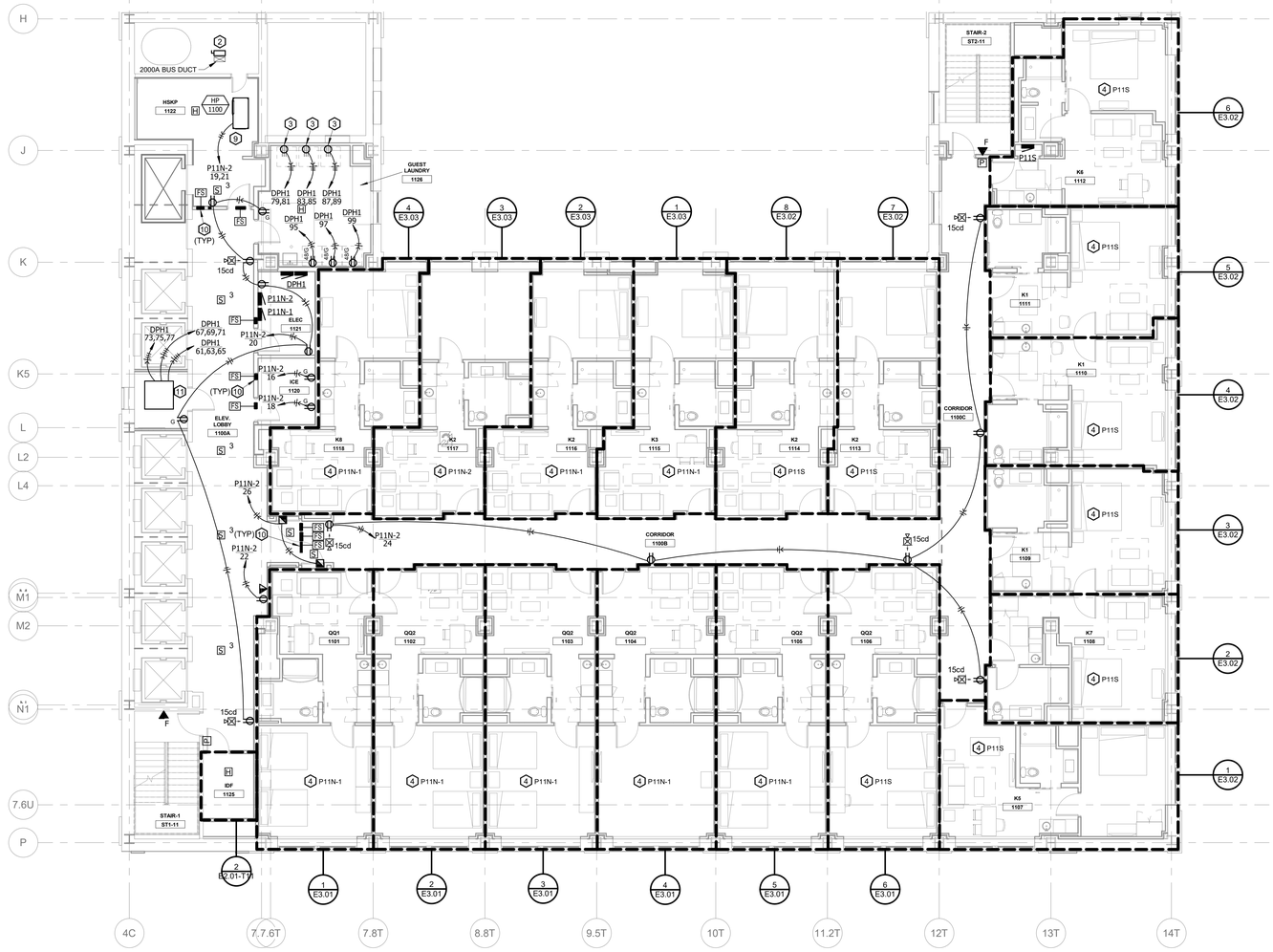
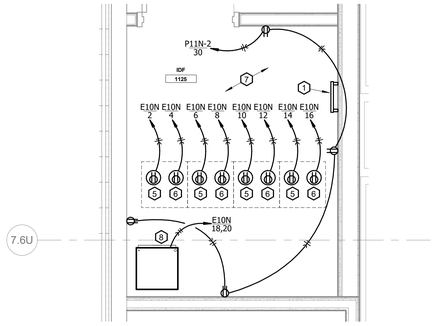


1 ELEVENTH FLOOR PLAN POWER & SPECIAL SYSTEMS

Scale: 1/8" = 1'-0"



2 ENLARGED POWER PLAN - IDF 1125

Scale: 1/2" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E201 FOR POWER GENERAL NOTES.

PLAN NOTES:

1. PROVIDE 'TGB' WITH GROUND WIRE TO BUILDING SERVICE GROUND.
2. 200A BUS PLUG. REFERENCE ELECTRICAL DEMO AND NEW WORK RISER DIAGRAMS ON SHEETS E5.01 AND E5.02 FOR INFORMATION ON NEW, EXISTING TO REMAIN AND RELOCATED BUS PLUGS.
3. PROVIDE NEMA 14-30R RECEPTACLE AND HOMERUN WITH (3)#10 & #10 GROUND WIRE IN A 3/4" CONDUIT.
4. ROUTE FEEDERS IN THIS ROOM TO DESIGNATED PANELBOARD. REFERENCE ASSOCIATED ENLARGED PLAN AND PANELBOARD SCHEDULE FOR MORE INFORMATION.
5. PROVIDE NEMA L5-20P RECEPTACLE FOR DATA RACK POWER. COORDINATE EXACT LOCATION WITH LOW VOLTAGE CONTRACTOR PRIOR TO INSTALLATION.
6. PROVIDE TWIST LOCK PLUG AND RECEPTACLE FOR DATA RACK PLUG STRIP POWER. COORDINATE EXACT PLUG TYPE AND LOCATION WITH LOW VOLTAGE CONTRACTOR PRIOR TO INSTALLATION.
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9. PROVIDE 30A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#10 & #10 GROUND WIRE IN A 3/4" CONDUIT. COORDINATION LOCATION OF DISCONNECT WITH MANUFACTURER AND INSTALL IN AN ACCESSIBLE LOCATIO
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11. MAKE ELECTRICAL CONNECTIONS TO BLOWER COIL, DUCT HEATER AND ENERGY RECOVERY UNIT. REFERENCE MECHANICAL ROOM ENLARGED PLANS, SHEET M3.04 FOR UNIT LOCATIONS.

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STATE OF MISSOURI
CASEY JOHN STEVENS
NUMBER
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PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
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Tower - Eleventh Floor Plan
Power/Special Systems

E2.01-T11

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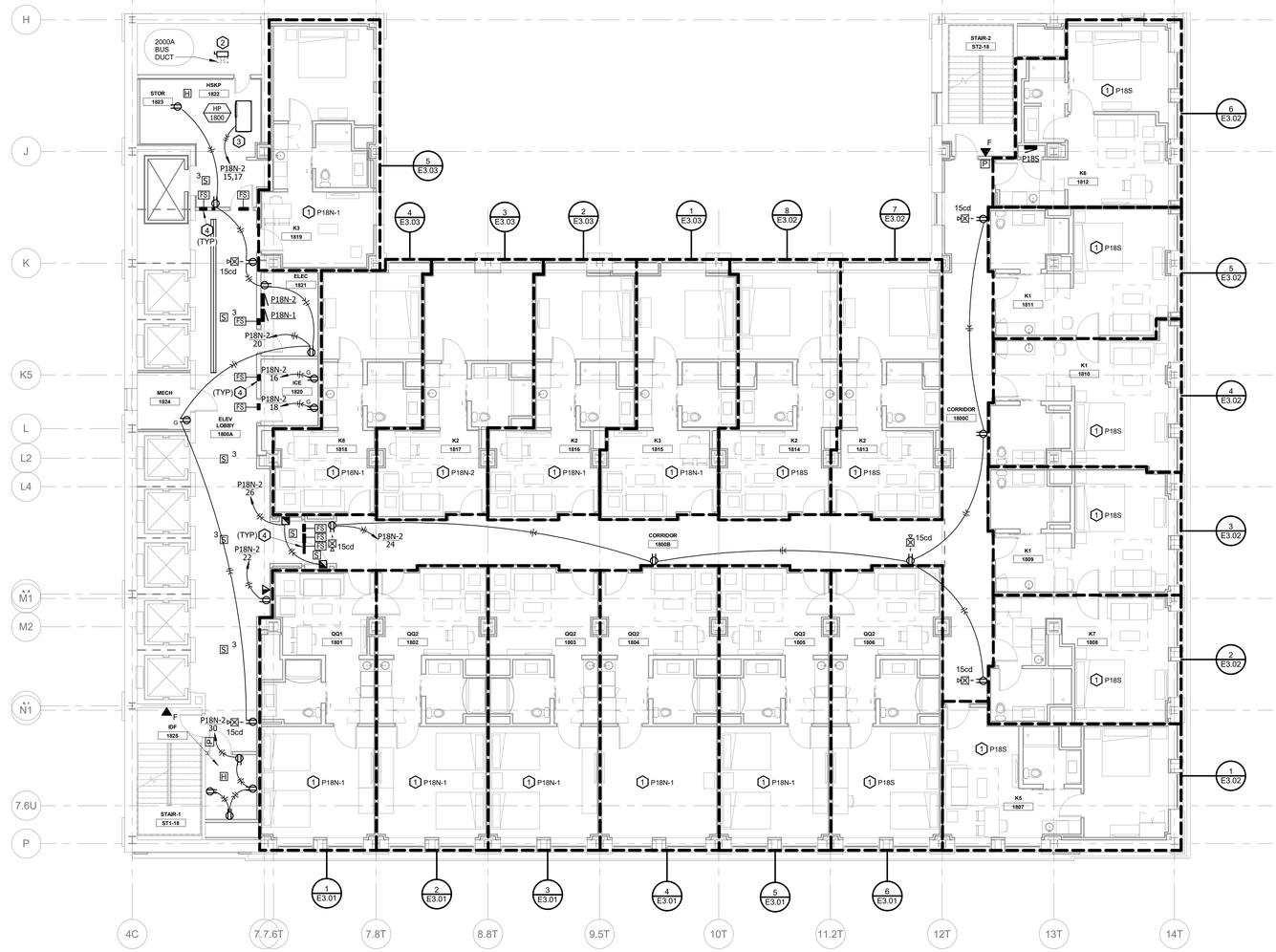

1 EIGHTEENTH FLOOR PLAN POWER & SPECIAL SYSTEMS

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E201 FOR POWER GENERAL NOTES.

PLAN NOTES:

1. ROUTE FEEDERS IN THIS ROOM TO DESIGNATED PANELBOARD. REFERENCE ASSOCIATED ENLARGED PLAN AND PANELBOARD SCHEDULE FOR MORE INFORMATION.
2. 200A BUS PLUG. REFERENCE ELECTRICAL DEMO AND NEW WORK RISER DIAGRAMS ON SHEETS E5.01 AND E5.02 FOR INFORMATION ON NEW, EXISTING TO REMAIN AND RELOCATED BUS PLUGS.
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Tower - Eighteenth Floor
Plan Power/Special Systems

E2.01-T18

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9/8/2020 10:05:04 AM

1 TOWER TWENTIETH FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.

PLAN NOTES:

1 ELEVATOR RECALL - PROVIDE SMOKE DETECTOR FOR PURPOSE OF ELEVATOR RECALL IN ELEVATOR HOISTWAY.

2 ELEVATOR HEAT DETECTOR - PROVIDE A HEAT DETECTOR ROUTED TO THE SHUNT TRIP BREAKER SERVING THE ELEVATOR TO DISCONNECT MAIN ELEVATOR POWER IN THE EVENT OF AN ALARM. HEAT DETECTOR SHALL BE LOCATED WITHIN 2'-0" OF EACH SPRINKLER HEAD SERVING THE HOISTWAY.

3 ELEVATOR FLOW SWITCH - PROVIDE A FLOW SWITCH IN THE BRANCH SPRINKLER LINE SERVING ELEVATOR HOISTWAY. CONNECT INDICATOR TO ADJACENT RELAY AND INTERLOCK WITH SHUNT TRIP BREAKER TO DISCONNECT MAIN ELEVATOR POWER IF FLOW IS DETECTED.

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Dallas, TX 75231
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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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Tower - Twentieth Flr Power & Special Systems Plan

E2.01-T20

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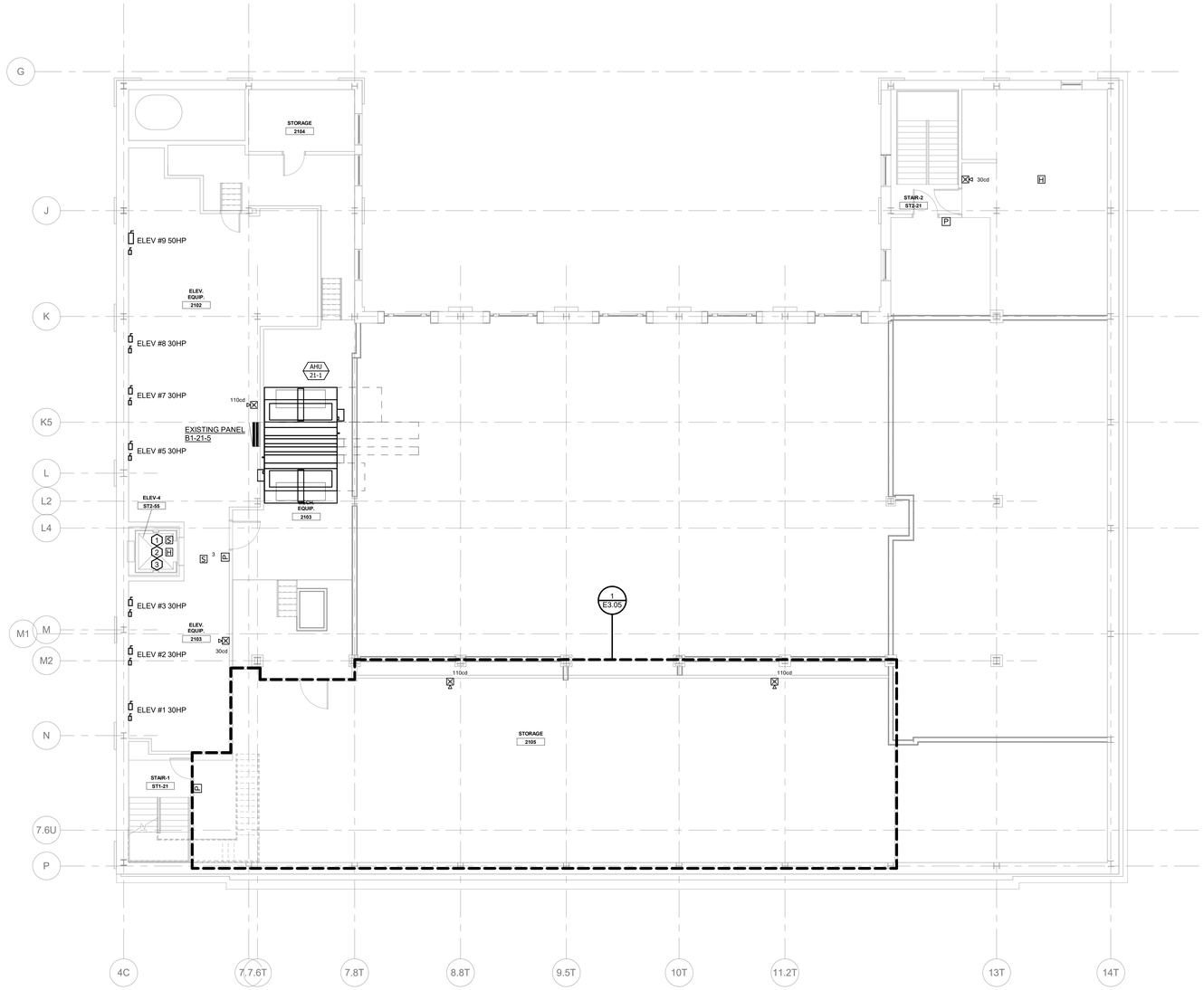

1 TOWER TWENTY FIRST FLOOR POWER & SPECIAL SYSTEMS PLAN

Scale: 1/8" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.

PLAN NOTES:

1 ELEVATOR RECALL - PROVIDE SMOKE DETECTOR FOR PURPOSE OF ELEVATOR RECALL IN ELEVATOR HOISTWAY.

2 ELEVATOR HEAT DETECTOR - PROVIDE A HEAT DETECTOR ROUTED TO THE SHUNT TRIP BREAKER SERVING THE ELEVATOR TO DISCONNECT MAIN ELEVATOR POWER IN THE EVENT OF AN ALARM. HEAT DETECTOR SHALL BE LOCATED WITHIN 2'-0" OF EACH SPRINKLER HEAD SERVING THE HOISTWAY.

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H&B PROJECT NUMBER : 1820630

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Tower - Twenty First Flr Pwr & Special Systems Plan

E2.01-T21

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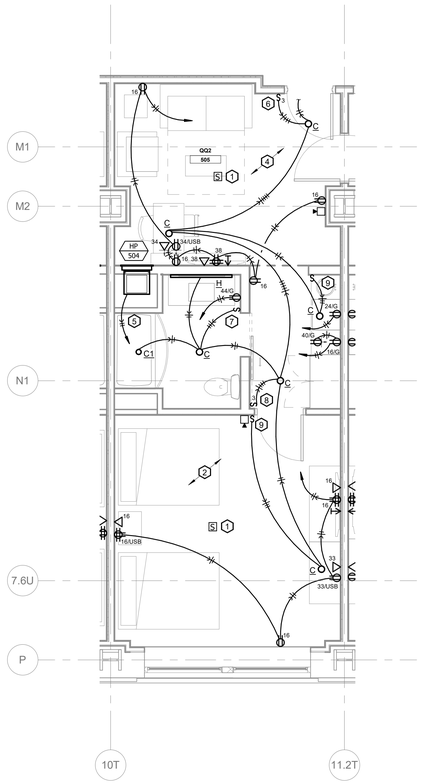
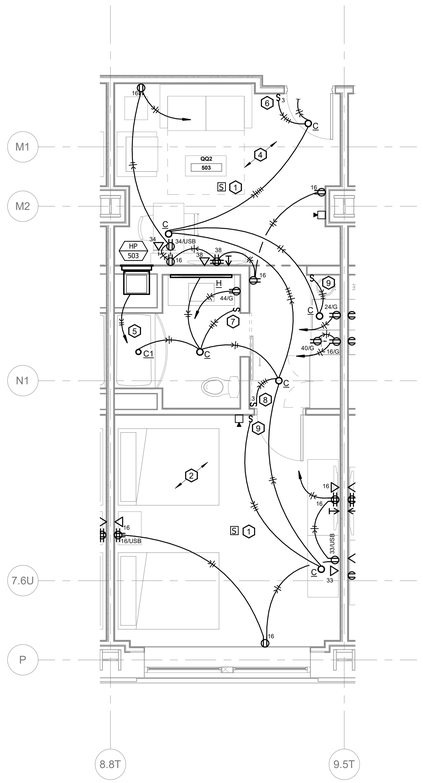


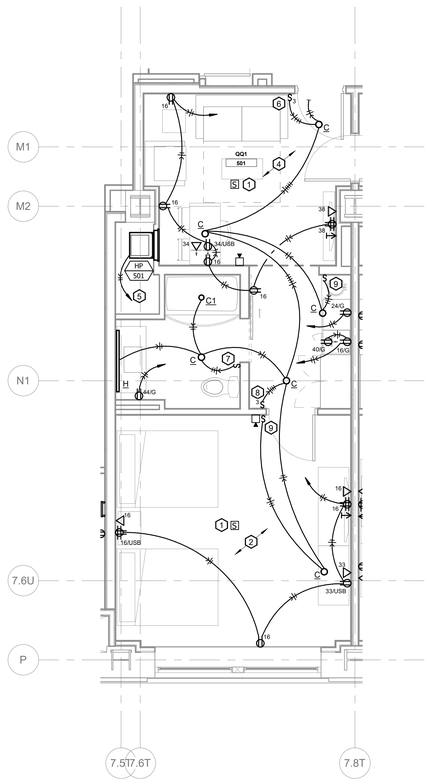
5 TYP. DOUBLE QUEEN 'E' - ELECTRICAL

Scale: 1/4" = 1'-0"



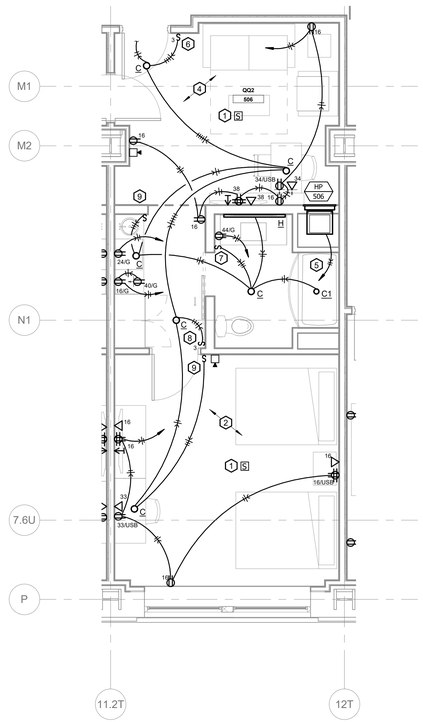
3 TYP. DOUBLE QUEEN 'C' ELECTRICAL

Scale: 1/4" = 1'-0"



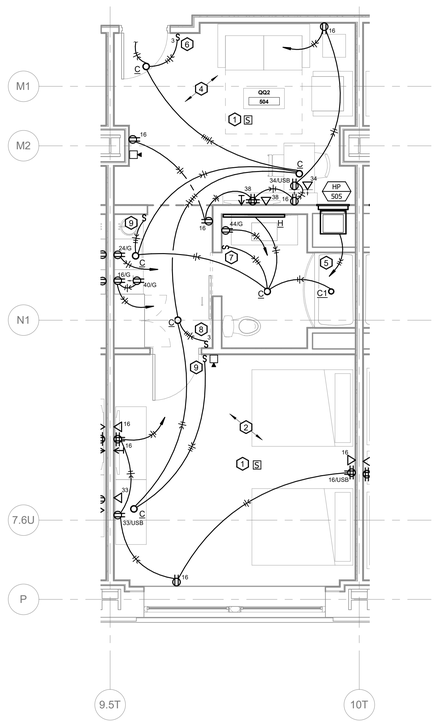
1 TYP. DOUBLE QUEEN 'A' - ELECTRICAL

Scale: 1/4" = 1'-0"



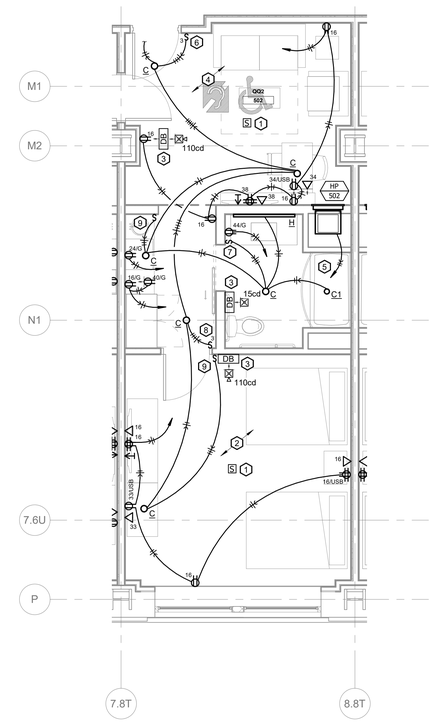
6 TYP. DOUBLE QUEEN 'F' ELECTRICAL

Scale: 1/4" = 1'-0"



4 TYP. DOUBLE QUEEN 'D' ELECTRICAL

Scale: 1/4" = 1'-0"



2 TYP. DOUBLE QUEEN 'B' ADA - ELECTRICAL

Scale: 1/4" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E201 FOR POWER GENERAL NOTES.

PLAN NOTES:

1. PROVIDE SMOKE DETECTOR WITH LOW FREQUENCY SOUNDER BASE.
2. PROVIDE JUNCTION BOX WITH 120V POWER FOR WIRELESS ACCESS POINT AND MAKE ALL REQUIRED CONNECTIONS.
3. DOOR CHIME WITH VISUAL STROBE FOR HEARING IMPAIRED ROOMS. CONNECT TO DOORBELL PUSHBUTTON AND DOORBELL DISABLE SWITCH PER MANUFACTURES INSTRUCTIONS.
4. REFERENCE OVERALL LEVEL ELECTRICAL PLANS AND PANELBOARD SCHEDULES FOR DESIGNATED PANELBOARD AND CIRCUIT NUMBERS IN EACH UNIT.
5. PROVIDE 20A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#12 & #12 GROUND WIRE IN A 1/2" CONDUIT. COORDINATION LOCATION OF DISCONNECT WITH MANUFACTURER AND INSTALL IN AN ACCESSIBLE LOCATION.
6. PROVIDE ILLUMINATED 3-WAY ROCKER SWITCH EQUAL TO LEVITON DECORA#5613-2 WITH SCREWLESS COVERPLATE.
7. PROVIDE ILLUMINATED ROCKER SWITCH EQUAL TO LEVITON DECORA#5611-2 WITH SCREWLESS COVERPLATE.
8. PROVIDE 3-WAY ROCKER SWITCH EQUAL TO LEVITON DECORA#5603-2 WITH SCREWLESS COVERPLATE.
9. PROVIDE ROCKER SWITCH EQUAL TO LEVITON DECORA#5601-2 WITH SCREWLESS COVERPLATE.

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9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
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Project No.: 18A023
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HOSS & BROWN ENGINEERS
15902 Midland Drive
Shawnee, Kansas 66217
913.362.9090 | mail@h-be.com
H&B PROJECT NUMBER : 1820630

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Enlarged Unit Plans
Electrical

E3.01

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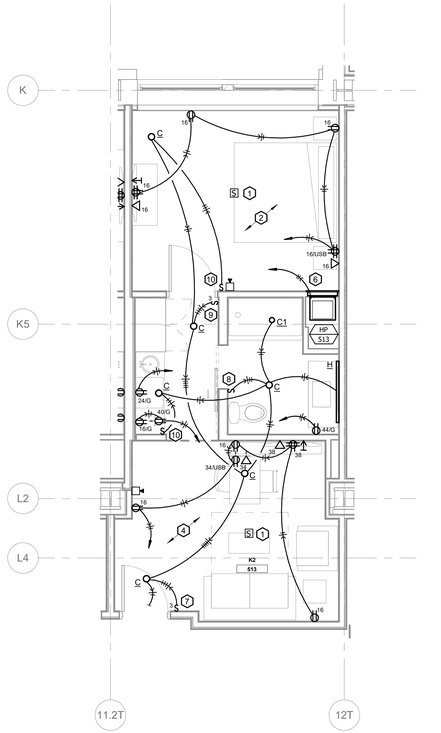
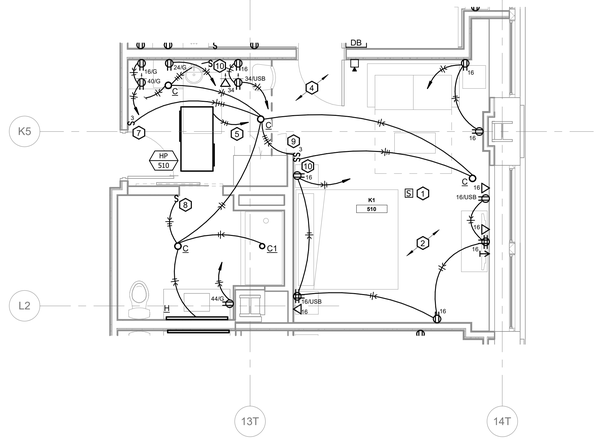


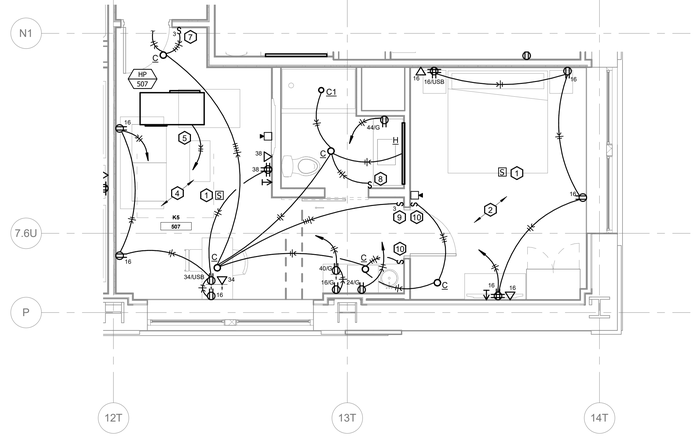
7 TYP. KING 'G' ELECTRICAL

Scale: 1/4" = 1'-0"



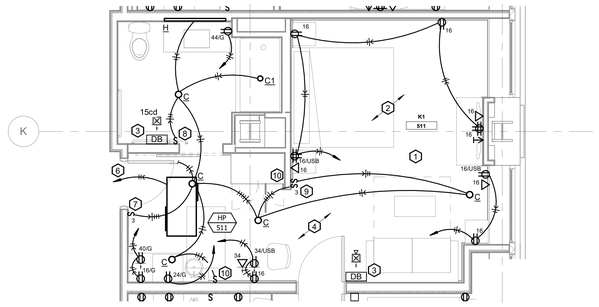
4 TYP. KING 'D' ELECTRICAL

Scale: 1/4" = 1'-0"



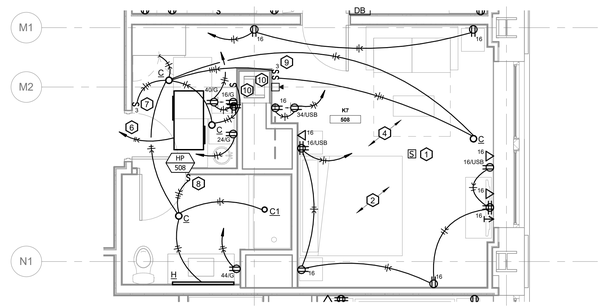
1 TYP. KING 'A' ELECTRICAL

Scale: 1/4" = 1'-0"



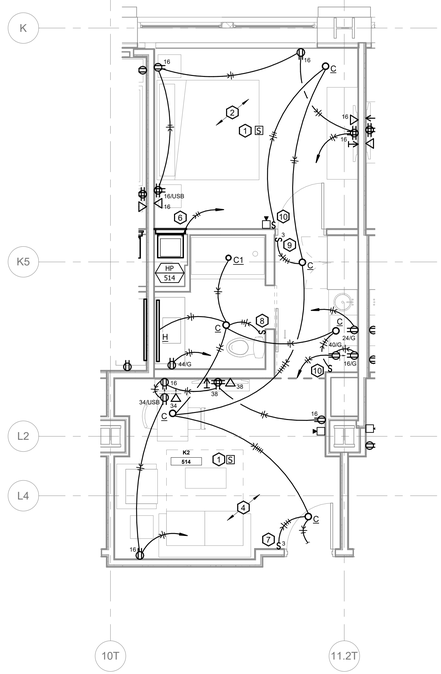
5 TYP. KING 'E' ADA ELECTRICAL

Scale: 1/4" = 1'-0"



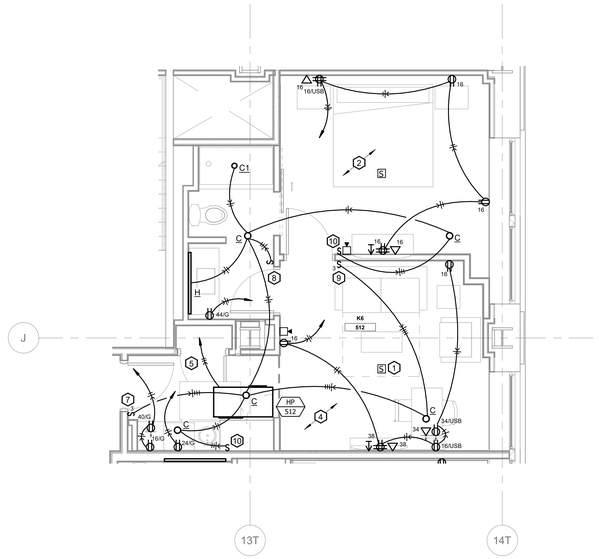
2 TYP. KING 'B' ELECTRICAL

Scale: 1/4" = 1'-0"



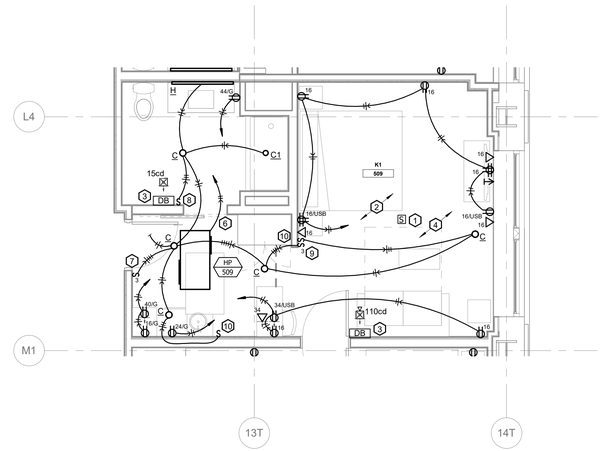
8 TYP. KING 'H' ELECTRICAL

Scale: 1/4" = 1'-0"



6 TYP. KING 'F' ELECTRICAL

Scale: 1/4" = 1'-0"



3 TYP. KING 'C' ELECTRICAL

Scale: 1/4" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E201 FOR POWER GENERAL NOTES.

PLAN NOTES:

1. PROVIDE SMOKE DETECTOR WITH LOW FREQUENCY SOUNDER BASE.
2. PROVIDE JUNCTION BOX WITH 120V POWER FOR WIRELESS ACCESS POINT AND MAKE ALL REQUIRED CONNECTIONS.
3. DOOR CHIME WITH VISUAL STROBE FOR HEARING IMPAIRED ROOMS. CONNECT TO DOORBELL PUSHBUTTON AND DOORBELL DISABLE SWITCH PER MANUFACTURES INSTRUCTIONS.
4. REFERENCE OVERALL LEVEL ELECTRICAL PLANS AND PANELBOARD SCHEDULES FOR DESIGNATED PANELBOARD AND CIRCUIT NUMBERS IN EACH UNIT.
5. PROVIDE 30A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#10 & #10 GROUND WIRE IN A 3/4" CONDUIT. COORDINATION LOCATION OF DISCONNECT WITH MANUFACTURER AND INSTALL IN AN ACCESSIBLE LOCATIO
6. PROVIDE 20A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#12 & #12 GROUND WIRE IN A 1/2" CONDUIT. COORDINATION LOCATION OF DISCONNECT WITH MANUFACTURER AND INSTALL IN AN ACCESSIBLE LOCATION.
7. PROVIDE ILLUMINATED 3-WAY ROCKER SWITCH EQUAL TO LEVITON DECORA#5613-2 WITH SCREWLESS COVERPLATE.
8. PROVIDE ILLUMINATED ROCKER SWITCH EQUAL TO LEVITON DECORA#5611-2 WITH SCREWLESS COVERPLATE.
9. PROVIDE 3-WAY ROCKER SWITCH EQUAL TO LEVITON DECORA#5603-2 WITH SCREWLESS COVERPLATE.
10. PROVIDE ROCKER SWITCH EQUAL TO LEVITON DECORA#5601-2 WITH SCREWLESS COVERPLATE.

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Enlarged Unit Plans
Electrical

E3.02

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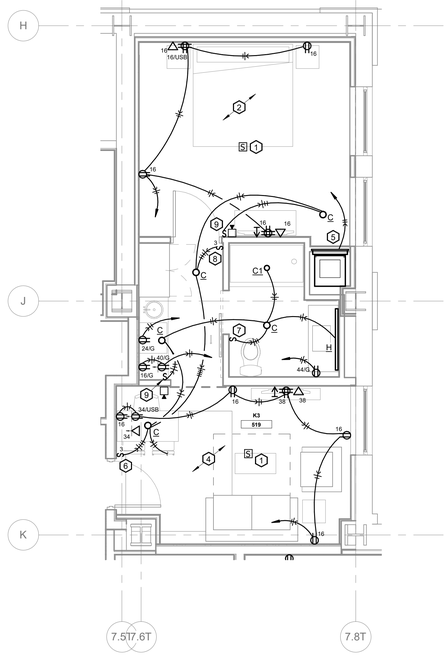
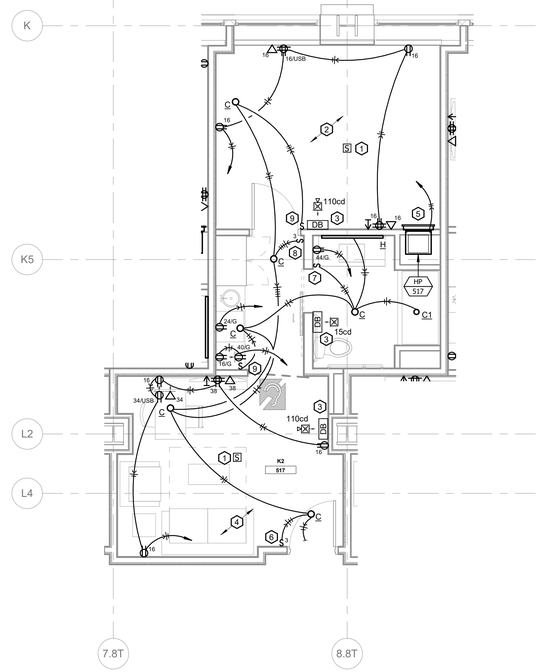


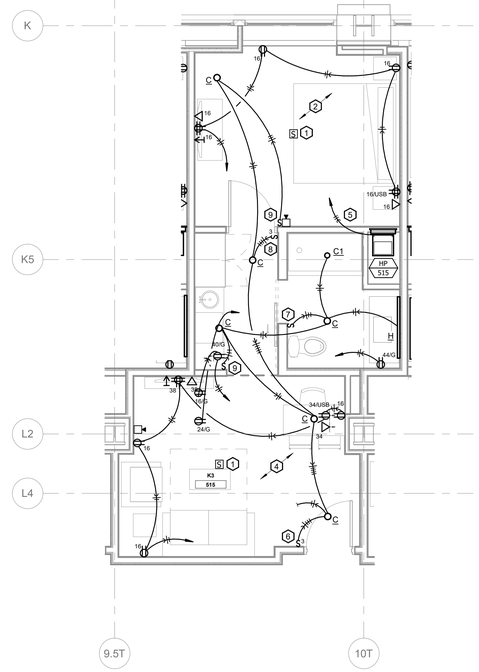
5 TYP. KING 'M' ELECTRICAL

Scale: 1/4" = 1'-0"



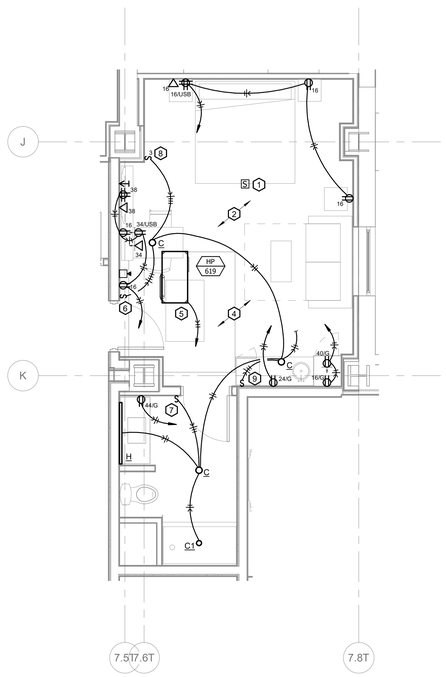
3 TYP. KING 'K' ADA ELECTRICAL

Scale: 1/4" = 1'-0"



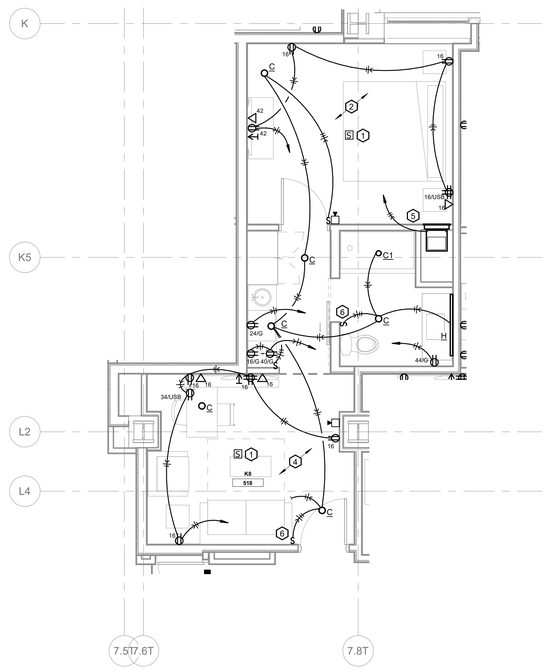
1 TYP. KING 'I' ELECTRICAL

Scale: 1/4" = 1'-0"



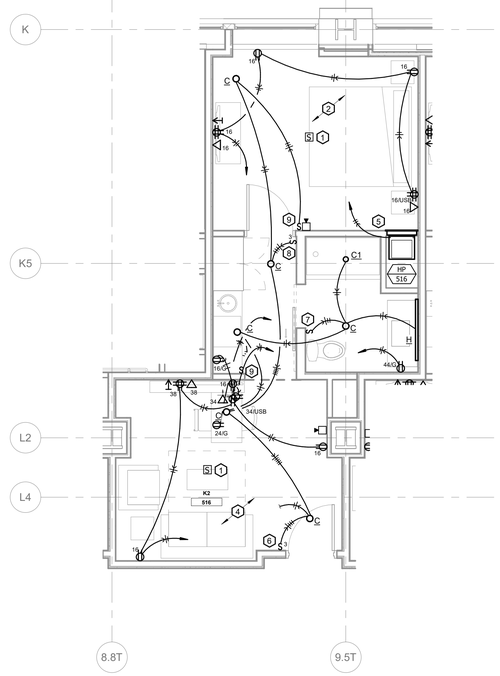
6 TYP. KING 'M1' ELECTRICAL

Scale: 1/4" = 1'-0"



4 TYP. KING 'L' ELECTRICAL

Scale: 1/4" = 1'-0"



2 TYP. KING 'J' ELECTRICAL

Scale: 1/4" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E201 FOR POWER GENERAL NOTES.

PLAN NOTES:

1. PROVIDE SMOKE DETECTOR WITH LOW FREQUENCY SOUNDER BASE.
2. PROVIDE JUNCTION BOX WITH 120V POWER FOR WIRELESS ACCESS POINT AND MAKE ALL REQUIRED CONNECTIONS.
3. DOOR CHIME WITH VISUAL STROBE FOR HEARING IMPAIRED ROOMS. CONNECT TO DOORBELL PUSHBUTTON AND DOORBELL DISABLE SWITCH PER MANUFACTURES INSTRUCTIONS.
4. REFERENCE OVERALL LEVEL ELECTRICAL PLANS AND PANELBOARD SCHEDULES FOR DESIGNATED PANELBOARD AND CIRCUIT NUMBERS IN EACH UNIT.
5. PROVIDE 20A/2P AC MOTOR RATED TOGGLE DISCONNECT SWITCH AND MAKE ELECTRICAL CONNECTION TO HEAT PUMP UNIT. HOMERUN WITH (2)#12 & #12 GROUND WIRE IN A 1/2" CONDUIT. COORDINATION LOCATION OF DISCONNECT WITH MANUFACTURER AND INSTALL IN AN ACCESSIBLE LOCATION.
6. PROVIDE ILLUMINATED 3-WAY ROCKER SWITCH EQUAL TO LEVITON DECORA#5613-2 WITH SCREWLESS COVERPLATE.
7. PROVIDE ILLUMINATED ROCKER SWITCH EQUAL TO LEVITON DECORA#5611-2 WITH SCREWLESS COVERPLATE.
8. PROVIDE 3-WAY ROCKER SWITCH EQUAL TO LEVITON DECORA#5603-2 WITH SCREWLESS COVERPLATE.
9. PROVIDE ROCKER SWITCH EQUAL TO LEVITON DECORA#5601-2 WITH SCREWLESS COVERPLATE.

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STATE OF MISSOURI
CASEY JOHN STEPHENS
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Enlarged Unit Plans
Electrical

E3.03

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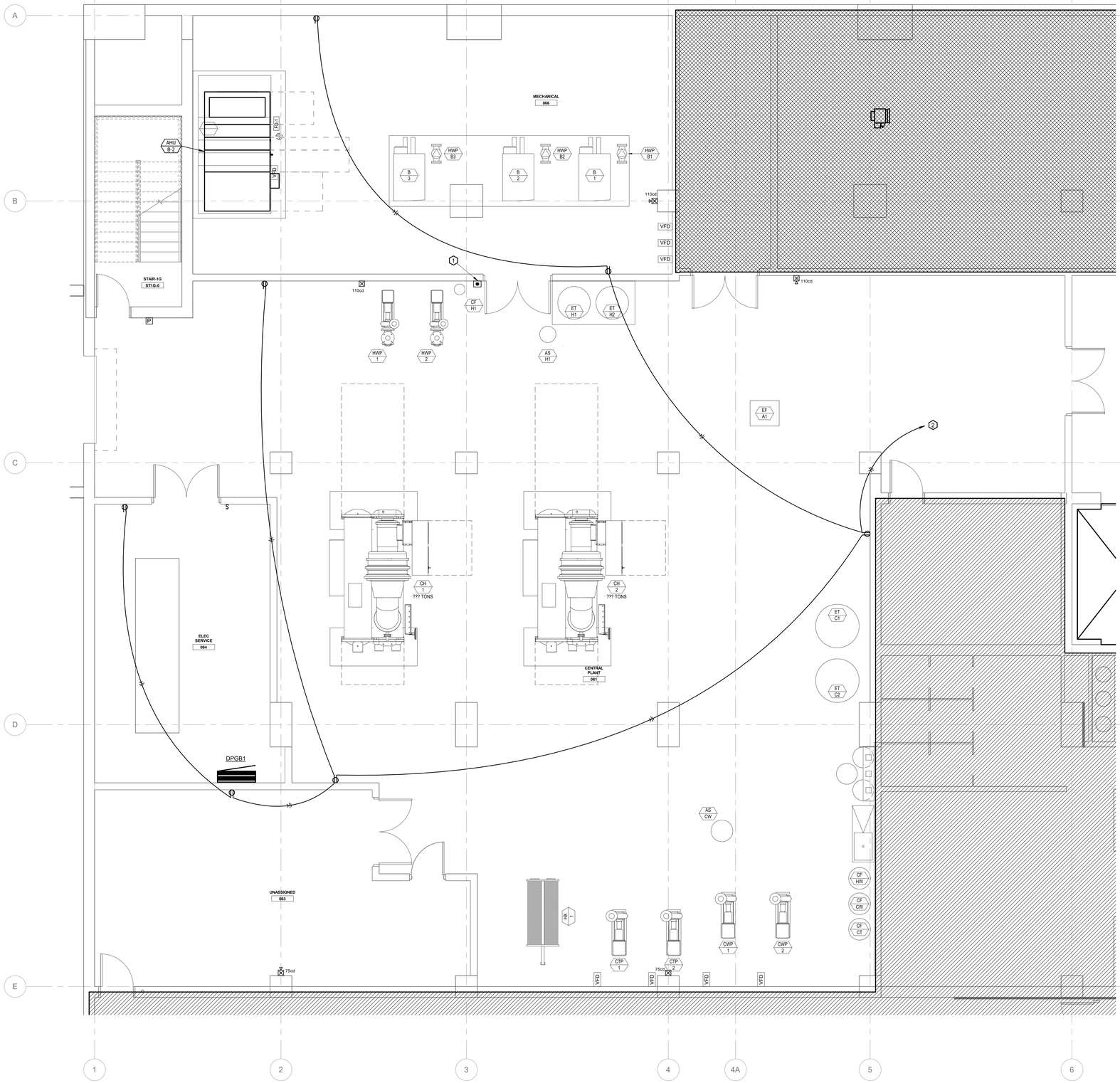

1 GARAGE BASEMENT FLOOR ELECTRICAL PLAN

Scale: 1/4" = 1'-0"

GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.

PLAN NOTES:

1 BOILER EMERGENCY SHUTOFF. PROVIDE CONTINUOUS CONTACT RED MUSHROOM SWITCH AND LABEL AS "BOILER SHUTDOWN". INTERLOCK SWITCH WITH ALL BOILERS SO CONTROL POWER IS REMOVED WHEN BUTTON IS PUSHED. COMPLETE INSTALLATION SHALL MEET THE REQUIREMENTS OF CSD-1. INSTALL BUTTON AT 66" AFF.

2 ROUTE HOMERUN TO NEAREST AVAILABLE 120V PANELBOARD. TERMINATE ON A SPARE 20A, SINGLE POLE CIRCUIT BREAKER.

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The Grand Reserve

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Kansas City, MO 64198

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Electrical Enlarged Plan

E3.04

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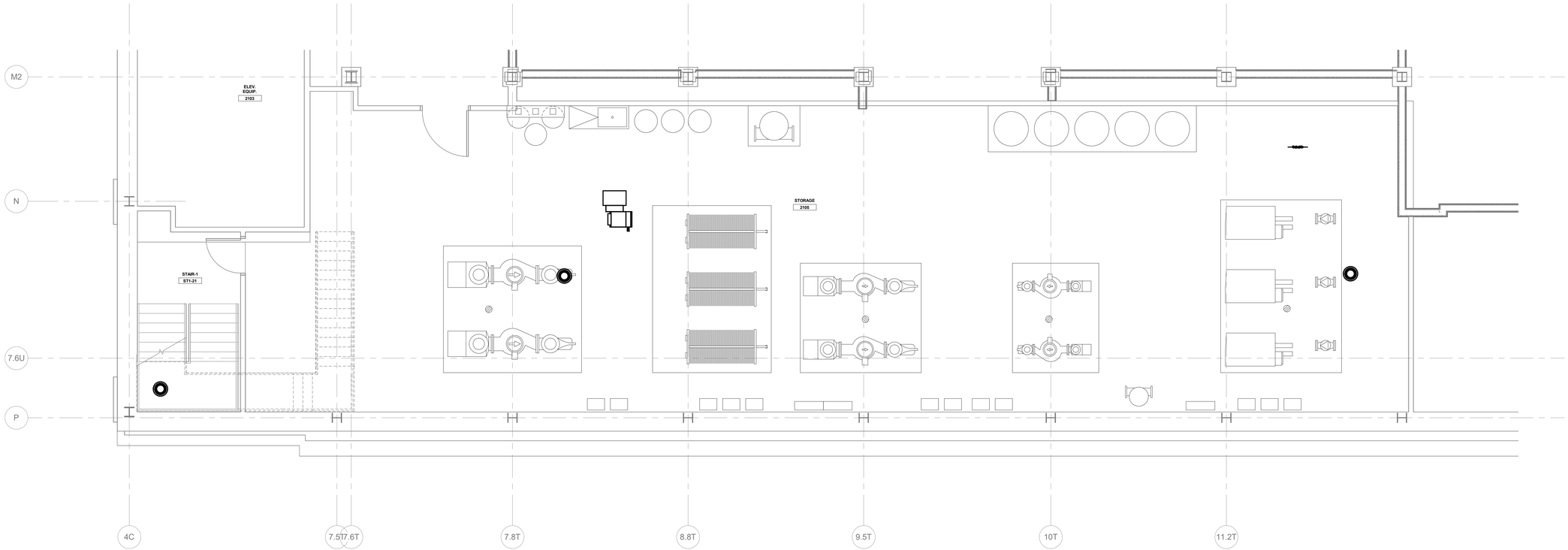
GENERAL NOTES:

A. REFERENCE SHEET E2.01-G FOR POWER AND SPECIAL SYSTEMS GENERAL NOTES.



1 TOWER TWENTY FIRST FLOOR ELECTRICAL PLAN

Scale: 1/4" = 1'-0"

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Electrical Enlarged Plan

E3.05

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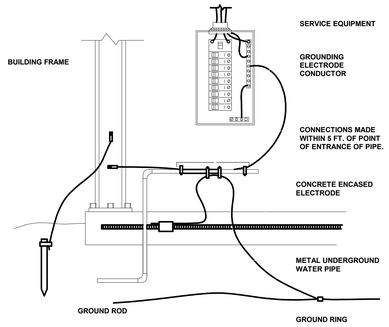
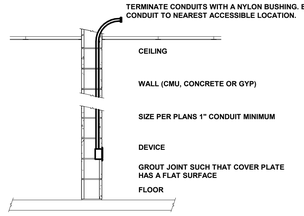


3 GROUNDING ELECTRODE SYSTEM

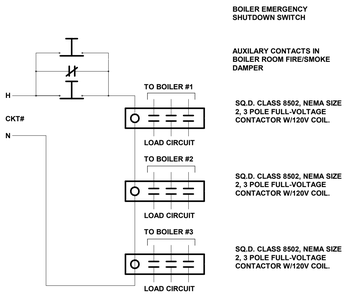
Scale: Not to Scale



NOTES:
1. DEVICE MOUNTED AT NORMAL RECEPTACLE HEIGHT UNLESS NOTED OTHERWISE. REFER TO PLANS FOR MOUNTING HEIGHTS.
2. REFER TO SPECS FOR OTHER INSTALLATION REQUIREMENTS.

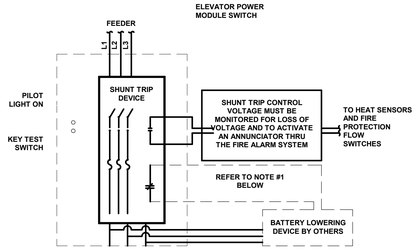
2 DATA CONDUIT AND BACK BOX

Scale: Not to Scale



4 EMERGENCY BOILER SHUTDOWN DETAIL

Scale: Not to Scale



NOTES:
1. AUXILARY CONTACT FOR BATTERY LOWERING DEVICES REQUIRED, BY ART. 620-91 (C) TO BE PROVIDED OVERCURRENT PROTECTION AND LOCKABLE IN THE OPEN POSITION, EXTERNALLY OPERABLE.

1 ELEVATOR SHUNT TRIP DEVICE DIAGRAM

Scale: Not to Scale

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PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
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REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Electrical Details

E4.01

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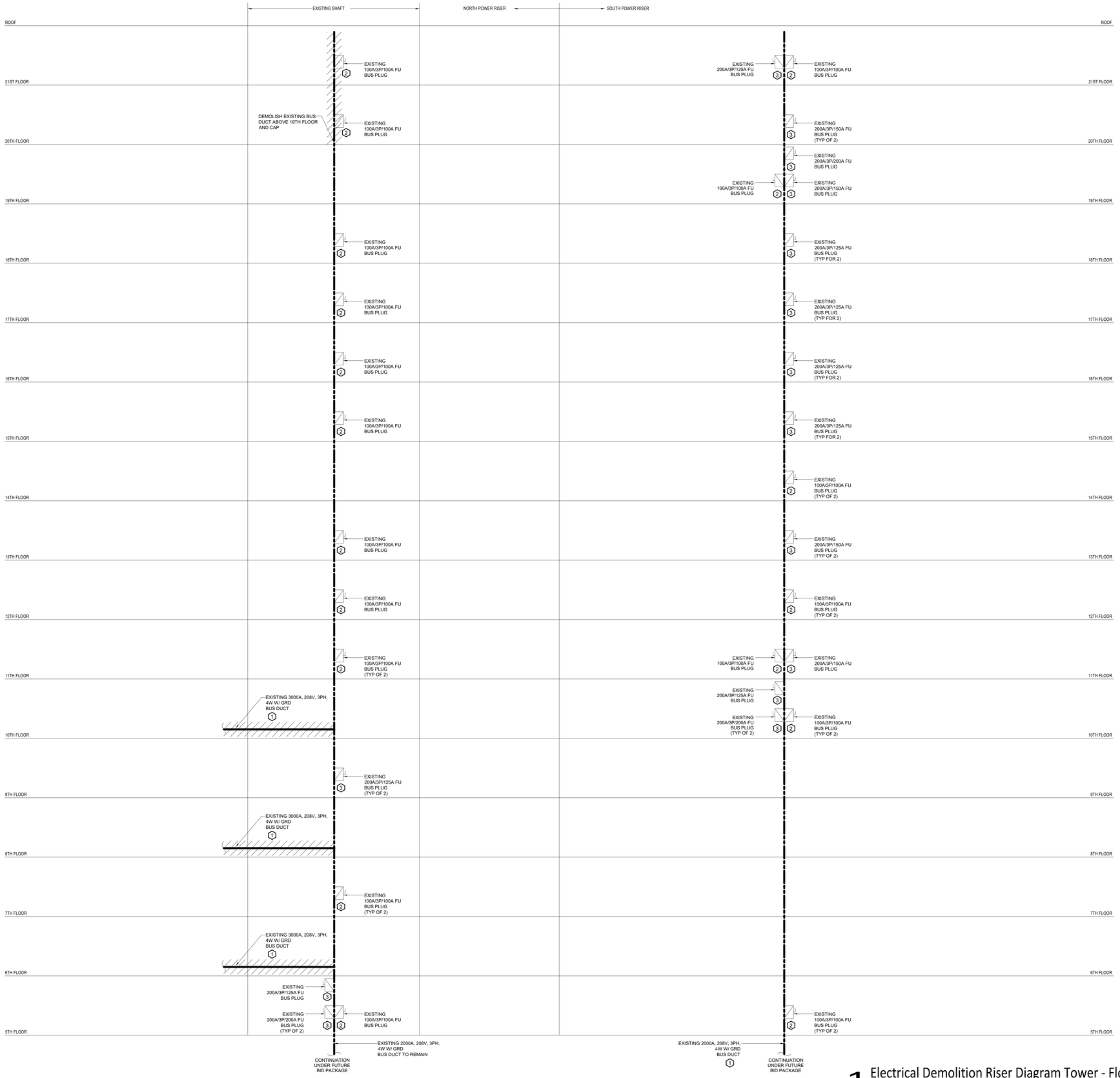

1 Electrical Demolition Riser Diagram Tower - Floors 5th - 19th

Scale: Not to Scale

GENERAL NOTES:

A. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE ROUTING OF ALL FEEDERS THROUGH BUILDING.

(#) PLAN NOTES:

1 DEMOLISH EXISTING BUS DUCT.

2 DEMOLISH EXISTING BUS PLUG AND TURN OVER TO OWNER.

3 DEMOLISH EXISTING BUS PLUG AND RETAIN FOR REUSE. RELOCATE TO NORTH BUS RISER AS INDICATED ON SHEET E5.02.

FEEDER SCHEDULE:

204 PROVIDE 4#3/0 & 1#6 GRD. IN 2"C.

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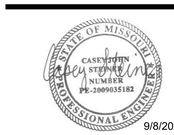

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Electrical Demo Riser Diagram

E5.01

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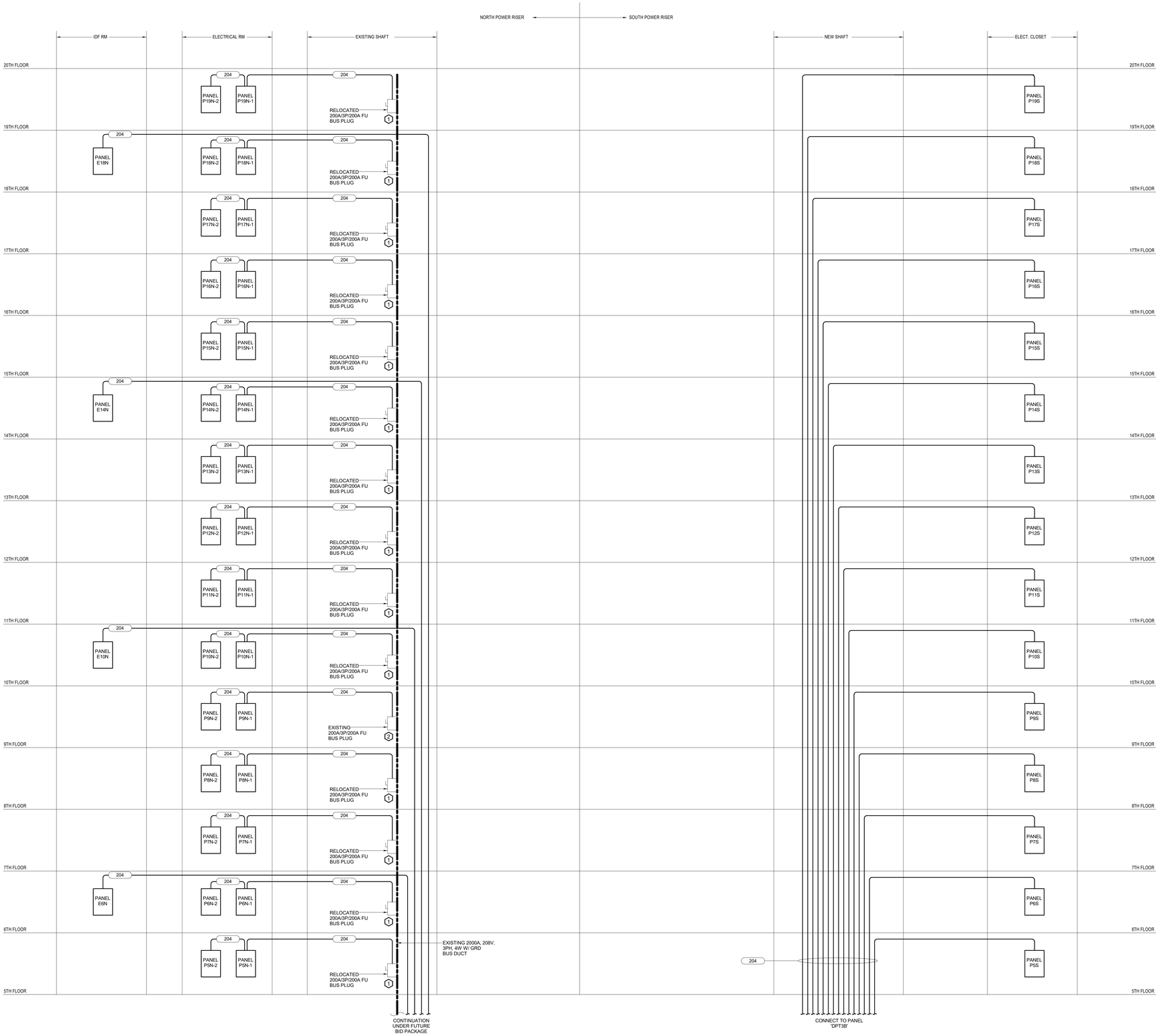

1 Electrical New Work Riser Diagram Tower - Floors 5th - 19th

Scale: Not to Scale

GENERAL NOTES:

A. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE ROUTING OF ALL FEEDERS THROUGH BUILDING.

(#) PLAN NOTES:

1. REUSE EXISTING PREVIOUSLY DEMOLISHED BUS PLUG AND PROVIDE NEW FUSES AS INDICATED. REFER TO SHEET E5.01 FOR ADDITIONAL INFORMATION.

2. EXISTING BUS PLUG. PROVIDE NEW FUSES AS INDICATED.

FEEDER SCHEDULE:

204 PROVIDE 4#3/0 & 1#6 GRD. IN 2"C.

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9/8/2020

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Electrical Riser Diagram

E5.02

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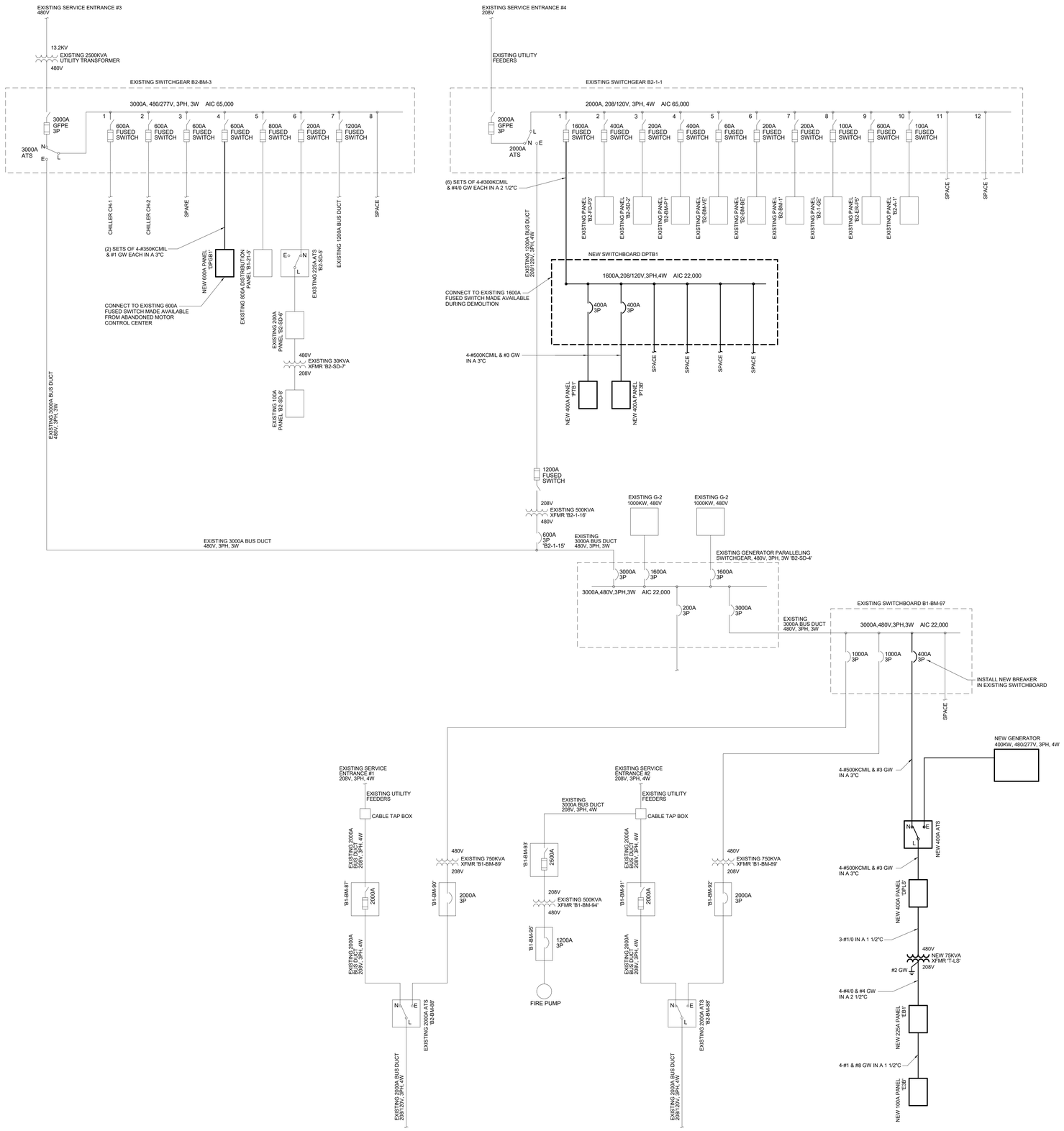

1 ELECTRICAL ONE-LINE DIAGRAM

Scale: Not to Scale

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Electrical Riser Diagram

E5.03

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TYPICAL FOR PANELBOARD SCHEDULES P14N-1 & P17N-1

PANEL P8N-1

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 50kW= 137A
DEMANDED LOAD CONTINUOUS: 43kW= 120A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 801 LIVING RM	1	20	A	20	1	RCPT - UNIT 802 LIVING RM	1080	2
3	180	RCPT - UNIT 801 RR	1	20	B	20	1	RCPT - UNIT 802 RR	180	4
5	750	RCPT - UNIT 801 REFRIG.	1	20	C	20	1	RCPT - UNIT 802 REFRIG.	750	6
7	1200	RCPT - UNIT 801 MICRO.	1	20	A	20	1	RCPT - UNIT 802 MICRO.	1200	8
9	720	RCPT - UNIT 801 BEDROOM	1	20	B	20	1	RCPT - UNIT 802 BEDROOM	720	10
11	1050	HP-801	2	20	C	20	2	HP-802	1050	12
13	1050				A				1050	14
15	720	LTG - UNITS 801 TO 806	1	20	B	20	1	LTG - UNITS 815 TO 819	540	16
17	1080	RCPT - UNIT 803 LIVING RM	1	20	C	20	1	RCPT - UNIT 804 LIVING RM	1080	18
19	180	RCPT - UNIT 803 RR	1	20	A	20	1	RCPT - UNIT 804 RR	180	20
21	750	RCPT - UNIT 803 REFRIG.	1	20	B	20	1	RCPT - UNIT 804 REFRIG.	750	22
23	1200	RCPT - UNIT 803 MICRO.	1	20	C	20	1	RCPT - UNIT 804 MICRO.	1200	24
25	720	RCPT - UNIT 803 BEDROOM	1	20	A	20	1	RCPT - UNIT 804 BEDROOM	720	26
27	1050	HP-803	2	20	B	20	2	HP-804	1050	28
29	1050				C				1050	30
31	1080	RCPT - UNIT 805 LIVING RM	1	20	A	20	1	RCPT - UNIT 816 LIVING RM	1080	32
33	180	RCPT - UNIT 805 RR	1	20	B	20	1	RCPT - UNIT 816 RR	180	34
35	750	RCPT - UNIT 805 REFRIG.	1	20	C	20	1	RCPT - UNIT 816 REFRIG.	750	36
37	1200	RCPT - UNIT 805 MICRO.	1	20	A	20	1	RCPT - UNIT 816 MICRO.	1200	38
39	720	RCPT - UNIT 805 BEDROOM	1	20	B	20	1	RCPT - UNIT 816 BEDROOM	720	40
41	1050	HP-805	2	20	C	20	2	HP-816	1050	42
43	1050				A				1050	44
45	1080	RCPT - UNIT 815 LIVING RM	1	20	B	20	1	RCPT - UNIT 818 LIVING RM	1080	46
47	180	RCPT - UNIT 815 RR	1	20	C	20	1	RCPT - UNIT 818 RR	180	48
49	750	RCPT - UNIT 815 REFRIG.	1	20	A	20	1	RCPT - UNIT 818 REFRIG.	750	50
51	1200	RCPT - UNIT 815 MICRO.	1	20	B	20	1	RCPT - UNIT 818 MICRO.	1200	52
53	720	RCPT - UNIT 815 BEDROOM	1	20	C	20	1	RCPT - UNIT 818 BEDROOM	720	54
55	1050	HP-815	2	20	A	20	2	HP-818	1050	56
57	1050				B				1050	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

TYPICAL FOR PANELBOARD SCHEDULES P10N-1, P13N-1, P16N-1 & P19N-1

PANEL P7N-1

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 50kW= 137A
DEMANDED LOAD CONTINUOUS: 43kW= 120A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 701 LIVING RM	1	20	A	20	1	RCPT - UNIT 702 LIVING RM	1080	2
3	180	RCPT - UNIT 701 RR	1	20	B	20	1	RCPT - UNIT 702 RR	180	4
5	750	RCPT - UNIT 701 REFRIG.	1	20	C	20	1	RCPT - UNIT 702 REFRIG.	750	6
7	1200	RCPT - UNIT 701 MICRO.	1	20	A	20	1	RCPT - UNIT 702 MICRO.	1200	8
9	720	RCPT - UNIT 701 BEDROOM	1	20	B	20	1	RCPT - UNIT 702 BEDROOM	720	10
11	1050	HP-701	2	20	C	20	2	HP-702	1050	12
13	1050				A				1050	14
15	720	LTG - UNITS 701 TO 706	1	20	B	20	1	LTG - UNITS 715 TO 719	540	16
17	1080	RCPT - UNIT 703 LIVING RM	1	20	C	20	1	RCPT - UNIT 704 LIVING RM	1080	18
19	180	RCPT - UNIT 703 RR	1	20	A	20	1	RCPT - UNIT 704 RR	180	20
21	750	RCPT - UNIT 703 REFRIG.	1	20	B	20	1	RCPT - UNIT 704 REFRIG.	750	22
23	1200	RCPT - UNIT 703 MICRO.	1	20	C	20	1	RCPT - UNIT 704 MICRO.	1200	24
25	720	RCPT - UNIT 703 BEDROOM	1	20	A	20	1	RCPT - UNIT 704 BEDROOM	720	26
27	1050	HP-703	2	20	B	20	2	HP-704	1050	28
29	1050				C				1050	30
31	1080	RCPT - UNIT 705 LIVING RM	1	20	A	20	1	RCPT - UNIT 716 LIVING RM	1080	32
33	180	RCPT - UNIT 705 RR	1	20	B	20	1	RCPT - UNIT 716 RR	180	34
35	750	RCPT - UNIT 705 REFRIG.	1	20	C	20	1	RCPT - UNIT 716 REFRIG.	750	36
37	1200	RCPT - UNIT 705 MICRO.	1	20	A	20	1	RCPT - UNIT 716 MICRO.	1200	38
39	720	RCPT - UNIT 705 BEDROOM	1	20	B	20	1	RCPT - UNIT 716 BEDROOM	720	40
41	1050	HP-705	2	20	C	20	2	HP-716	1050	42
43	1050				A				1050	44
45	1080	RCPT - UNIT 715 LIVING RM	1	20	B	20	1	RCPT - UNIT 718 LIVING RM	1080	46
47	180	RCPT - UNIT 715 RR	1	20	C	20	1	RCPT - UNIT 718 RR	180	48
49	750	RCPT - UNIT 715 REFRIG.	1	20	A	20	1	RCPT - UNIT 718 REFRIG.	750	50
51	1200	RCPT - UNIT 715 MICRO.	1	20	B	20	1	RCPT - UNIT 718 MICRO.	1200	52
53	720	RCPT - UNIT 715 BEDROOM	1	20	C	20	1	RCPT - UNIT 718 BEDROOM	720	54
55	1050	HP-715	2	20	A	20	2	HP-718	1050	56
57	1050				B				1050	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

PANEL P6N-1

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 50kW= 137A
DEMANDED LOAD CONTINUOUS: 43kW= 120A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 601 LIVING RM	1	20	A	20	1	RCPT - UNIT 602 LIVING RM	1080	2
3	180	RCPT - UNIT 601 RR	1	20	B	20	1	RCPT - UNIT 602 RR	180	4
5	750	RCPT - UNIT 601 REFRIG.	1	20	C	20	1	RCPT - UNIT 602 REFRIG.	750	6
7	1200	RCPT - UNIT 601 MICRO.	1	20	A	20	1	RCPT - UNIT 602 MICRO.	1200	8
9	720	RCPT - UNIT 601 BEDROOM	1	20	B	20	1	RCPT - UNIT 602 BEDROOM	720	10
11	1050	HP-601	2	20	C	20	2	HP-602	1050	12
13	1050				A				1050	14
15	720	LTG - UNITS 601 TO 606	1	20	B	20	1	LTG - UNITS 615 TO 619	540	16
17	1080	RCPT - UNIT 603 LIVING RM	1	20	C	20	1	RCPT - UNIT 604 LIVING RM	1080	18
19	180	RCPT - UNIT 603 RR	1	20	A	20	1	RCPT - UNIT 604 RR	180	20
21	750	RCPT - UNIT 603 REFRIG.	1	20	B	20	1	RCPT - UNIT 604 REFRIG.	750	22
23	1200	RCPT - UNIT 603 MICRO.	1	20	C	20	1	RCPT - UNIT 604 MICRO.	1200	24
25	720	RCPT - UNIT 603 BEDROOM	1	20	A	20	1	RCPT - UNIT 604 BEDROOM	720	26
27	1050	HP-603	2	20	B	20	2	HP-604	1050	28
29	1050				C				1050	30
31	1080	RCPT - UNIT 605 LIVING RM	1	20	A	20	1	RCPT - UNIT 616 LIVING RM	1080	32
33	180	RCPT - UNIT 605 RR	1	20	B	20	1	RCPT - UNIT 616 RR	180	34
35	750	RCPT - UNIT 605 REFRIG.	1	20	C	20	1	RCPT - UNIT 616 REFRIG.	750	36
37	1200	RCPT - UNIT 605 MICRO.	1	20	A	20	1	RCPT - UNIT 616 MICRO.	1200	38
39	720	RCPT - UNIT 605 BEDROOM	1	20	B	20	1	RCPT - UNIT 616 BEDROOM	720	40
41	1050	HP-605	2	20	C	20	2	HP-616	1050	42
43	1050				A				1050	44
45	1080	RCPT - UNIT 615 LIVING RM	1	20	B	20	1	RCPT - UNIT 618 LIVING RM	1080	46
47	180	RCPT - UNIT 615 RR	1	20	C	20	1	RCPT - UNIT 618 RR	180	48
49	750	RCPT - UNIT 615 REFRIG.	1	20	A	20	1	RCPT - UNIT 618 REFRIG.	750	50
51	1200	RCPT - UNIT 615 MICRO.	1	20	B	20	1	RCPT - UNIT 618 MICRO.	1200	52
53	720	RCPT - UNIT 615 BEDROOM	1	20	C	20	1	RCPT - UNIT 618 BEDROOM	720	54
55	1050	HP-615	2	20	A	20	2	HP-618	1050	56
57	1050				B				1050	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

PANEL P5N-1

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 50kW= 137A
DEMANDED LOAD CONTINUOUS: 43kW= 120A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 501 LIVING RM	1	20	A	20	1	RCPT - UNIT 502 LIVING RM	1080	2
3	180	RCPT - UNIT 501 RR	1	20	B	20	1	RCPT - UNIT 502 RR	180	4
5	750	RCPT - UNIT 501 REFRIG.	1	20	C	20	1	RCPT - UNIT 502 REFRIG.	750	6
7	1200	RCPT - UNIT 501 MICRO.	1	20	A	20	1	RCPT - UNIT 502 MICRO.	1200	8
9	720	RCPT - UNIT 501 BEDROOM	1	20	B	20	1	RCPT - UNIT 502 BEDROOM	720	10
11	1050	HP-501	2	20	C	20	2	HP-502	1050	12
13	1050				A				1050	14
15	720	LTG - UNITS 501 TO 506	1	20	B	20	1	LTG - UNITS 515 TO 519	540	16
17	1080	RCPT - UNIT 503 LIVING RM	1	20	C	20	1	RCPT - UNIT 504 LIVING RM	1080	18
19	180	RCPT - UNIT 503 RR	1	20	A	20	1	RCPT - UNIT 504 RR	180	20
21	750	RCPT - UNIT 503 REFRIG.	1	20	B	20	1	RCPT - UNIT 504 REFRIG.	750	22
23	1200	RCPT - UNIT 503 MICRO.	1	20	C	20	1	RCPT - UNIT 504 MICRO.	1200	24
25	720	RCPT - UNIT 503 BEDROOM	1	20	A	20	1	RCPT - UNIT 504 BEDROOM	720	26
27	1050	HP-503	2	20	B	20	2	HP-504	1050	28
29	1050				C				1050	30
31	1080	RCPT - UNIT 505 LIVING RM	1	20	A	20	1	RCPT - UNIT 516 LIVING RM	1080	32
33	180	RCPT - UNIT 505 RR	1	20	B	20	1	RCPT - UNIT 516 RR	180	34
35	750	RCPT - UNIT 505 REFRIG.	1	20	C	20	1	RCPT - UNIT 516 REFRIG.	750	36
37	1200	RCPT - UNIT 505 MICRO.	1	20	A	20	1	RCPT - UNIT 516 MICRO.	1200	38
39	720	RCPT - UNIT 505 BEDROOM	1	20	B	20	1	RCPT - UNIT 516 BEDROOM	720	40
41	1050	HP-505	2	20	C	20	2	HP-516	1050	42
43	1050				A				1050	44
45	1080	RCPT - UNIT 515 LIVING RM	1	20	B	20	1	RCPT - UNIT 518 LIVING RM	1080	46
47	180	RCPT - UNIT 515 RR	1	20	C	20	1	RCPT - UNIT 518 RR	180	48
49	750	RCPT - UNIT 515 REFRIG.	1	20	A	20	1	RCPT - UNIT 518 REFRIG.	750	50
51	1200	RCPT - UNIT 515 MICRO.	1	20	B	20	1	RCPT - UNIT 518 MICRO.	1200	52
53	720	RCPT - UNIT 515 BEDROOM	1	20	C	20	1	RCPT - UNIT 518 BEDROOM	720	54
55	1050	HP-515	2	20	A	20	2	HP-518	1050	56
57	1050				B				1050	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

TYPICAL FOR PANELBOARD SCHEDULES P14N-2 & P17N-2

PANEL P8N-2

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 23kW= 64A
DEMANDED LOAD CONTINUOUS: 25kW= 70A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 817 LIVING RM	1	20	A	20	1	RCPT - UNIT 819 LIVING RM	1080	2
3	180	RCPT - UNIT 817 RR	1	20	B	20	1	RCPT - UNIT 819 RR	180	4
5	750	RCPT - UNIT 817 REFRIG.	1	20	C	20	1	RCPT - UNIT 819 REFRIG.	750	6
7	1200	RCPT - UNIT 817 MICRO.	1	20	A	20	1	RCPT - UNIT 819 MICRO.	1200	8
9	720	RCPT - UNIT 817 BEDROOM	1	20	B	20	1	RCPT - UNIT 819 BEDROOM	720	10
11	1050	HP-817	2	20	C	30	2	HP-819	1500	12
13	1050				A				1500	14
15	1800	HP-800	2	30	B	20	1	RCPT - VENDING MACH.	1000	16
17	1800				C	20	1	RCPT - ICE MACHINE	1200	18
19	100	FS DAMPERS	1	20	A	20	1	RCPT - CONVENIENCE	1260	20
21	-	SPARE	1	20	B	20	1	RCPT - CONSOLE TABLE	180	22
23	-	SPARE	1	20	C	20	1	RCPT - CONVENIENCE	1080	24
25	-	SPARE	1	20	A	20	1	DOOR HOLD OPENS	100	26
27	-	SPARE	1	20	B	20	1	LTG - CORR./ELEV. LOBBY	920	28
29	-	SPARE	1	20	C	20	1	RCPT - IDF	720	30
31	-	SPARE	1	20	A	20	1	SPARE	-	32
33	-	SPARE	1	20	B	20	1	SPARE	-	34
35	-	SPARE	1	20	C	20	1	SPARE	-	36
37	-	SPARE	1	20	A	20	1	SPARE	-	38
39	-	SPARE	1	20	B	20	1	SPARE	-	40
41	-	SPARE	1	20	C	20	1	SPARE	-	42
43	-	SPARE	1	20	A	20	1	SPARE	-	44
45	-	SPARE	1	20	B	20	1	SPARE	-	46
47	-	SPARE	1	20	C	20	1	SPARE	-	48
49	-	SPARE	1	20	A	20	1	SPARE	-	50
51	-	SPARE	1	20	B	20	1	SPARE	-	52
53	-	SPARE	1	20	C	20	1	SPARE	-	54
55	-	SPARE	1	20	A	20	1	SPARE	-	56
57	-	SPARE	1	20	B	20	1	SPARE	-	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

TYPICAL FOR PANELBOARD SCHEDULES P10N-2, P13N-2, P16N-2 & P19N-2

PANEL P7N-2

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 23kW= 64A
DEMANDED LOAD CONTINUOUS: 25kW= 69A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 717 LIVING RM	1	20	A	20	1	RCPT - UNIT 719 LIVING RM	1080	2
3	180	RCPT - UNIT 717 RR	1	20	B	20	1	RCPT - UNIT 719 RR	180	4
5	750	RCPT - UNIT 717 REFRIG.	1	20	C	20	1	RCPT - UNIT 719 REFRIG.	750	6
7	1200	RCPT - UNIT 717 MICRO.	1	20	A	20	1	RCPT - UNIT 719 MICRO.	1200	8
9	720	RCPT - UNIT 717 BEDROOM	1	20	B	20	1	RCPT - UNIT 719 BEDROOM	720	10
11	1050	HP-717	2	20	C	30	2	HP-719	1500	12
13	1050				A				1500	14
15	1800	HP-700	2	30	B	20	1	RCPT - VENDING MACH.	1000	16
17	1800				C	20	1	RCPT - ICE MACHINE	1200	18
19	100	FS DAMPERS	1	20	A	20	1	RCPT - CONVENIENCE	1260	20
21	-	SPARE	1	20	B	20	1	RCPT - CONSOLE TABLE	180	22
23	-	SPARE	1	20	C	20	1	RCPT - CONVENIENCE	1080	24
25	-	SPARE	1	20	A	20	1	DOOR HOLD OPENS	100	26
27	-	SPARE	1	20	B	20	1	LTG - CORR./ELEV. LOBBY	920	28
29	-	SPARE	1	20	C	20	1	RCPT - IDF	720	30
31	-	SPARE	1	20	A	20	1	SPARE	-	32
33	-	SPARE	1	20	B	20	1	SPARE	-	34
35	-	SPARE	1	20	C	20	1	SPARE	-	36
37	-	SPARE	1	20	A	20	1	SPARE	-	38
39	-	SPARE	1	20	B	20	1	SPARE	-	40
41	-	SPARE	1	20	C	20	1	SPARE	-	42
43	-	SPARE	1	20	A	20	1	SPARE	-	44
45	-	SPARE	1	20	B	20	1	SPARE	-	46
47	-	SPARE	1	20	C	20	1	SPARE	-	48
49	-	SPARE	1	20	A	20	1	SPARE	-	50
51	-	SPARE	1	20	B	20	1	SPARE	-	52
53	-	SPARE	1	20	C	20	1	SPARE	-	54
55	-	SPARE	1	20	A	20	1	SPARE	-	56
57	-	SPARE	1	20	B	20	1	SPARE	-	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

PANEL P6N-2

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 22kW= 61A
DEMANDED LOAD CONTINUOUS: 23kW= 63A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 617 LIVING RM	1	20	A	20	1	RCPT - UNIT 619 LIVING RM	1080	2
3	180	RCPT - UNIT 617 RR	1	20	B	20	1	RCPT - UNIT 619 RR	180	4
5	750	RCPT - UNIT 617 REFRIG.	1	20	C	20	1	RCPT - UNIT 619 REFRIG.	750	6
7	1200	RCPT - UNIT 617 MICRO.	1	20	A	20	1	RCPT - UNIT 619 MICRO.	1200	8
9	720	RCPT - UNIT 617 BEDROOM	1	20	B	20	1	RCPT - UNIT 619 BEDROOM	720	10
11	1050	HP-617	2	20	C	20	2	HP-619	890	12
13	1050				A				890	14
15	1800	HP-600	2	30	B	20	1	RCPT - VENDING MACH.	1000	16
17	1800				C	20	1	RCPT - ICE MACHINE	1200	18
19	100	FS DAMPERS	1	20	A	20	1	RCPT - CONVENIENCE	1260	20
21	-	SPARE	1	20	B	20	1	RCPT - CONSOLE TABLE	180	22
23	-	SPARE	1	20	C	20	1	RCPT - CONVENIENCE	1080	24
25	-	SPARE	1	20	A	20	1	DOOR HOLD OPENS	100	26
27	-	SPARE	1	20	B	20	1	LTG - CORR./ELEV. LOBBY	920	28
29	-	SPARE	1	20	C	20	1	RCPT - IDF	720	30
31	-	SPARE	1	20	A	20	1	SPARE	-	32
33	-	SPARE	1	20	B	20	1	SPARE	-	34
35	-	SPARE	1	20	C	20	1	SPARE	-	36
37	-	SPARE	1	20	A	20	1	SPARE	-	38
39	-	SPARE	1	20	B	20	1	SPARE	-	40
41	-	SPARE	1	20	C	20	1	SPARE	-	42
43	-	SPARE	1	20	A	20	1	SPARE	-	44
45	-	SPARE	1	20	B	20	1	SPARE	-	46
47	-	SPARE	1	20	C	20	1	SPARE	-	48
49	-	SPARE	1	20	A	20	1	SPARE	-	50
51	-	SPARE	1	20	B	20	1	SPARE	-	52
53	-	SPARE	1	20	C	20	1	SPARE	-	54
55	-	SPARE	1	20	A	20	1	SPARE	-	56
57	-	SPARE	1	20	B	20	1	SPARE	-	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

PANEL P5N-2

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 24kW= 66A
DEMANDED LOAD CONTINUOUS: 25kW= 68A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 517 LIVING RM	1	20	A	20	1	RCPT - UNIT 519 LIVING RM	1080	2
3	180	RCPT - UNIT 517 RR	1	20	B	20	1	RCPT - UNIT 519 RR	180	4
5	750	RCPT - UNIT 517 REFRIG.	1	20	C	20	1	RCPT - UNIT 519 REFRIG.	750	6
7	1200	RCPT - UNIT 517 MICRO.	1	20	A	20	1	RCPT - UNIT 519 MICRO.	1200	8
9	720	RCPT - UNIT 517 BEDROOM	1	20	B	20	1	RCPT - UNIT 519 BEDROOM	720	10
11	1050	HP-517	2	20	C	30	2	HP-519	1500	12
13	1050				A				1500	14
15	1800	HP-500	2	30	B	20	1	RCPT - VENDING MACH.	1000	16
17	1800				C	20	1	RCPT - ICE MACHINE	1200	18
19	100	FS DAMPERS	1	20	A	20	1	RCPT - CONVENIENCE	1260	20
21	600	LTG - STAIRWELL	1	20	B	20	1	RCPT - CONSOLE TABLE	180	22
23	-	SPARE	1	20	C	20	1	RCPT - CONVENIENCE	1080	24
25	-	SPARE	1	20	A	20	1	DOOR HOLD OPENS	100	26
27	-	SPARE	1	20	B	20	1	LTG - CORR./ELEV. LOBBY	920	28
29	-	SPARE	1	20	C	20	1	RCPT - IDF	720	30
31	-	SPARE	1	20	A	20	1	SPARE	-	32
33	-	SPARE	1	20	B	20	1	SPARE	-	34
35	-	SPARE	1	20	C	20	1	SPARE	-	36
37	-	SPARE	1	20	A	20	1	SPARE	-	38
39	-	SPARE	1	20	B	20	1	SPARE	-	40
41	-	SPARE	1	20	C	20	1	SPARE	-	42
43	-	SPARE	1	20	A	20	1	SPARE	-	44
45	-	SPARE	1	20	B	20	1	SPARE	-	46
47	-	SPARE	1	20	C	20	1	SPARE	-	48
49	-	SPARE	1	20	A	20	1	SPARE	-	50
51	-	SPARE	1	20	B	20	1	SPARE	-	52
53	-	SPARE	1	20	C	20	1	SPARE	-	54
55	-	SPARE	1	20	A	20	1	SPARE	-	56
57	-	SPARE	1	20	B	20	1	SPARE	-	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

TYPICAL FOR PANELBOARD SCHEDULES P14S & P17S

PANEL P8S

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 59kW= 162A
DEMANDED LOAD CONTINUOUS: 52kW= 143A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 807 LIVING RM	1	20	A	20	1	RCPT - UNIT 806 LIVING RM	1080	2
3	180	RCPT - UNIT 807 RR	1	20	B	20	1	RCPT - UNIT 806 RR	180	4
5	750	RCPT - UNIT 807 REFRIG.	1	20	C	20	1	RCPT - UNIT 806 REFRIG.	750	6
7	1200	RCPT - UNIT 807 MICRO.	1	20	A	20	1	RCPT - UNIT 806 MICRO.	1200	8
9	720	RCPT - UNIT 807 BEDROOM	1	20	B	20	1	RCPT - UNIT 806 BEDROOM	720	10
11	1730	HP-807	2	30	C	20	2	HP-806	1050	12
13	1730				A				1050	14
15	-	LTG - UNITS 806,807,813,814	1	20	B	20	1	LTG - UNITS 808 TO 812	-	16
17	1080	RCPT - UNIT 809 LIVING RM	1	20	C	20	1	RCPT - UNIT 808 LIVING RM	1080	18
19	180	RCPT - UNIT 809 RR	1	20	A	20	1	RCPT - UNIT 808 RR	180	20
21	750	RCPT - UNIT 809 REFRIG.	1	20	B	20	1	RCPT - UNIT 808 REFRIG.	750	22
23	1200	RCPT - UNIT 809 MICRO.	1	20	C	20	1	RCPT - UNIT 808 MICRO.	1200	24
25	720	RCPT - UNIT 809 BEDROOM	1	20	A	20	1	RCPT - UNIT 808 BEDROOM	720	26
27	1125	HP-809	2	20	B	20	2	HP-808	1125	28
29	1125				C				1125	30
31	1080	RCPT - UNIT 811 LIVING RM	1	20	A	20	1	RCPT - UNIT 810 LIVING RM	1080	32
33	180	RCPT - UNIT 811 RR	1	20	B	20	1	RCPT - UNIT 810 RR	180	34
35	750	RCPT - UNIT 811 REFRIG.	1	20	C	20	1	RCPT - UNIT 810 REFRIG.	750	36
37	1200	RCPT - UNIT 811 MICRO.	1	20	A	20	1	RCPT - UNIT 810 MICRO.	1200	38
39	720	RCPT - UNIT 811 BEDROOM	1	20	B	20	1	RCPT - UNIT 810 BEDROOM	720	40
41	1125	HP-811	2	20	C	30	2	HP-810	1730	42
43	1125				A				1730	44
45	1080	RCPT - UNIT 813 LIVING RM	1	20	B	20	1	RCPT - UNIT 812 LIVING RM	1080	46
47	180	RCPT - UNIT 813 RR	1	20	C	20	1	RCPT - UNIT 812 RR	180	48
49	750	RCPT - UNIT 813 REFRIG.	1	20	A	20	1	RCPT - UNIT 812 REFRIG.	750	50
51	1200	RCPT - UNIT 813 MICRO.	1	20	B	20	1	RCPT - UNIT 812 MICRO.	1200	52
53	720	RCPT - UNIT 813 BEDROOM	1	20	C	20	1	RCPT - UNIT 812 BEDROOM	720	54
55	1050	HP-813	2	20	A	30	2	HP-812	1590	56
57	1050				B				1590	58
59	-	SPARE	1	20	C	20	1	RCPT - UNIT 814 LIVING RM	1080	60
61	-	SPARE	1	20	A	20	1	RCPT - UNIT 814 RR	180	62
63	-	SPARE	1	20	B	20	1	RCPT - UNIT 814 REFRIG.	750	64
65	-	SPARE	1	20	C	20	1	RCPT - UNIT 814 MICRO.	1200	66
67	-	SPARE	1	20	A	20	1	RCPT - UNIT 814 BEDROOM	720	68
69	-	SPARE	1	20	B	20	2	HP-814	1050	70
71	-	SPARE	1	20	C				1050	72

TYPICAL FOR PANELBOARD SCHEDULES P10S, P13S, P16S & P19S

PANEL P7S

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 59kW= 162A
DEMANDED LOAD CONTINUOUS: 52kW= 143A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 707 LIVING RM	1	20	A	20	1	RCPT - UNIT 706 LIVING RM	1080	2
3	180	RCPT - UNIT 707 RR	1	20	B	20	1	RCPT - UNIT 706 RR	180	4
5	750	RCPT - UNIT 707 REFRIG.	1	20	C	20	1	RCPT - UNIT 706 REFRIG.	750	6
7	1200	RCPT - UNIT 707 MICRO.	1	20	A	20	1	RCPT - UNIT 706 MICRO.	1200	8
9	720	RCPT - UNIT 707 BEDROOM	1	20	B	20	1	RCPT - UNIT 706 BEDROOM	720	10
11	1730	HP-707	2	30	C	20	2	HP-706	1050	12
13	1730				A				1050	14
15	-	LTG - UNITS 706,707,713,714	1	20	B	20	1	LTG - UNITS 708 TO 712	-	16
17	1080	RCPT - UNIT 709 LIVING RM	1	20	C	20	1	RCPT - UNIT 708 LIVING RM	1080	18
19	180	RCPT - UNIT 709 RR	1	20	A	20	1	RCPT - UNIT 708 RR	180	20
21	750	RCPT - UNIT 709 REFRIG.	1	20	B	20	1	RCPT - UNIT 708 REFRIG.	750	22
23	1200	RCPT - UNIT 709 MICRO.	1	20	C	20	1	RCPT - UNIT 708 MICRO.	1200	24
25	720	RCPT - UNIT 709 BEDROOM	1	20	A	20	1	RCPT - UNIT 708 BEDROOM	720	26
27	1125	HP-709	2	20	B	20	2	HP-708	1125	28
29	1125				C				1125	30
31	1080	RCPT - UNIT 711 LIVING RM	1	20	A	20	1	RCPT - UNIT 710 LIVING RM	1080	32
33	180	RCPT - UNIT 711 RR	1	20	B	20	1	RCPT - UNIT 710 RR	180	34
35	750	RCPT - UNIT 711 REFRIG.	1	20	C	20	1	RCPT - UNIT 710 REFRIG.	750	36
37	1200	RCPT - UNIT 711 MICRO.	1	20	A	20	1	RCPT - UNIT 710 MICRO.	1200	38
39	720	RCPT - UNIT 711 BEDROOM	1	20	B	20	1	RCPT - UNIT 710 BEDROOM	720	40
41	1125	HP-711	2	20	C	30	2	HP-710	1730	42
43	1125				A				1730	44
45	1080	RCPT - UNIT 713 LIVING RM	1	20	B	20	1	RCPT - UNIT 712 LIVING RM	1080	46
47	180	RCPT - UNIT 713 RR	1	20	C	20	1	RCPT - UNIT 712 RR	180	48
49	750	RCPT - UNIT 713 REFRIG.	1	20	A	20	1	RCPT - UNIT 712 REFRIG.	750	50
51	1200	RCPT - UNIT 713 MICRO.	1	20	B	20	1	RCPT - UNIT 712 MICRO.	1200	52
53	720	RCPT - UNIT 713 BEDROOM	1	20	C	20	1	RCPT - UNIT 712 BEDROOM	720	54
55	1050	HP-713	2	20	A	30	2	HP-712	1590	56
57	1050				B				1590	58
59	-	SPARE	1	20	C	20	1	RCPT - UNIT 714 LIVING RM	1080	60
61	-	SPARE	1	20	A	20	1	RCPT - UNIT 714 RR	180	62
63	-	SPARE	1	20	B	20	1	RCPT - UNIT 714 REFRIG.	750	64
65	-	SPARE	1	20	C	20	1	RCPT - UNIT 714 MICRO.	1200	66
67	-	SPARE	1	20	A	20	1	RCPT - UNIT 714 BEDROOM	720	68
69	-	SPARE	1	20	B	20	2	HP-714	1050	70
71	-	SPARE	1	20	C				1050	72

PANEL P6S

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 59kW= 162A
DEMANDED LOAD CONTINUOUS: 52kW= 143A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 607 LIVING RM	1	20	A	20	1	RCPT - UNIT 606 LIVING RM	1080	2
3	180	RCPT - UNIT 607 RR	1	20	B	20	1	RCPT - UNIT 606 RR	180	4
5	750	RCPT - UNIT 607 REFRIG.	1	20	C	20	1	RCPT - UNIT 606 REFRIG.	750	6
7	1200	RCPT - UNIT 607 MICRO.	1	20	A	20	1	RCPT - UNIT 606 MICRO.	1200	8
9	720	RCPT - UNIT 607 BEDROOM	1	20	B	20	1	RCPT - UNIT 606 BEDROOM	720	10
11	1730	HP-607	2	30	C	20	2	HP-606	1050	12
13	1730				A				1050	14
15	-	LTG - UNITS 606,607,613,614	1	20	B	20	1	LTG - UNITS 608 TO 612	-	16
17	1080	RCPT - UNIT 609 LIVING RM	1	20	C	20	1	RCPT - UNIT 608 LIVING RM	1080	18
19	180	RCPT - UNIT 609 RR	1	20	A	20	1	RCPT - UNIT 608 RR	180	20
21	750	RCPT - UNIT 609 REFRIG.	1	20	B	20	1	RCPT - UNIT 608 REFRIG.	750	22
23	1200	RCPT - UNIT 609 MICRO.	1	20	C	20	1	RCPT - UNIT 608 MICRO.	1200	24
25	720	RCPT - UNIT 609 BEDROOM	1	20	A	20	1	RCPT - UNIT 608 BEDROOM	720	26
27	1125	HP-609	2	20	B	20	2	HP-608	1125	28
29	1125				C				1125	30
31	1080	RCPT - UNIT 611 LIVING RM	1	20	A	20	1	RCPT - UNIT 610 LIVING RM	1080	32
33	180	RCPT - UNIT 611 RR	1	20	B	20	1	RCPT - UNIT 610 RR	180	34
35	750	RCPT - UNIT 611 REFRIG.	1	20	C	20	1	RCPT - UNIT 610 REFRIG.	750	36
37	1200	RCPT - UNIT 611 MICRO.	1	20	A	20	1	RCPT - UNIT 610 MICRO.	1200	38
39	720	RCPT - UNIT 611 BEDROOM	1	20	B	20	1	RCPT - UNIT 610 BEDROOM	720	40
41	1125	HP-611	2	20	C	30	2	HP-610	1730	42
43	1125				A				1730	44
45	1080	RCPT - UNIT 613 LIVING RM	1	20	B	20	1	RCPT - UNIT 612 LIVING RM	1080	46
47	180	RCPT - UNIT 613 RR	1	20	C	20	1	RCPT - UNIT 612 RR	180	48
49	750	RCPT - UNIT 613 REFRIG.	1	20	A	20	1	RCPT - UNIT 612 REFRIG.	750	50
51	1200	RCPT - UNIT 613 MICRO.	1	20	B	20	1	RCPT - UNIT 612 MICRO.	1200	52
53	720	RCPT - UNIT 613 BEDROOM	1	20	C	20	1	RCPT - UNIT 612 BEDROOM	720	54
55	1050	HP-613	2	20	A	30	2	HP-612	1590	56
57	1050				B				1590	58
59	-	SPARE	1	20	C	20	1	RCPT - UNIT 614 LIVING RM	1080	60
61	-	SPARE	1	20	A	20	1	RCPT - UNIT 614 RR	180	62
63	-	SPARE	1	20	B	20	1	RCPT - UNIT 614 REFRIG.	750	64
65	-	SPARE	1	20	C	20	1	RCPT - UNIT 614 MICRO.	1200	66
67	-	SPARE	1	20	A	20	1	RCPT - UNIT 614 BEDROOM	720	68
69	-	SPARE	1	20	B	20	2	HP-614	1050	70
71	-	SPARE	1	20	C				1050	72

PANEL P5S

DESCRIPTION: 200A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 59kW= 164A
DEMANDED LOAD CONTINUOUS: 52kW= 145A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 507 LIVING RM	1	20	A	20	1	RCPT - UNIT 506 LIVING RM	1080	2
3	180	RCPT - UNIT 507 RR	1	20	B	20	1	RCPT - UNIT 506 RR	180	4
5	750	RCPT - UNIT 507 REFRIG.	1	20	C	20	1	RCPT - UNIT 506 REFRIG.	750	6
7	1200	RCPT - UNIT 507 MICRO.	1	20	A	20	1	RCPT - UNIT 506 MICRO.	1200	8
9	720	RCPT - UNIT 507 BEDROOM	1	20	B	20	1	RCPT - UNIT 506 BEDROOM	720	10
11	1730	HP-507	2	30	C	20	2	HP-506	1050	12
13	1730				A				1050	14
15	-	LTG - UNITS 506,507,513,514	1	20	B	20	1	LTG - UNITS 508 TO 512	-	16
17	1080	RCPT - UNIT 509 LIVING RM	1	20	C	20	1	RCPT - UNIT 508 LIVING RM	1080	18
19	180	RCPT - UNIT 509 RR	1	20	A	20	1	RCPT - UNIT 508 RR	180	20
21	750	RCPT - UNIT 509 REFRIG.	1	20	B	20	1	RCPT - UNIT 508 REFRIG.	750	22
23	1200	RCPT - UNIT 509 MICRO.	1	20	C	20	1	RCPT - UNIT 508 MICRO.	1200	24
25	720	RCPT - UNIT 509 BEDROOM	1	20	A	20	1	RCPT - UNIT 508 BEDROOM	720	26
27	1125	HP-509	2	20	B	20	2	HP-508	1125	28
29	1125				C				1125	30
31	1080	RCPT - UNIT 511 LIVING RM	1	20	A	20	1	RCPT - UNIT 510 LIVING RM	1080	32
33	180	RCPT - UNIT 511 RR	1	20	B	20	1	RCPT - UNIT 510 RR	180	34
35	750	RCPT - UNIT 511 REFRIG.	1	20	C	20	1	RCPT - UNIT 510 REFRIG.	750	36
37	1200	RCPT - UNIT 511 MICRO.	1	20	A	20	1	RCPT - UNIT 510 MICRO.	1200	38
39	720	RCPT - UNIT 511 BEDROOM	1	20	B	20	1	RCPT - UNIT 510 BEDROOM	720	40
41	1125	HP-511	2	20	C	30	2	HP-510	1730	42
43	1125				A				1730	44
45	1080	RCPT - UNIT 513 LIVING RM	1	20	B	20	1	RCPT - UNIT 512 LIVING RM	1080	46
47	180	RCPT - UNIT 513 RR	1	20	C	20	1	RCPT - UNIT 512 RR	180	48
49	750	RCPT - UNIT 513 REFRIG.	1	20	A	20	1	RCPT - UNIT 512 REFRIG.	750	50
51	1200	RCPT - UNIT 513 MICRO.	1	20	B	20	1	RCPT - UNIT 512 MICRO.	1200	52
53	720	RCPT - UNIT 513 BEDROOM	1	20	C	20	1	RCPT - UNIT 512 BEDROOM	720	54
55	1050	HP-513	2	20	A	30	2	HP-512	1590	56
57	1050				B				1590	58
59	600	LTG - STAIRWELL	1	20	C	20	1	RCPT - UNIT 514 LIVING RM	1080	60
61	-	SPARE	1	20	A	20	1	RCPT - UNIT 514 RR	180	62
63	-	SPARE	1	20	B	20	1	RCPT - UNIT 514 REFRIG.	750	64
65	-	SPARE	1	20	C	20	1	RCPT - UNIT 514 MICRO.	1200	66
67	-	SPARE	1	20	A	20	1	RCPT - UNIT 514 BEDROOM	720	68
69	-	SPARE	1	20	B	20	2	HP-514	1050	70
71	-	SPARE	1	20	C				1050	72

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STATE OF MISSOURI
CASEY JOHN STEINER
NUMBER
PE-2009035182
PROFESSIONAL ENGINEER
9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: RC/WH
Checked By: CJS
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE

Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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Electrical Schedules

E6.01

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9/8/2020 10:05:52 AM

PANEL EB1

DESCRIPTION: 100A MLO — 100% Neutral Bus, w/ Feed Through Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: kW= A
22 kAIC RATING — DEMANDED LOAD CONTINUOUS: kW= A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	-	EM LTG -	1	20	A	20	1	SPARE	-	2
3	-	EM LTG -	1	20	B	20	1	SPARE	-	4
5	-	EM LTG - STAIR	1	20	C	20	1	SPARE	-	6
7	-	SPARE	1	20	A	20	1	SPARE	-	8
9	-	SPARE	1	20	B	20	1	SPARE	-	10
11	-	SPARE	1	20	C	20	1	SPARE	-	12
13	-	SPARE	1	20	A	20	1	SPARE	-	14
15	-	SPARE	1	20	B	20	1	SPARE	-	16
17	-	SPARE	1	20	C	20	1	SPARE	-	18
19	-	SPARE	1	20	A	20	1	SPARE	-	20
21	-	SPARE	1	20	B	20	1	SPARE	-	22
23	-	SPARE	1	20	C	20	1	SPARE	-	24
25	-	SPARE	1	20	A	20	1	SPARE	-	26
27	-	SPARE	1	20	B	20	1	SPARE	-	28
29	-	SPARE	1	20	C	20	1	SPARE	-	30

PANEL EB1

DESCRIPTION: 100A MLO — 100% Neutral Bus, w/ Feed Through Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: kW= A
22 kAIC RATING — DEMANDED LOAD CONTINUOUS: kW= A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	-	EM LTG -	1	20	A	20	1	SPARE	-	2
3	-	EM LTG -	1	20	B	20	1	SPARE	-	4
5	-	EM LTG - STAIR	1	20	C	20	1	SPARE	-	6
7	-	SPARE	1	20	A	20	1	SPARE	-	8
9	-	SPARE	1	20	B	20	1	SPARE	-	10
11	-	SPARE	1	20	C	20	1	SPARE	-	12
13	-	SPARE	1	20	A	20	1	SPARE	-	14
15	-	SPARE	1	20	B	20	1	SPARE	-	16
17	-	SPARE	1	20	C	20	1	SPARE	-	18
19	-	SPARE	1	20	A	20	1	SPARE	-	20
21	-	SPARE	1	20	B	20	1	SPARE	-	22
23	-	SPARE	1	20	C	20	1	SPARE	-	24
25	-	SPARE	1	20	A	20	1	SPARE	-	26
27	-	SPARE	1	20	B	20	1	SPARE	-	28
29	-	SPARE	1	20	C	20	1	SPARE	-	30

PANEL E6N

DESCRIPTION: 200A MCB — 100% Neutral Bus, w/ Feed Through Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 32kW= 89A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 32kW= 89A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1900	RCPT - IDF 525 RACK	1	20	A	20	1	RCPT - IDF 725 RACK	1900	2
3	1900	RCPT - IDF 525 RACK	1	20	B	20	1	RCPT - IDF 725 RACK	1900	4
5	1900	RCPT - IDF 525 RACK	1	20	C	20	1	RCPT - IDF 725 RACK	1900	6
7	1900	RCPT - IDF 525 RACK	1	20	A	20	1	RCPT - IDF 725 RACK	1900	8
9	1900	RCPT - IDF 525 RACK	1	20	B	20	1	RCPT - IDF 725 RACK	1900	10
11	1900	RCPT - IDF 525 RACK	1	20	C	20	1	RCPT - IDF 725 RACK	1900	12
13	1900	RCPT - IDF 525 RACK	1	20	A	20	1	RCPT - IDF 725 RACK	1900	14
15	1900	RCPT - IDF 525 RACK	1	20	B	20	1	RCPT - IDF 725 RACK	1900	16
17	430	HP-520	2	20	C	20	2	HP-720	430	18
19	430				A				430	20
21	-	SPARE	1	20	B	20	1	SPARE	-	22
23	-	SPARE	1	20	C	20	1	SPARE	-	24
25	-	SPARE	1	20	A	20	1	SPARE	-	26
27	-	SPARE	1	20	B	20	1	SPARE	-	28
29	-	SPARE	1	20	C	20	1	SPARE	-	30

PANEL E10N

DESCRIPTION: 200A MCB — 100% Neutral Bus, w/ Feed Through Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 32kW= 89A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 32kW= 89A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1900	RCPT - IDF 925 RACK	1	20	A	20	1	RCPT - IDF 1125 RACK	1900	2
3	1900	RCPT - IDF 925 RACK	1	20	B	20	1	RCPT - IDF 1125 RACK	1900	4
5	1900	RCPT - IDF 925 RACK	1	20	C	20	1	RCPT - IDF 1125 RACK	1900	6
7	1900	RCPT - IDF 925 RACK	1	20	A	20	1	RCPT - IDF 1125 RACK	1900	8
9	1900	RCPT - IDF 925 RACK	1	20	B	20	1	RCPT - IDF 1125 RACK	1900	10
11	1900	RCPT - IDF 925 RACK	1	20	C	20	1	RCPT - IDF 1125 RACK	1900	12
13	1900	RCPT - IDF 925 RACK	1	20	A	20	1	RCPT - IDF 1125 RACK	1900	14
15	1900	RCPT - IDF 925 RACK	1	20	B	20	1	RCPT - IDF 1125 RACK	1900	16
17	430	HP-920	2	20	C	20	2	HP-1120	430	18
19	430				A				430	20
21	-	SPARE	1	20	B	20	1	SPARE	-	22
23	-	SPARE	1	20	C	20	1	SPARE	-	24
25	-	SPARE	1	20	A	20	1	SPARE	-	26
27	-	SPARE	1	20	B	20	1	SPARE	-	28
29	-	SPARE	1	20	C	20	1	SPARE	-	30

PANEL E14N

DESCRIPTION: 200A MCB — 100% Neutral Bus, w/ Feed Through Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 32kW= 89A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 32kW= 89A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1900	RCPT - IDF 1325 RACK	1	20	A	20	1	RCPT - IDF 1525 RACK	1900	2
3	1900	RCPT - IDF 1325 RACK	1	20	B	20	1	RCPT - IDF 1525 RACK	1900	4
5	1900	RCPT - IDF 1325 RACK	1	20	C	20	1	RCPT - IDF 1525 RACK	1900	6
7	1900	RCPT - IDF 1325 RACK	1	20	A	20	1	RCPT - IDF 1525 RACK	1900	8
9	1900	RCPT - IDF 1325 RACK	1	20	B	20	1	RCPT - IDF 1525 RACK	1900	10
11	1900	RCPT - IDF 1325 RACK	1	20	C	20	1	RCPT - IDF 1525 RACK	1900	12
13	1900	RCPT - IDF 1325 RACK	1	20	A	20	1	RCPT - IDF 1525 RACK	1900	14
15	1900	RCPT - IDF 1325 RACK	1	20	B	20	1	RCPT - IDF 1525 RACK	1900	16
17	430	HP-1320	2	20	C	20	2	HP-1520	430	18
19	430				A				430	20
21	-	SPARE	1	20	B	20	1	SPARE	-	22
23	-	SPARE	1	20	C	20	1	SPARE	-	24
25	-	SPARE	1	20	A	20	1	SPARE	-	26
27	-	SPARE	1	20	B	20	1	SPARE	-	28
29	-	SPARE	1	20	C	20	1	SPARE	-	30

PANEL E18N

DESCRIPTION: 200A MCB — 100% Neutral Bus, w/ Feed Through Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 32kW= 89A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 32kW= 89A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1900	RCPT - IDF 1725 RACK	1	20	A	20	1	RCPT - IDF 1925 RACK	1900	2
3	1900	RCPT - IDF 1725 RACK	1	20	B	20	1	RCPT - IDF 1925 RACK	1900	4
5	1900	RCPT - IDF 1725 RACK	1	20	C	20	1	RCPT - IDF 1925 RACK	1900	6
7	1900	RCPT - IDF 1725 RACK	1	20	A	20	1	RCPT - IDF 1925 RACK	1900	8
9	1900	RCPT - IDF 1725 RACK	1	20	B	20	1	RCPT - IDF 1925 RACK	1900	10
11	1900	RCPT - IDF 1725 RACK	1	20	C	20	1	RCPT - IDF 1925 RACK	1900	12
13	1900	RCPT - IDF 1725 RACK	1	20	A	20	1	RCPT - IDF 1925 RACK	1900	14
15	1900	RCPT - IDF 1725 RACK	1	20	B	20	1	RCPT - IDF 1925 RACK	1900	16
17	430	HP-1720	2	20	C	20	2	HP-1920	430	18
19	430				A				430	20
21	-	SPARE	1	20	B	20	1	SPARE	-	22
23	-	SPARE	1	20	C	20	1	SPARE	-	24
25	-	SPARE	1	20	A	20	1	SPARE	-	26
27	-	SPARE	1	20	B	20	1	SPARE	-	28
29	-	SPARE	1	20	C	20	1	SPARE	-	30

PANEL P18N-1

DESCRIPTION: 200A MLO — 100% Neutral Bus, w/ Double Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 50kW= 137A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 43kW= 120A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 1801 LIVING RM	1	20	A	20	1	RCPT - UNIT 1802 LIVING RM	1080	2
3	180	RCPT - UNIT 1801 RR	1	20	B	20	1	RCPT - UNIT 1802 RR	180	4
5	750	RCPT - UNIT 1801 REFRIG.	1	20	C	20	1	RCPT - UNIT 1802 REFRIG.	750	6
7	1200	RCPT - UNIT 1801 MICRO.	1	20	A	20	1	RCPT - UNIT 1802 MICRO.	1200	8
9	720	RCPT - UNIT 1801 BEDROOM	1	20	B	20	1	RCPT - UNIT 1802 BEDROOM	720	10
11	1050	HP-1801	2	20	C	20	2	HP-1802	1050	12
13	1050				A				1050	14
15	720	LTG - UNITS 1801 TO 1806	1	20	B	20	1	LTG - UNITS 1815 TO 1819	540	16
17	1080	RCPT - UNIT 1803 LIVING RM	1	20	C	20	1	RCPT - UNIT 1804 LIVING RM	1080	18
19	180	RCPT - UNIT 1803 RR	1	20	A	20	1	RCPT - UNIT 1804 RR	180	20
21	750	RCPT - UNIT 1803 REFRIG.	1	20	B	20	1	RCPT - UNIT 1804 REFRIG.	750	22
23	1200	RCPT - UNIT 1803 MICRO.	1	20	C	20	1	RCPT - UNIT 1804 MICRO.	1200	24
25	720	RCPT - UNIT 1803 BEDROOM	1	20	A	20	1	RCPT - UNIT 1804 BEDROOM	720	26
27	1050	HP-1803	2	20	B	20	2	HP-1804	1050	28
29	1050				C				1050	30
31	1080	RCPT - UNIT 1805 LIVING RM	1	20	A	20	1	RCPT - UNIT 1816 LIVING RM	1080	32
33	180	RCPT - UNIT 1805 RR	1	20	B	20	1	RCPT - UNIT 1816 RR	180	34
35	750	RCPT - UNIT 1805 REFRIG.	1	20	C	20	1	RCPT - UNIT 1816 REFRIG.	750	36
37	1200	RCPT - UNIT 1805 MICRO.	1	20	A	20	1	RCPT - UNIT 1816 MICRO.	1200	38
39	720	RCPT - UNIT 1805 BEDROOM	1	20	B	20	1	RCPT - UNIT 1816 BEDROOM	720	40
41	1050	HP-1805	2	20	C	20	2	HP-1816	1050	42
43	1050				A				1050	44
45	1080	RCPT - UNIT 1815 LIVING RM	1	20	B	20	1	RCPT - UNIT 1818 LIVING RM	1080	46
47	180	RCPT - UNIT 1815 RR	1	20	C	20	1	RCPT - UNIT 1818 RR	180	48
49	750	RCPT - UNIT 1815 REFRIG.	1	20	A	20	1	RCPT - UNIT 1818 REFRIG.	750	50
51	1200	RCPT - UNIT 1815 MICRO.	1	20	B	20	1	RCPT - UNIT 1818 MICRO.	1200	52
53	720	RCPT - UNIT 1815 BEDROOM	1	20	C	20	1	RCPT - UNIT 1818 BEDROOM	720	54
55	1050	HP-1815	2	20	A	20	2	HP-1818	1050	56
57	1050				B				1050	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

PANEL P18N-2

DESCRIPTION: 200A MLO — 100% Neutral Bus, w/ Double Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 23kW= 64A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 25kW= 69A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 1817 LIVING RM	1	20	A	20	1	RCPT - UNIT 1819 LIVING RM	1080	2
3	180	RCPT - UNIT 1817 RR	1	20	B	20	1	RCPT - UNIT 1819 RR	180	4
5	750	RCPT - UNIT 1817 REFRIG.	1	20	C	20	1	RCPT - UNIT 1819 REFRIG.	750	6
7	1200	RCPT - UNIT 1817 MICRO.	1	20	A	20	1	RCPT - UNIT 1819 MICRO.	1200	8
9	720	RCPT - UNIT 1817 BEDROOM	1	20	B	20	1	RCPT - UNIT 1819 BEDROOM	720	10
11	1050	HP-1817	2	20	C	30	2	HP-1819	1500	12
13	1050				A				1500	14
15	1800	HP-1800	2	30	B	20	1	RCPT - VENDING MACH.	1000	16
17	1800				C	20	1	RCPT - ICE MACHINE	1200	18
19	100	FS DAMPERS	1	20	A	20	1	RCPT - CONVENIENCE	1260	20
21	-	SPARE	1	20	B	20	1	RCPT - CONSOLE TABLE	180	22
23	-	SPARE	1	20	C	20	1	RCPT - CONVENIENCE	1080	24
25	-	SPARE	1	20	A	20	1	DOOR HOLD OPENS	100	26
27	-	SPARE	1	20	B	20	1	LTG - CORR./ELEV. LOBBY	920	28
29	-	SPARE	1	20	C	20	1	RCPT - IDF	720	30
31	-	SPARE	1	20	A	20	1	SPARE	-	32
33	-	SPARE	1	20	B	20	1	SPARE	-	34
35	-	SPARE	1	20	C	20	1	SPARE	-	36
37	-	SPARE	1	20	A	20	1	SPARE	-	38
39	-	SPARE	1	20	B	20	1	SPARE	-	40
41	-	SPARE	1	20	C	20	1	SPARE	-	42
43	-	SPARE	1	20	A	20	1	SPARE	-	44
45	-	SPARE	1	20	B	20	1	SPARE	-	46
47	-	SPARE	1	20	C	20	1	SPARE	-	48
49	-	SPARE	1	20	A	20	1	SPARE	-	50
51	-	SPARE	1	20	B	20	1	SPARE	-	52
53	-	SPARE	1	20	C	20	1	SPARE	-	54
55	-	SPARE	1	20	A	20	1	SPARE	-	56
57	-	SPARE	1	20	B	20	1	SPARE	-	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

PANEL P18S

DESCRIPTION: 200A MLO — 100% Neutral Bus, w/ Double Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 59kW= 162A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 52kW= 143A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 1807 LIVING RM	1	20	A	20	1	RCPT - UNIT 1806 LIVING RM	1080	2
3	180	RCPT - UNIT 1807 RR	1	20	B	20	1	RCPT - UNIT 1806 RR	180	4
5	750	RCPT - UNIT 1807 REFRIG.	1	20	C	20	1	RCPT - UNIT 1806 REFRIG.	750	6
7	1200	RCPT - UNIT 1807 MICRO.	1	20	A	20	1	RCPT - UNIT 1806 MICRO.	1200	8
9	720	RCPT - UNIT 1807 BEDROOM	1	20	B	20	1	RCPT - UNIT 1806 BEDROOM	720	10
11	1730	HP-1807	2	30	C	20	2	HP-1806	1050	12
13	1730				A				1050	14
15	-	LTG - UNITS 1806,1807,1813,1814	1	20	B	20	1	LTG - UNITS 1808 TO 1812	-	16
17	1080	RCPT - UNIT 1809 LIVING RM	1	20	C	20	1	RCPT - UNIT 1808 LIVING RM	1080	18
19	180	RCPT - UNIT 1809 RR	1	20	A	20	1	RCPT - UNIT 1808 RR	180	20
21	750	RCPT - UNIT 1809 REFRIG.	1	20	B	20	1	RCPT - UNIT 1808 REFRIG.	750	22
23	1200	RCPT - UNIT 1809 MICRO.	1	20	C	20	1	RCPT - UNIT 1808 MICRO.	1200	24
25	720	RCPT - UNIT 1809 BEDROOM	1	20	A	20	1	RCPT - UNIT 1808 BEDROOM	720	26
27	1125	HP-1809	2	20	B	20	2	HP-1808	1125	28
29	1125				C				1125	30
31	1080	RCPT - UNIT 1811 LIVING RM	1	20	A	20	1	RCPT - UNIT 1810 LIVING RM	1080	32
33	180	RCPT - UNIT 1811 RR	1	20	B	20	1	RCPT - UNIT 1810 RR	180	34
35	750	RCPT - UNIT 1811 REFRIG.	1	20	C	20	1	RCPT - UNIT 1810 REFRIG.	750	36
37	1200	RCPT - UNIT 1811 MICRO.	1	20	A	20	1	RCPT - UNIT 1810 MICRO.	1200	38
39	720	RCPT - UNIT 1811 BEDROOM	1	20	B	20	1	RCPT - UNIT 1810 BEDROOM	720	40
41	1125	HP-1811	2	20	C	30	2	HP-1810	1730	42
43	1125				A				1730	44
45	1080	RCPT - UNIT 1813 LIVING RM	1	20	B	20	1	RCPT - UNIT 1812 LIVING RM	1080	46
47	180	RCPT - UNIT 1813 RR	1	20	C	20	1	RCPT - UNIT 1812 RR	180	48
49	750	RCPT - UNIT 1813 REFRIG.	1	20	A	20	1	RCPT - UNIT 1812 REFRIG.	750	50
51	1200	RCPT - UNIT 1813 MICRO.	1	20	B	20	1	RCPT - UNIT 1812 MICRO.	1200	52
53	720	RCPT - UNIT 1813 BEDROOM	1	20	C	20	1	RCPT - UNIT 1812 BEDROOM	720	54
55	1050	HP-1813	2	20	A	30	2	HP-1812	1590	56
57	1050				B				1590	58
59	-	SPARE	1	20	C	20	1	RCPT - UNIT 1814 LIVING RM	1080	60
61	-	SPARE	1	20	A	20	1	RCPT - UNIT 1814 RR	180	62
63	-	SPARE	1	20	B	20	1	RCPT - UNIT 1814 REFRIG.	750	64
65	-	SPARE	1	20	C	20	1	RCPT - UNIT 1814 MICRO.	1200	66
67	-	SPARE	1	20	A	20	1	RCPT - UNIT 1814 BEDROOM	720	68
69	-	SPARE	1	20	B	20	2	HP-1814	1050	70
71	-	SPARE	1	20	C				1050	72

PANEL P11N-1

DESCRIPTION: 200A MLO — 100% Neutral Bus, w/ Double Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 50kW= 137A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 43kW= 120A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 1101 LIVING RM	1	20	A	20	1	RCPT - UNIT 1102 LIVING RM	1080	2
3	180	RCPT - UNIT 1101 RR	1	20	B	20	1	RCPT - UNIT 1102 RR	180	4
5	750	RCPT - UNIT 1101 REFRIG.	1	20	C	20	1	RCPT - UNIT 1102 REFRIG.	750	6
7	1200	RCPT - UNIT 1101 MICRO.	1	20	A	20	1	RCPT - UNIT 1102 MICRO.	1200	8
9	720	RCPT - UNIT 1101 BEDROOM	1	20	B	20	1	RCPT - UNIT 1102 BEDROOM	720	10
11	1050	HP-1101	2	20	C	20	2	HP-1102	1050	12
13	1050				A				1050	14
15	720	LTG - UNITS 1101 TO 1106	1	20	B	20	1	LTG - UNITS 1115 TO 1119	540	16
17	1080	RCPT - UNIT 1103 LIVING RM	1	20	C	20	1	RCPT - UNIT 1104 LIVING RM	1080	18
19	180	RCPT - UNIT 1103 RR	1	20	A	20	1	RCPT - UNIT 1104 RR	180	20
21	750	RCPT - UNIT 1103 REFRIG.	1	20	B	20	1	RCPT - UNIT 1104 REFRIG.	750	22
23	1200	RCPT - UNIT 1103 MICRO.	1	20	C	20	1	RCPT - UNIT 1104 MICRO.	1200	24
25	720	RCPT - UNIT 1103 BEDROOM	1	20	A	20	1	RCPT - UNIT 1104 BEDROOM	720	26
27	1050	HP-1103	2	20	B	20	2	HP-1104	1050	28
29	1050				C				1050	30
31	1080	RCPT - UNIT 1105 LIVING RM	1	20	A	20	1	RCPT - UNIT 1116 LIVING RM	1080	32
33	180	RCPT - UNIT 1105 RR	1	20	B	20	1	RCPT - UNIT 1116 RR	180	34
35	750	RCPT - UNIT 1105 REFRIG.	1	20	C	20	1	RCPT - UNIT 1116 REFRIG.	750	36
37	1200	RCPT - UNIT 1105 MICRO.	1	20	A	20	1	RCPT - UNIT 1116 MICRO.	1200	38
39	720	RCPT - UNIT 1105 BEDROOM	1	20	B	20	1	RCPT - UNIT 1116 BEDROOM	720	40
41	1050	HP-1105	2	20	C	20	2	HP-1116	1050	42
43	1050				A				1050	44
45	1080	RCPT - UNIT 1115 LIVING RM	1	20	B	20	1	RCPT - UNIT 1118 LIVING RM	1080	46
47	180	RCPT - UNIT 1115 RR	1	20	C	20	1	RCPT - UNIT 1118 RR	180	48
49	750	RCPT - UNIT 1115 REFRIG.	1	20	A	20	1	RCPT - UNIT 1118 REFRIG.	750	50
51	1200	RCPT - UNIT 1115 MICRO.	1	20	B	20	1	RCPT - UNIT 1118 MICRO.	1200	52
53	720	RCPT - UNIT 1115 BEDROOM	1	20	C	20	1	RCPT - UNIT 1118 BEDROOM	720	54
55	1050	HP-1115	2	20	A	20	2	HP-1118	1050	56
57	1050				B				1050	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

PANEL P11N-2

DESCRIPTION: 200A MLO — 100% Neutral Bus, w/ Double Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 24kW= 67A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 25kW= 70A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 1117 LIVING RM	1	20	A	20	1	RCPT - UNIT 1119 LIVING RM	1080	2
3	180	RCPT - UNIT 1117 RR	1	20	B	20	1	RCPT - UNIT 1119 RR	180	4
5	750	RCPT - UNIT 1117 REFRIG.	1	20	C	20	1	RCPT - UNIT 1119 REFRIG.	750	6
7	1200	RCPT - UNIT 1117 MICRO.	1	20	A	20	1	RCPT - UNIT 1119 MICRO.	1200	8
9	720	RCPT - UNIT 1117 BEDROOM	1	20	B	20	1	RCPT - UNIT 1119 BEDROOM	720	10
11	1050	HP-1117	2	20	C	30	2	HP-1119	1500	12
13	1050				A				1500	14
15	100	FS DAMPERS	1	20	B	20	1	RCPT - VENDING MACH.	1000	16
17	882	LTG - STAIRWELL	1	20	C	20	1	RCPT - ICE MACHINE	1200	18
19	1800	HP-1100	2	30	A	20	1	RCPT - CONVENIENCE	1260	20
21	1800				B	20	1	RCPT - CONSOLE TABLE	180	22
23	-	SPARE	1	20	C	20	1	RCPT - CONVENIENCE	1080	24
25	-	SPARE	1	20	A	20	1	DOOR HOLD OPENS	100	26
27	-	SPARE	1	20	B	20	1	LTG - CORR./ELEV. LOBBY	920	28
29	-	SPARE	1	20	C	20	1	RCPT - IDF	720	30
31	-	SPARE	1	20	A	20	1	SPARE	-	32
33	-	SPARE	1	20	B	20	1	SPARE	-	34
35	-	SPARE	1	20	C	20	1	SPARE	-	36
37	-	SPARE	1	20	A	20	1	SPARE	-	38
39	-	SPARE	1	20	B	20	1	SPARE	-	40
41	-	SPARE	1	20	C	20	1	SPARE	-	42
43	-	SPARE	1	20	A	20	1	SPARE	-	44
45	-	SPARE	1	20	B	20	1	SPARE	-	46
47	-	SPARE	1	20	C	20	1	SPARE	-	48
49	-	SPARE	1	20	A	20	1	SPARE	-	50
51	-	SPARE	1	20	B	20	1	SPARE	-	52
53	-	SPARE	1	20	C	20	1	SPARE	-	54
55	-	SPARE	1	20	A	20	1	SPARE	-	56
57	-	SPARE	1	20	B	20	1	SPARE	-	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

PANEL P11S

DESCRIPTION: 200A MLO — 100% Neutral Bus, w/ Double Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 59kW= 165A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 53kW= 146A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 1107 LIVING RM	1	20	A	20	1	RCPT - UNIT 1106 LIVING RM	1080	2
3	180	RCPT - UNIT 1107 RR	1	20	B	20	1	RCPT - UNIT 1106 RR	180	4
5	750	RCPT - UNIT 1107 REFRIG.	1	20	C	20	1	RCPT - UNIT 1106 REFRIG.	750	6
7	1200	RCPT - UNIT 1107 MICRO.	1	20	A	20	1	RCPT - UNIT 1106 MICRO.	1200	8
9	720	RCPT - UNIT 1107 BEDROOM	1	20	B	20	1	RCPT - UNIT 1106 BEDROOM	720	10
11	1730	HP-1107	2	30	C	20	2	HP-1106	1050	12
13	1730				A				1050	14
15	-	LTG - UNITS 1106,1107,1113,1114	1	20	B	20	1	LTG - UNITS 1108 TO 1112	-	16
17	1080	RCPT - UNIT 1109 LIVING RM	1	20	C	20	1	RCPT - UNIT 1108 LIVING RM	1080	18
19	180	RCPT - UNIT 1109 RR	1	20	A	20	1	RCPT - UNIT 1108 RR	180	20
21	750	RCPT - UNIT 1109 REFRIG.	1	20	B	20	1	RCPT - UNIT 1108 REFRIG.	750	22
23	1200	RCPT - UNIT 1109 MICRO.	1	20	C	20	1	RCPT - UNIT 1108 MICRO.	1200	24
25	720	RCPT - UNIT 1109 BEDROOM	1	20	A	20	1	RCPT - UNIT 1108 BEDROOM	720	26
27	1125	HP-1109	2	20	B	20	2	HP-1108	1125	28
29	1125				C				1125	30
31	1080	RCPT - UNIT 1111 LIVING RM	1	20	A	20	1	RCPT - UNIT 1110 LIVING RM	1080	32
33	180	RCPT - UNIT 1111 RR	1	20	B	20	1	RCPT - UNIT 1110 RR	180	34
35	750	RCPT - UNIT 1111 REFRIG.	1	20	C	20	1	RCPT - UNIT 1110 REFRIG.	750	36
37	1200	RCPT - UNIT 1111 MICRO.	1	20	A	20	1	RCPT - UNIT 1110 MICRO.	1200	38
39	720	RCPT - UNIT 1111 BEDROOM	1	20	B	20	1	RCPT - UNIT 1110 BEDROOM	720	40
41	1125	HP-1111	2	20	C	30	2	HP-1110	1730	42
43	1125				A				1730	44
45	1080	RCPT - UNIT 1113 LIVING RM	1	20	B	20	1	RCPT - UNIT 1112 LIVING RM	1080	46
47	180	RCPT - UNIT 1113 RR	1	20	C	20	1	RCPT - UNIT 1112 RR	180	48
49	750	RCPT - UNIT 1113 REFRIG.	1	20	A	20	1	RCPT - UNIT 1112 REFRIG.	750	50
51	1200	RCPT - UNIT 1113 MICRO.	1	20	B	20	1	RCPT - UNIT 1112 MICRO.	1200	52
53	720	RCPT - UNIT 1113 BEDROOM	1	20	C	20	1	RCPT - UNIT 1112 BEDROOM	720	54
55	1050	HP-1113	2	20	A	30	2	HP-1112	1590	56
57	1050				B				1590	58
59	882	LTG - STAIRWELL	1	20	C	20	1	RCPT - UNIT 1114 LIVING RM	1080	60
61	-	SPARE	1	20	A	20	1	RCPT - UNIT 1114 RR	180	62
63	-	SPARE	1	20	B	20	1	RCPT - UNIT 1114 REFRIG.	750	64
65	-	SPARE	1	20	C	20	1	RCPT - UNIT 1114 MICRO.	1200	66
67	-	SPARE	1	20	A	20	1	RCPT - UNIT 1114 BEDROOM	720	68
69	-	SPARE	1	20	B	20	2	HP-1114	1050	70
71	-	SPARE	1	20	C				1050	72

TYPICAL FOR PANELBOARD SCHEDULES P12N-1 & P15N-1

PANEL P9N-1

DESCRIPTION: 200A MLO — 100% Neutral Bus, w/ Double Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 50kW= 137A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 43kW= 120A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 901 LIVING RM	1	20	A	20	1	RCPT - UNIT 902 LIVING RM	1080	2
3	180	RCPT - UNIT 901 RR	1	20	B	20	1	RCPT - UNIT 902 RR	180	4
5	750	RCPT - UNIT 901 REFRIG.	1	20	C	20	1	RCPT - UNIT 902 REFRIG.	750	6
7	1200	RCPT - UNIT 901 MICRO.	1	20	A	20	1	RCPT - UNIT 902 MICRO.	1200	8
9	720	RCPT - UNIT 901 BEDROOM	1	20	B	20	1	RCPT - UNIT 902 BEDROOM	720	10
11	1050	HP-901	2	20	C	20	2	HP-902	1050	12
13	1050				A				1050	14
15	720	LTG - UNITS 901 TO 906	1	20	B	20	1	LTG - UNITS 915 TO 919	540	16
17	1080	RCPT - UNIT 903 LIVING RM	1	20	C	20	1	RCPT - UNIT 904 LIVING RM	1080	18
19	180	RCPT - UNIT 903 RR	1	20	A	20	1	RCPT - UNIT 904 RR	180	20
21	750	RCPT - UNIT 903 REFRIG.	1	20	B	20	1	RCPT - UNIT 904 REFRIG.	750	22
23	1200	RCPT - UNIT 903 MICRO.	1	20	C	20	1	RCPT - UNIT 904 MICRO.	1200	24
25	720	RCPT - UNIT 903 BEDROOM	1	20	A	20	1	RCPT - UNIT 904 BEDROOM	720	26
27	1050	HP-903	2	20	B	20	2	HP-904	1050	28
29	1050				C				1050	30
31	1080	RCPT - UNIT 905 LIVING RM	1	20	A	20	1	RCPT - UNIT 916 LIVING RM	1080	32
33	180	RCPT - UNIT 905 RR	1	20	B	20	1	RCPT - UNIT 916 RR	180	34
35	750	RCPT - UNIT 905 REFRIG.	1	20	C	20	1	RCPT - UNIT 916 REFRIG.	750	36
37	1200	RCPT - UNIT 905 MICRO.	1	20	A	20	1	RCPT - UNIT 916 MICRO.	1200	38
39	720	RCPT - UNIT 905 BEDROOM	1	20	B	20	1	RCPT - UNIT 916 BEDROOM	720	40
41	1050	HP-905	2	20	C	20	2	HP-916	1050	42
43	1050				A				1050	44
45	1080	RCPT - UNIT 915 LIVING RM	1	20	B	20	1	RCPT - UNIT 918 LIVING RM	1080	46
47	180	RCPT - UNIT 915 RR	1	20	C	20	1	RCPT - UNIT 918 RR	180	48
49	750	RCPT - UNIT 915 REFRIG.	1	20	A	20	1	RCPT - UNIT 918 REFRIG.	750	50
51	1200	RCPT - UNIT 915 MICRO.	1	20	B	20	1	RCPT - UNIT 918 MICRO.	1200	52
53	720	RCPT - UNIT 915 BEDROOM	1	20	C	20	1	RCPT - UNIT 918 BEDROOM	720	54
55	1050	HP-915	2	20	A	20	2	HP-918	1050	56
57	1050				B				1050	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

TYPICAL FOR PANELBOARD SCHEDULES P12N-2 & P15N-2

PANEL P9N-2

DESCRIPTION: 200A MLO — 100% Neutral Bus, w/ Double Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 23kW= 64A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 25kW= 69A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 917 LIVING RM	1	20	A	20	1	RCPT - UNIT 919 LIVING RM	1080	2
3	180	RCPT - UNIT 917 RR	1	20	B	20	1	RCPT - UNIT 919 RR	180	4
5	750	RCPT - UNIT 917 REFRIG.	1	20	C	20	1	RCPT - UNIT 919 REFRIG.	750	6
7	1200	RCPT - UNIT 917 MICRO.	1	20	A	20	1	RCPT - UNIT 919 MICRO.	1200	8
9	720	RCPT - UNIT 917 BEDROOM	1	20	B	20	1	RCPT - UNIT 919 BEDROOM	720	10
11	1050	HP-917	2	20	C	30	2	HP-919	1500	12
13	1050				A				1500	14
15	1800	HP-900	2	30	B	20	1	RCPT - VENDING MACH.	1000	16
17	1800				C	20	1	RCPT - ICE MACHINE	1200	18
19	100	FS DAMPERS	1	20	A	20	1	RCPT - CONVENIENCE	1260	20
21	-	SPARE	1	20	B	20	1	RCPT - CONSOLE TABLE	180	22
23	-	SPARE	1	20	C	20	1	RCPT - CONVENIENCE	1080	24
25	-	SPARE	1	20	A	20	1	DOOR HOLD OPENS	100	26
27	-	SPARE	1	20	B	20	1	LTG - CORR./ELEV. LOBBY	920	28
29	-	SPARE	1	20	C	20	1	RCPT - IDF	720	30
31	-	SPARE	1	20	A	20	1	SPARE	-	32
33	-	SPARE	1	20	B	20	1	SPARE	-	34
35	-	SPARE	1	20	C	20	1	SPARE	-	36
37	-	SPARE	1	20	A	20	1	SPARE	-	38
39	-	SPARE	1	20	B	20	1	SPARE	-	40
41	-	SPARE	1	20	C	20	1	SPARE	-	42
43	-	SPARE	1	20	A	20	1	SPARE	-	44
45	-	SPARE	1	20	B	20	1	SPARE	-	46
47	-	SPARE	1	20	C	20	1	SPARE	-	48
49	-	SPARE	1	20	A	20	1	SPARE	-	50
51	-	SPARE	1	20	B	20	1	SPARE	-	52
53	-	SPARE	1	20	C	20	1	SPARE	-	54
55	-	SPARE	1	20	A	20	1	SPARE	-	56
57	-	SPARE	1	20	B	20	1	SPARE	-	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

TYPICAL FOR PANELBOARD SCHEDULES P12S & P15S

PANEL P9S

DESCRIPTION: 200A MLO — 100% Neutral Bus, w/ Double Lugs
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 59kW= 162A
10 kAIC RATING — DEMANDED LOAD CONTINUOUS: 52kW= 143A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	RCPT - UNIT 907 LIVING RM	1	20	A	20	1	RCPT - UNIT 906 LIVING RM	1080	2
3	180	RCPT - UNIT 907 RR	1	20	B	20	1	RCPT - UNIT 906 RR	180	4
5	750	RCPT - UNIT 907 REFRIG.	1	20	C	20	1	RCPT - UNIT 906 REFRIG.	750	6
7	1200	RCPT - UNIT 907 MICRO.	1	20	A	20	1	RCPT - UNIT 906 MICRO.	1200	8
9	720	RCPT - UNIT 907 BEDROOM	1	20	B	20	1	RCPT - UNIT 906 BEDROOM	720	10
11	1730	HP-907	2	30	C	20	2	HP-906	1050	12
13	1730				A				1050	14
15	-	LTG - UNITS 906,907,913,914	1	20	B	20	1	LTG - UNITS 908 TO 912	-	16
17	1080	RCPT - UNIT 909 LIVING RM	1	20	C	20	1	RCPT - UNIT 908 LIVING RM	1080	18
19	180	RCPT - UNIT 909 RR	1	20	A	20	1	RCPT - UNIT 908 RR	180	20
21	750	RCPT - UNIT 909 REFRIG.	1	20	B	20	1	RCPT - UNIT 908 REFRIG.	750	22
23	1200	RCPT - UNIT 909 MICRO.	1	20	C	20	1	RCPT - UNIT 908 MICRO.	1200	24
25	720	RCPT - UNIT 909 BEDROOM	1	20	A	20	1	RCPT - UNIT 908 BEDROOM	720	26
27	1125	HP-909	2	20	B	20	2	HP-908	1125	28
29	1125				C				1125	30
31	1080	RCPT - UNIT 911 LIVING RM	1	20	A	20	1	RCPT - UNIT 910 LIVING RM	1080	32
33	180	RCPT - UNIT 911 RR	1	20	B	20	1	RCPT - UNIT 910 RR	180	34
35	750	RCPT - UNIT 911 REFRIG.	1	20	C	20	1	RCPT - UNIT 910 REFRIG.	750	36
37	1200	RCPT - UNIT 911 MICRO.	1	20	A	20	1	RCPT - UNIT 910 MICRO.	1200	38
39	720	RCPT - UNIT 911 BEDROOM	1	20	B	20	1	RCPT - UNIT 910 BEDROOM	720	40
41	1125	HP-911	2	20	C	30	2	HP-910	1730	42
43	1125				A				1730	44
45	1080	RCPT - UNIT 913 LIVING RM	1	20	B	20	1	RCPT - UNIT 912 LIVING RM	1080	46
47	180	RCPT - UNIT 913 RR	1	20	C	20	1	RCPT - UNIT 912 RR	180	48
49	750	RCPT - UNIT 913 REFRIG.	1	20	A	20	1	RCPT - UNIT 912 REFRIG.	750	50
51	1200	RCPT - UNIT 913 MICRO.	1	20	B	20	1	RCPT - UNIT 912 MICRO.	1200	52
53	720	RCPT - UNIT 913 BEDROOM	1	20	C	20	1	RCPT - UNIT 912 BEDROOM	720	54
55	1050	HP-913	2	20	A	30	2	HP-912	1590	56
57	1050				B				1590	58
59	-	SPARE	1	20	C	20	1	RCPT - UNIT 914 LIVING RM	1080	60
61	-	SPARE	1	20	A	20	1	RCPT - UNIT 914 RR	180	62
63	-	SPARE	1	20	B	20	1	RCPT - UNIT 914 REFRIG.	750	64
65	-	SPARE	1	20	C	20	1	RCPT - UNIT 914 MICRO.	1200	66
67	-	SPARE	1	20	A	20	1	RCPT - UNIT 914 BEDROOM	720	68
69	-	SPARE	1	20	B	20	2	HP-914	1050	70
71	-	SPARE	1	20	C				1050	72

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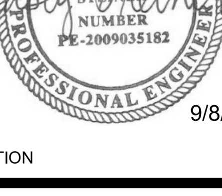

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

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H&B PROJECT NUMBER : 1820630

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MO Certificate of Authority 01022

Electrical Schedules

E6.02

LIGHT FIXTURE SCHEDULE

NOTES:

1. PROVIDE NUMBER OF FACES AND DIRECTIONAL ARROWS TO MATCH WHAT IS SHOWN ON DRAWINGS.
2. VERIFY FINISH WITH ARCHITECT.

GENERAL NOTES:

A. CONTRACTOR SHALL VERIFY CEILING TYPE PRIOR TO ORDERING ALL FIXTURES.
B. PROVIDE ALL REQUIRED ACCESSORIES FOR A COMPLETE INSTALLATION.
C. REFERENCE PLANS FOR FIXTURES REQUIRING EMERGENCY DRIVERS.

MARK	MANUFACTURER	MODEL	LAMP DATA LUMEN OUTPUT	TYPE	COLOR (K)	DIMMING	VOLTS	MOUNTING	WATTS	DESCRIPTION	NOTES
A	H.E. WILLIAMS	LT-24-L52/835-AF-DIM-UNV	5200	LED	3500	0-10V	UNV	RECESSED	37	2X4 DIRECT/INDIRECT TROFFER	
A1	H.E. WILLIAMS	LT-22-L39/835-AF-DIM-UNV	3900	LED	3500	0-10V	UNV	RECESSED	33	2X2 DIRECT/INDIRECT TROFFER	
A2	HUBBELL	LZPT 24-35 ML G-LSR S-E U	5100	LED	3500	0-10V	UNV	RECESSED	48	2X4 DIRECT/INDIRECT SHALLOW PLENUM TROFFER	
A2E	HUBBELL	LZPT 24-35 ML G-LSR S-E U-ELL14	5100	LED	3500	0-10V	UNV	RECESSED	48	2X4 DIRECT/INDIRECT SHALLOW PLENUM TROFFER WITH EMERGENCY BATTERY DRIVER	
AE	H.E. WILLIAMS	LT-24-L52/835-AF-EM/10W-DIM-UNV	5200	LED	3500	0-10V	UNV	RECESSED	37	2X4 DIRECT/INDIRECT TROFFER WITH EMERGENCY BATTERY DRIVER	
B	H.E. WILLIAMS	7SS-4-L65/835-DRV-UNV	6600	LED	3500	-	UNV	SURFACE	49	4FT. LENSED STRIP FIXTURE	
BE	H.E. WILLIAMS	7SS-4-L65/835-DRV-UNV	6600	LED	3500	-	UNV	SURFACE	49	4FT. LENSED STRIP FIXTURE	
C	H.E. WILLIAMS	4DR-TL-L10/830-DIM-UNV-OM-OF-CS	1000	LED	3000	0-10V	UNV	RECESSED	10	4" DIAMETER DOWNLIGHT WITH CLEAR SEMI-SPECULAR REFLECTOR	
C1	H.E. WILLIAMS	4DR-TL-L10/830-DIM-UNV-OM-OF-CS-WET/CC	1000	LED	3000	0-10V	UNV	RECESSED	10	4" DIAMETER SHOWER LIGHT WITH LENS	
DE	H.E. WILLIAMS	SLF-4-L52/835-EM/10W-OCDWS FSP-211-L2-DIM-UNV	5200	LED	3500	0-10V	UNV	SURFACE	58	4' LENSED FIXTURE WITH INTEGRAL OCCUPANCY SENSOR ADN EMERGENCY BATERY DRIVER	
E	DUAL-LITE	EVHC 12 I 06L	-	LED	-	-	UNV	WALL	12	BUG EYE EMERGENCY LIGHT FIXTURE WITH EMERGENCY BATTERY DRIVER	
F	-	-	-	-	3000	-	UNV	WALL	-	REFERENCE INTERIOR DESIGN SPECIFICATIONS FOR MORE INFORMATION	
G	-	-	-	-	3000	-	UNV	SURFACE	-	REFERENCE INTERIOR DESIGN SPECIFICATIONS FOR MORE INFORMATION	
H	-	-	-	-	3000	-	UNV	WALL	-	REFERENCE INTERIOR DESIGN SPECIFICATIONS FOR MORE INFORMATION	
X	DUAL-LITE	LE-C/W/E-S/D-G-EI	-	-	-	-	UNV	SEE PLANS	5	EDGE-LIT EXIT SIGN WITH GREEN LETTERS	1
X1	DUAL-LITE	LE-C/W/E-S/D-G-EI	-	-	-	-	UNV	SEE PLANS	5	EDGE-LIT EXIT SIGN WITH GREEN LETTERS	1

PANEL PTB1

DESCRIPTION: 400A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 29kW= 79A
DEMANDED LOAD CONTINUOUS: 19kW= 54A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	SEATING 004 RECEPT	1	20	A	20	1	WARMING 008 RECEPT	180	2
3	180	WARMING 008 RECEPT	1	20	B	20	1	WARMING 008 RECEPT	180	4
5	180	WARMING 008 RECEPT	1	20	C	20	1	WARMING 008 RECEPT	180	6
7	180	WARMING 008 RECEPT	1	20	A	20	1	WARMING 008 RECEPT	180	8
9	180	WARMING 008 RECEPT	1	20	B	20	1	WARMING 008 RECEPT	180	10
11	180	WARMING 008 RECEPT	1	20	C	20	1	WARMING 008 RECEPT	180	12
13	720	SEATING 004 RECEPT	1	20	A	20	1	VENDING MACHINE	1000	14
15	1000	VENDING MACHINE	1	20	B	20	1	COMP 006 RECEPT	360	16
17	1000	VENDING MACHINE	1	20	C	20	1	COMP 006 RECEPT	360	18
19	720	VENDING 005 RECEPT	1	20	A	20	1	MEN'S 025 RECEPT	360	20
21	360	NURSE 003 RECEPT	1	20	B	20	1	WOMEN'S 021 RECEPT	360	22
23	720	HSKPG OFFICE RECEPT	1	20	C	20	1	BSMT UTILITY RECEPT	1440	24
25	1440	RESTROOMS RECEPT	1	20	A	20	1	SERVERY 007 RECEPT	540	26
27	900	CORRIDOR 002 RECEPT	1	20	B	20	1	BSMT UTILITY RECEPT	540	28
29	900	CORRIDOR 001 RECEPT	1	20	C	20	1	BSMT UTILITY RECEPT	1440	30
31	1260	BSMT UTILITY RECEPT	1	20	A	20	1	LOUNGE 107 RECEPT	1440	32
33	1080	ELEV LOBBY 104 RECEPT	1	20	B	20	1	LOUNGE 107 RECEPT	1440	34
35	1440	T1 RESTROOMS RECEPT	1	20	C	20	1	CONCIERGE 109 RECEPT	1440	36
37	1080	VESTIBULE 101 RECEPT	1	20	A	20	1	SPARE	-	38
39	1440	GRAND LOBBY RECEPT	1	20	B	20	1	SPARE	-	40
41	720	FIRE CMD ROOM RECEPT	1	20	C	20	1	SPARE	-	42
43	-	SPARE	1	20	A	20	1	SPARE	-	44
45	-	SPARE	1	20	B	20	1	SPARE	-	46
47	-	SPARE	1	20	C	20	1	SPARE	-	48
49	-	SPARE	1	20	A	20	1	SPARE	-	50
51	-	SPARE	1	20	B	20	1	SPARE	-	52
53	-	SPARE	1	20	C	20	1	SPARE	-	54
55	-	SPARE	1	20	A	20	1	SPARE	-	56
57	-	SPARE	1	20	B	20	1	SPARE	-	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

PANEL PT3B

DESCRIPTION: 400A MLO — 100% Neutral Bus w/ Double Lugs
10 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 16kW= 44A
DEMANDED LOAD CONTINUOUS: 13kW= 36A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	1080	LOUNGE SE 213 RECEPT	1	20	A	20	1	BAR 214 RECEPT	180	2
3	500	DRINKING FOUNTAIN	1	20	B	20	1	BAR 214 RECEPT	1440	4
5	500	DRINKING FOUNTAIN	1	20	C	20	1	ELEV LOBBY 206 RECEPT	1440	6
7	1440	LOUNGE W 216 RECEPT	1	20	A	20	1	BAR 214 RECEPT	180	8
9	1260	LOUNGE W 216 RECEPT	1	20	B	20	1	BAR 214 RECEPT	180	10
11	720	T3B UTILITY RECEPT	1	20	C	20	1	ELEV LOBBY 401 RECEPT	1080	12
13	900	PREFUNC 402 RECEPT	1	20	A	20	1	PREFUNC 402 RECEPT	180	14
15	360	CORRIDOR 403 RECEPT	1	20	B	20	1	PREFUNC 2002 RECEPT	1620	16
17	180	PREFUNC 402 RECEPT	1	20	C	20	1	CORRIDOR 2008 RECEPT	540	18
19	720	ELEV 2001 RECEPT	1	20	A	20	1	MEN'S 2003 RECEPT	360	20
21	360	MEN'S 405 RECEPT	1	20	B	20	1	WOMEN'S 2004 RECEPT	180	22
23	360	WOMEN'S 408 RECEPT	1	20	C	20	1	SPARE	-	24
25	-	SPARE	1	20	A	20	1	SPARE	-	26
27	-	SPARE	1	20	B	20	1	SPARE	-	28
29	-	SPARE	1	20	C	20	1	SPARE	-	30
31	-	SPARE	1	20	A	20	1	SPARE	-	32
33	-	SPARE	1	20	B	20	1	SPARE	-	34
35	-	SPARE	1	20	C	20	1	SPARE	-	36
37	-	SPARE	1	20	A	20	1	SPARE	-	38
39	-	SPARE	1	20	B	20	1	SPARE	-	40
41	-	SPARE	1	20	C	20	1	SPARE	-	42
43	-	SPARE	1	20	A	20	1	SPARE	-	44
45	-	SPARE	1	20	B	20	1	SPARE	-	46
47	-	SPARE	1	20	C	20	1	SPARE	-	48
49	-	SPARE	1	20	A	20	1	SPARE	-	50
51	-	SPARE	1	20	B	20	1	SPARE	-	52
53	-	SPARE	1	20	C	20	1	SPARE	-	54
55	-	SPARE	1	20	A	20	1	SPARE	-	56
57	-	SPARE	1	20	B	20	1	SPARE	-	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60
61	-	SPARE	1	20	A	20	1	SPARE	-	62
63	-	SPARE	1	20	B	20	1	SPARE	-	64
65	-	SPARE	1	20	C	20	1	SPARE	-	66
67	-	SPARE	1	20	A	20	1	SPARE	-	68
69	-	SPARE	1	20	B	20	1	SPARE	-	70
71	-	SPARE	1	20	C	20	1	SPARE	-	72

PANEL DPH1

DESCRIPTION: 400A MCB — 100% Neutral Bus w/ Feed Through Lugs
22 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 91kW= 254A
DEMANDED LOAD CONTINUOUS: 105kW= 293A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
1	793	DOAU-5 - BLOWER COIL	3	20	A	20	3	DOAU-13 - BLOWER COIL	793	2
3	793				B				793	4
5	793				C				793	6
7	1667	DOAU-5 - DUCT HEATER	3	20	A	20	3	DOAU-13 - DUCT HEATER	1667	8
9	1667				B				1667	10
11	1667				C				1667	12
13	793	DOAU-5 - ERV	3	20	A	20	3	DOAU-13 - ERV	793	14
15	793				B				793	16
17	793				C				793	18
19	793	DOAU-7 - BLOWER COIL	3	20	A	20	3	DOAU-15 - BLOWER COIL	793	20
21	793				B				793	22
23	793				C				793	24
25	1667	DOAU-7 - DUCT HEATER	3	20	A	20	3	DOAU-15 - DUCT HEATER	1667	26
27	1667				B				1667	28
29	1667				C				1667	30
31	793	DOAU-7 - ERV	3	20	A	20	3	DOAU-15 - ERV	793	32
33	793				B				793	34
35	793				C				793	36
37	793	DOAU-9 - BLOWER COIL	3	20	A	20	3	DOAU-17 - BLOWER COIL	793	38
39	793				B				793	40
41	793				C				793	42
43	1667	DOAU-9 - DUCT HEATER	3	20	A	20	3	DOAU-17 - DUCT HEATER	1667	44
45	1667				B				1667	46
47	1667				C				1667	48
49	793	DOAU-9 - ERV	3	20	A	20	3	DOAU-17 - ERV	793	50
51	793				B				793	52
53	793				C				793	54
55	-	SPARE	1	20	A	20	1	SPARE	-	56
57	-	SPARE	1	20	B	20	1	SPARE	-	58
59	-	SPARE	1	20	C	20	1	SPARE	-	60

PANEL DPH1 (SECTION 2)

DESCRIPTION: 400A MLO — 100% Neutral Bus w/ Feed Through Lugs
22 kAIC RATING
VOLTAGE: 120/208V, 3PH, 4 WIRE
TOTAL CONNECTED LOAD: 29kW= 81A
DEMANDED LOAD CONTINUOUS: 34kW= 95A

NO	LOAD (W)	LOAD DESCRIPTION	P	AMP SIZE	PH	AMP SIZE	P	LOAD DESCRIPTION	LOAD (W)	NO
61	793	DOAU-11 - BLOWER COIL	3	20	A	20	1	SPARE	-	62
63	793				B	20	1	SPARE	-	64
65	793				C	20	1	SPARE	-	66
67	1667	DOAU-11 - DUCT HEATER	3	20	A	20	1	SPARE	-	68
69	1667				B	20	1	SPARE	-	70
71	1667				C	20	1	SPARE	-	72
73	793	DOAU-11 - ERV	3	20	A	20	1	SPARE	-	74
75	793				B	20	1	SPARE	-	76
77	793				C	20	1	SPARE	-	78
79	2500	DRYER	2	30	A	20	1	SPARE	-	80
81	2500				B	20	1	SPARE	-	82
83	2500	DRYER	2	30	C	20	1	SPARE	-	84
85	2500				A	20	1	SPARE	-	86
87	2500	DRYER	2	30	B	20	1	SPARE	-	88
89	2500				C	20	1	SPARE	-	90
91	-	SPARE	1	20	A	20	1	SPARE	-	92
93	-	SPARE	1	20	B	20	1	SPARE	-	94
95	1500	WASHING MACHINE	1	20	C	20	1	SPARE	-	96
97	1500	WASHING MACHINE	1	20	A	20	1	SPARE	-	98
99	1500	WASHING MACHINE	1	20	B	20	1	SPARE	-	100
101	-	SPARE	1	20	C	20	1	SPARE	-	102
103	-	SPARE	1	20	A	20	1	SPARE	-	104
105	-	SPARE	1	20	B	20	1	SPARE	-	106
107	-	SPARE	1	20	C	20	1	SPARE	-	108
109	-	SPARE	1	20	A	20	1	SPARE	-	110
111	-	SPARE	1	20	B	20	1	SPARE	-	112
113	-	SPARE	1	20	C	20	1	SPARE	-	114
115	-	SPARE	1	20	A	20	1	SPARE	-	116
117	-	SPARE	1	20	B	20	1	SPARE	-	118
119	-	SPARE	1	20	C	20	1	SPARE	-	120

DPLS

DESCRIPTION: 400A I-LINE — TYPE HCR-U — 99" MOUNTING SPACE — 42 KAIC
480/277V, 3PH, 4 WIRE
MAIN CIRCUIT BREAKER — CONNECTED LOAD: 195 AMPS 162,175 WATTS
SURFACE MOUNTING — DEMAND LOAD: 220 AMPS 183,179 WATTS

NO	LOAD DESCRIPTION	P	AMP SIZE	FEEDER	CONNECTED LOAD (W)	CONNECTED LOAD (A)	DEMAND LOAD (W)	DEMAND LOAD (A)
1	ELEVATOR	3	150	(3)#3 & #8 GW IN A 1 1/4"C	54,015	65	67,519	81
2	ELEVATOR	3	100	(3)#6 & #8 GW IN A 1 1/4"C	33,260	40	33,260	40
3	STAIR PRESSURIZATION FAN SCF-1	3	60	(3)#8 & #10 GW IN A 3/4"C	22,450	27	22,450	27
4	STAIR PRESSURIZATION FAN SCF-2	3	60	(3)#8 & #10 GW IN A 3/4"C	22,450	27	22,450	27
5	TRANSFORMER T-LS	3	125	SEE RISER	30,000	36	37,500	45
6	PROVISION	3	-	-	-	0	0	0
7	PROVISION	3	-	-	-	0	0	0

EXISTING PANEL B1-21-5

DESCRIPTION: 800A I-LINE — TYPE HCR-U — 99" MOUNTING SPACE — 42 KAIC
480/277V, 3PH, 4 WIRE
MAIN CIRCUIT BREAKER — CONNECTED LOAD: 305 AMPS 253,575 WATTS
SURFACE MOUNTING — DEMAND LOAD: 321 AMPS 267,079 WATTS

NO	LOAD DESCRIPTION	P	AMP SIZE	FEEDER	CONNECTED LOAD (W)	CONNECTED LOAD (A)	DEMAND LOAD (W)	DEMAND LOAD (A)
1	ELEVATOR	3	150	(3)#3 & #8 GW IN A 1 1/4"C	54,015	65	67,519	81
2	ELEVATOR	3	100	(3)#6 & #8 GW IN A 1 1/4"C	33,260	40	33,260	40
3	ELEVATOR	3	100	(3)#6 & #8 GW IN A 1 1/4"C	33,260	40	33,260	40
4	ELEVATOR	3	100	(3)#6 & #8 GW IN A 1 1/4"C	33,260	40	33,260	40
5	ELEVATOR	3	100	(3)#6 & #8 GW IN A 1 1/4"C	33,260	40	33,260	40
6	ELEVATOR	3	100	(3)#6 & #8 GW IN A 1 1/4"C	33,260	40	33,260	40
7	ELEVATOR	3	100	(3)#6 & #8 GW IN A 1 1/4"C	33,260	40	33,260	40
8		3	-	-	-	-	-	-

DPT3B

DESCRIPTION: 2000AMP MAIN CIRCUIT BREAKER — 100 KAIC
208/120V, 3PH, 4 WIRE — CONNECTED LOAD: 2,445 AMPS 880,164 WATTS
SURFACE MOUNTING — DEMAND LOAD: 1,724 AMPS 620,480 WATTS

NO	LOAD DESCRIPTION	P	AMP SIZE	FEEDER	CONNECTED LOAD (W)	CONNECTED LOAD (A)	DEMAND LOAD (W)	DEMAND LOAD (A)
1	PANEL P5S	3	200	SEE RISER	59,120	164	52,373	145
2	PANEL P6S	3	200	SEE RISER	58,520	162	51,623	143
3	PANEL P7S	3	200	SEE RISER	58,520	162	51,623	143
4	PANEL P8S	3	200	SEE RISER	58,520	162	51,623	143
5	PANEL P9S	3	200	SEE RISER	58,520	162	51,623	143
6	PANEL P10S	3	200	SEE RISER	58,520	162	51,623	143
7	PANEL P11S	3	200	SEE RISER	59,402	165	52,725	146
8	PANEL P12S	3	200	SEE RISER	58,520	162	51,623	143
9	PANEL P13S	3	200	SEE RISER	58,520	162	51,623	143
10	PANEL P14S	3	200	SEE RISER	58,520	162	51,623	143
11	PANEL P15S	3	200	SEE RISER	58,520	162	51,623	143
12	PANEL P16S	3	200	SEE RISER	58,520	162	51,623	143
13	PANEL P17S	3	200	SEE RISER	59,402	165	51,623	143
14	PANEL P18S	3	200	SEE RISER	58,520	162	51,623	143
15	PANEL P19S	3	200	SEE RISER	58,520	162	51,623	143
16	-	-	-	-	-	-	-	-

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H&B PROJECT NUMBER : 182063

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STATE OF MISSOURI — CASEY JOHN STOKES — NUMBER PE-2009035182 — PROFESSIONAL ENGINEER

9/8/2020

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: Author
Checked By: Checker
Scale: See Drawing
Issue Date: September 8, 2020

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Electrical Schedules

E6.03

9/8/2020 10:05:56 AM C:\Users\bdecker\Documents\1820630_The Grand Reserve M-E_CENTRAL_R17_bdeckerCCYSG.rvt

A SCOPE

THIS PROJECT INVOLVES THE INSTALLATION OF INFRASTRUCTURE FOR THE VOICE, DATA, MATV, CCTV AND INTRUSION DETECTION SYSTEMS. THE DESIGN OF THESE INFRASTRUCTURE SYSTEMS IS BASED UPON CURRENT INDUSTRY STANDARDS, SUPPORTING AN OPEN SYSTEM ARCHITECTURE.

B CONTRACTOR PROJECT REQUIREMENTS

1.) INSTALLATION SHALL COMPLY WITH APPLICABLE CODES INCLUDING BUT NOT LIMITED TO ANSI/TIA/EIA 568C (FOR STRUCTURED CABLING SYSTEM), NATIONAL ELECTRICAL CODE, NFPA GUIDELINES, AND ANY LOCAL CODES OR ORDINANCES IN EFFECT.

2.) CABLING CONTRACTOR IS RESPONSIBLE FOR THEIR OWN CLEANUP.

3.) CABLING CONTRACTOR IS RESPONSIBLE FOR SAFE KEEPING OF THEIR OWN MATERIAL. ANY LOSSES OF MATERIAL ARE THE RESPONSIBILITY OF THE VENDOR. THE OWNER, GENERAL CONTRACTOR, ETC. IS NOT RESPONSIBLE FOR LOSSES.

4.) ALL WORK WILL BE SCHEDULED AND CONTINGENT UPON THE SCHEDULE OF THE GENERAL CONTRACTOR. PROJECT CABLING CONTRACTOR SHALL ATTEND REGULAR AND MANDATORY SAFETY MEETINGS FOR PROJECT MANAGER AND/OR TECHNICIANS.

5.) CABLING CONTRACTOR MUST COORDINATE WITH GENERAL CONTRACTOR AND ARCHITECT BEFORE DRILLING OR CORING FLOORS FOR CABLE ACCESS OR 'SHOOTING' FASTENERS INTO CONCRETE FOR CABLE SUPPORT AND PATHWAY SYSTEMS.

6.) IT IS THE RESPONSIBILITY OF THE CABLING CONTRACTOR TO VERIFY FINAL OUTLET PLACEMENT PRIOR TO ANY CONDUIT ROUGH IN BOX INSTALLATION. VERIFICATION PROCESS SHALL INCLUDE REFERENCING I.D., MEP AND ARCHITECTURAL DRAWINGS AS WELL AS FIELD VERIFICATION.

7.) PROVISIONS OUTLINED IN RELATED PROJECT DOCUMENTS, DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SCOPE.

8.) IT IS A RESPONSIBILITY OF THE CABLING CONTRACTOR TO IMMEDIATELY NOTIFY NETWORK TECHNOLOGIES, INC. (NTI) OF ANY CONFLICTS/DISCREPANCIES ON THE PROJECT DOCUMENTS. IN CASE OF SUCH CONFLICT, MOST STRINGENT REQUIREMENT APPLIES UNLESS OTHERWISE NOTED/DIRECTED BY NTI.

9.) CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND CABLING IN THE PROPER SEQUENCE ACCORDING TO THE OVERALL CONSTRUCTION SCHEDULE. ALL COSTS ASSOCIATED WITH PREARATION OF A BID PROPOSAL WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

10.) CABLING CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS FOR PROJECT. PROVIDE CURRENT LV LICENSE REQUIRED PER STATE REGULATIONS.

11.) PROVIDE PROOF OF CERTIFICATION OF TEAM MEMBERS. INCLUDE ANY RCDD MEMBERS ON STAFF OR INSTALLATION TEAM. VOICE/DATA CABLING CONTRACTOR SHALL BE A CURRENTLY CERTIFIED CONTRACTOR FOR THE MANUFACTURER OF THE CABLING SYSTEM USED.

C VOICE AND DATA INFRASTRUCTURE OVERVIEW

FIBER OPTIC AND CAT–6 UTP INFRASTRUCTURE TO SUPPORT DATA, VOICE, AND INTERNET SERVICES THROUGHOUT THE FACILITY. OUTLETS WILL BE CONFIGURED PER FLOOR PLANS AND CORRESPONDING OUTLET CONFIGURATION DETAILS. ALL OUTLETS, PATCH PANELS AND CABLE LINKS ARE TO BE LABELED PER ANSI/TIA/EIA STANDARDS. INSTALLER SHALL DEVELOP AND SUBMIT FOR APPROVAL A LABELING SYSTEM FOR THE INFRASTRUCTURE INSTALLATION USING THE GUIDELINES SPECIFIED HEREIN. SYSTEMS INFRASTRUCTURE SHALL BE TESTED AND CERTIFIED AS DOCUMENTED HEREIN.

D MATV INFRASTRUCTURE OVERVIEW

TELEVISION SERVICE TO FACILITY WILL BE DELIVERED VIA A COAXIAL DISTRIBUTION SYSTEM. THE SYSTEM SHALL CONSIST OF RG–6 AND RG–11 COAXIAL CABLING AND COMPONENTS. CABLING CONTRACTOR IS RESPONSIBLE FOR SUPPLYING ALL CABLE, SPLITTERS/TAPS, AMPLIFIERS, ETC. TO PROVIDE A COMPLETE MATV DISTRIBUTION SYSTEM. LABELING OF ALL CABLE RUNS, HEADEND TERMINATIONS, OUTLET LOCATIONS AND JUNCTION BOX COVERS IS REQUIRED. THE LABELING SCHEME SHALL BE CLEAR, CONCISE AND REFLECTED ON AS–BUILT DRAWINGS.

E SECURITY INFRASTRUCTURE OVERVIEW

SECURITY SYSTEM WILL CONSIST OF ALL OR SOME OF THE FOLLOWING:

CLOSED CIRCUIT CAMERAS, DIGITAL RECORDER(S), DURESS ALARMS, DOOR CONTACTS AND INTERCOM UNITS. ALL COMPONENTS SHALL BE PROVIDED AND INSTALLED IN APPROPRIATE LOCATIONS PER DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR INSTALLING ALL NECESSARY COMPONENTS, CABLE, HARDWARE, ETC. TO FURNISH COMPLETE SYSTEM. CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING TRAINING TO OPERATOR PERSONNEL, AS REQUIRED, TO ENSURE THE APPROPRIATE PERSONNEL ARE FAMILIAR AND FLUENT IN OPERATING AND PROGRAMMING SYSTEMS. TRAINING SESSIONS SHALL BE COORDINATED WITH OWNER/OPERATOR PRIOR TO COMPLETION OF SYSTEM INSTALLATION.

F GENERAL INFRASTRUCTURE INSTALLATION NOTES

1.) INSTALLATION OF CABLING SYSTEM, ALL EQUIPMENT RACKS & LADDER RACKS, GROUNDING, ETC. MUST FOLLOW INSTALLATION GUIDELINES IN THE MOST CURRENTLY PUBLISHED VERSION OF NEC, TIA/EIA 568C, NFPA AND ANY LOCAL, STATE OR MUNICIPAL CODES IN EFFECT AT TIME OF INSTALLATION. ALL CABLE BUNDLES SHALL BE INSTALLED USING PROPER WIRE MANAGEMENT TECHNIQUES, IN A NEAT AND WORKMANLIKE FASHION. INSTALLER SHALL INSTALL CABLE BUNDLES FOLLOWING ALL TIA/EIA & BICSI GUIDELINES AS TO WIRE TIES, CINCHING TIGHTNESS, BEND RADIUS, NEATNESS, WIRE MANAGEMENT, LABELING, ETC. ANY ASSOCIATED HARDWARE, MATERIALS OR COMPONENTS NEEDED TO PROPERLY INSTALL A COMPLETE AND FUNCTIONAL SYSTEM PER THESE GUIDELINES MUST BE INCLUDED IN THE INITIAL BID RESPONSE AND ARE THE RESPONSIBILITY OF THE CABLING CONTRACTOR.

2.) FREE STANDING EQUIPMENT RACKS SHALL BE FASTENED TO CONCRETE FLOOR AND FASTENED TO OVERHEAD RACK WITH PROPER HARDWARE. RACKS SHALL BE SUPPLIED IN SUFFICIENT QUANTITY TO PROVIDE RACK SPACE FOR ALL PATCH PANELS, ASSOCIATED WIRE MANAGEMENT AND ANTICIPATED NETWORK HARDWARE.

3.) VERTICAL CABLE MANAGEMENT SHALL BE SUPPLIED BETWEEN EACH RACK AND ON THE ENDS OF ALL RACK CONFIGURATIONS OR AS NOTED ON RACK ELEVATIONS.

4.) MDF ROOMS SHALL HAVE 18' WIDE X 6' DEEP LADDER RACK (CPI OR APPROVED EQUIVALENT) AND FROM RACKS TO WALL IN APPROPRIATE ROOMS AS DEPICTED IN CLOSET LAYOUTS. IDF CLOSETS SHALL UTILIZE LADDER STYLE CABLE RUNWAY (MIN. 12'W OR SPECIFIED HEREIN) AS DEPICTED IN IDF LAYOUTS.

5.) PATCH PANELS SHALL BE CATEGORY 6, RJ–45, RACK MOUNT STYLE PANELS TERMINATED TO T568B COLOR CODE. PATCH PANELS SHALL BE SUPPLIED IN AMPLE QUANTITY AND PORT CONFIGURATION TO TERMINATE ALL HORIZONTAL DATA AND RISER DATA CABLES. PROVIDE SEPARATE PATCH PANELS FOR EACH OF THE FOLLOWING OUTLET TYPES–PUBLIC/FUNCTION AREAS, ADMINISTRATIVE AREAS, WIRELESS HSIA, IPTV (IF APPLICABLE) DATA AND POINT OF SALE AND COPPER DATA RISER CABLES. ALL PATCH PANELS SHALL BE LABELED ACCORDINGLY TO PROVIDE CLEAR AND CONCISE INFORMATION DETAILING THE OUTLET CIRCUITING FOR EACH PATCH PANEL PORT. WIRE MANAGEMENT SHALL BE SUPPLIED BETWEEN EACH PANEL AND ON THE TOP AND BOTTOM OF ALL PANEL ROWS. HORIZONTAL WIRE MANAGEMENT SHALL BE 2 RACK UNITS IN HEIGHT (3.5").

6.) PATCH CABLES AND WORKSTATION CABLES SHALL BE SUPPLIED BY OTHERS OR AS NOTED IN "ALTERNATE/UNIT PRICING" BLOCK.

7.) ALL HORIZONTAL COPPER CABLE SHALL BE 4 PAIR, UTP, CAT–6. ALL HORIZONTAL CABLE SHALL BE PLENUM RATED. IF REQUIRED BY LOCAL CODES "LC" CABLE SHALL BE USED IN LIEU OF PLENUM RATED CABLE. ALL RISER CABLES MUST BE PLENUM RATED. CABLING CONTRACTOR IS RESPONSIBLE FOR VERIFYING WITH LOCAL CODE OFFICIALS THE ACCEPTANCE FOR USE OF ANY NON–PLENUM RATED CABLE.

8.) ALL HORIZONTAL CABLING RUNS SHALL BE SUPPORTED IN THE OPEN SPACE AREAS AN INDEPENDENT SUPPORT SYSTEM (I.E. J–HOOKS MUST NOT BE HUNG FROM CEILING GRID SUPPORT OR ANY OTHER DISCIPLINES SUPPORT SYSTEM). LOCAL CODE MAY REQUIRE CONTRACTOR TO SUPPORT EXISTING CABLING INFRASTRUCTURE AND MUST MEET CURRENT LOCAL CODE. BRIDLE RINGS OR TYING CABLES TO STRUCTURE SHALL NOT BE PERMITTED.

9.) CABLING CONTRACTOR SHALL FURNISH ALL RACKS, OVERHEAD CABLE TRAY AND ALL ASSOCIATED HARDWARE NECESSARY TO BUILD OUT CABLING SYSTEM INFRASTRUCTURE IN ALL IDF LOCATIONS AND EQUIPMENT ROOMS AS DETAILED ON THE DRAWINGS.

10.) ANALOG TELEPHONE RISER SHALL TERMINATE ON CAT–6 RATED 110 BLOCKS. TELEPHONE RISER CABLES SHALL BE 24 GAUGE, CATEGORY 3, UTP, CMP RATED, SUPPLIED IN THE APPROPRIATE PAIR COUNT TO PROVIDE 2 PAIRS PER HORIZONTAL VOICE CABLE PLUS 25% FOR FUTURE GROWTH.

11.) 110 BLOCKS SHALL BE INSTALLED IN A SUFFICIENT QUANTITY TO FULLY TERMINATE ALL HORIZONTAL VOICE CABLES AND PROVIDE 4 PAIRS FOR RISER CABLE TERMINATIONS. HORIZONTAL AND VERTICAL CROSS–CONNECT CABLE MANAGEMENT TROUGHS MANUFACTURED BY THE SAME MANUFACTURER AS THE 110 BLOCKS SHALL BE USED BETWEEN 110 BLOCKS AND VERTICAL BLOCK ARRAYS. D–RINGS WILL NOT BE PERMITTED FOR CABLE MANAGEMENT IN THE 110 BLOCK FIELD. REAR CABLE TROUGH TYPE ARRANGEMENT IS REQUIRED FOR THE 110 BLOCKS. REAR FEED AND CABLE DRESSING IN THE CABLE TROUGHS IS REQUIRED FOR ALL CABLE, BOTH WORKSTATION AND RISERS. CABLING CONTRACTOR SHALL PROVIDE ALL VOICE CROSS–CONNECTING AT WALL FIELDS UNLESS OTHERWISE NOTED.

12.) ALL GUESTROOM HORIZONTAL CABLING RUNS SHALL BE HOMERUN TO THE APPROPRIATE IDF USING THE PRIMARY CABLING PATHWAYS IDENTIFIED ON THE FLOOR PLANS. UNLESS OTHERWISE NOTED, DATA CABLES SHALL TERMINATE ON DATA PATCH PANELS. TELEPHONE HORIZONTAL CABLES SHALL TERMINATE ON THE IDF 110 BLOCKS OR PATCH PANELS AS NOTED. CONTRACTOR IS RESPONSIBLE FOR FINAL ROUTING AND FIELD VERIFICATION OF LENGTH OF STATION RUNS. CABLE LENGTHS SHALL NOT EXCEED TIA/EIA STANDARDS (90 METERS MAXIMUM).

13.) ALL TELEPHONE AND DATA JACKS SHALL BE CATEGORY 6, 8 POSITION, RJ–45, TERMINATED TO T568B PIN CONFIGURATION. DATA JACKS SHALL BE BLACK. VOICE AND TV JACKS SHALL MATCH FACEPLATE COLOR. ALL P.O.S. JACKS SHALL BE BLUE. ALL JACKS SHALL BE LABELED WITH APPROPRIATE ICON FOR VOICE, DATA OR P.O.S. CIRCUIT.

14.) WALL OUTLET FACEPLATES SHALL BE 110 SERIES, SINGLE GANG, UP TO 6 POSITIONS PER SINGLE GANG PLATE. MODULAR FURNITURE FACEPLATES SHALL BE USED WHERE REQUIRED, IF APPLICABLE. BLANKS SHALL BE INSERTED IN OPEN POSITIONS ON FACEPLATE. FACEPLATES SHALL BE OF THE SAME MANUFACTURER AS THE JACKS AND PATCH PANELS. ALL WALL MOUNTED PHONE OUTLETS SHALL HAVE WALL MOUNT FACE PLATE. (REFER TO ID DRAWINGS FOR WALL MOUNT LOCATIONS).

15.) FACEPLATE COLOR SHALL MATCH ELECTRICAL OUTLET FACEPLATE COLOR UNLESS OTHERWISE SPECIFIED ON I.D. DRAWINGS.

ALL NETWORK SWITCHES AND OTHER ACTIVE ELECTRONIC EQUIPMENT TO BE SUPPLIED AND INSTALLED BY OTHERS UNLESS NOTED OTHERWISE.

16.) TYPICALLY, VOICE AND DATA OUTLETS SHALL BE AT STANDARD OUTLET HEIGHT, UNLESS OTHERWISE NOTED. ALL DATA AND TV OUTLETS REQUIRE ADJACENT ELECTRICAL OUTLETS. ALL WALL PHONES SHALL BE 48 INCHES A.F.F. UNLESS OTHERWISE NOTED. NO BACK TO BACK OUTLETS ON SHARED WALLS; OFFSET BY A MINIMUM OF (1) STUD CAVITY.

17.) DEVICE LOCATIONS IDENTIFIED ON THESE DRAWINGS ARE APPROXIMATE AND ARE INTENDED TO CONVEY OUTLET CONTENTS. IF A CONFLICT EXISTS REGARDING FINAL OUTLET PLACEMENT DEFER TO INTERIOR DESIGN AND ELECTRICAL DRAWINGS FOR FINAL OUTLET LOCATIONS.

18.) ALL DATA SYSTEMS CABLE SHALL BE BLUE. GUESTROOM VOICE CABLE (NON–IP) SHALL BE GRAY. WIRELESS NODE CABLE SHALL BE YELLOW.

G CABLE PULLING GUIDELINES

1.) MAINTAIN MINIMUM BEND RADIUS OF:

A. 4 TIMES THE CABLE O.D. FOR COPPER UNSHIELDED TWISTED PAIR CABLE.

B. 10 TIMES THE CABLE O.D. OR 1.2" (WHICHEVER IS LARGER) FOR FIBER OPTIC CABLE.

2.) MAXIMUM CABLE LENGTH BETWEEN TELECOMMUNICATIONS CLOSET TERMINATION AND OUTLET IS 90 METERS (295 FEET).

3.) PULLING TENSION ON 4 PAIR, UNSHIELDED TWISTED PAIR CABLE CAN NOT EXCEED 25 POUNDS.

4.) TO MINIMIZE TENSION IN SUSPENDED CABLE RUNS, LIMIT SPANS TO 5 FEET OR LESS BETWEEN SUPPORTS (I.E. J–HOOKS).

5.) DO NOT OVER CINCH CABLE TIES ON CABLE BUNDLES. CABLE TIES SHOULD BE LOOSELY FITTED OVER CABLE(S) SO AS NOT TO CAUSE AN INDENTATION IN THE CABLE JACKETS.

6.) PLENUM RATED CABLE TIES MUST BE USED IN ALL RETURN AIR PLENUM SPACES.

7.) LEAVE A 20'–0" SERVICE LOOP AT EACH END OF FIBER RISER RUNS.

8.) FIBER RISERS SHALL BE LABELED EVERY 50'–0" FOR CLEAR IDENTIFICATION IN PATHWAYS.

9.) LEAVE A 10'–0" SERVICE LOOP AT EACH END OF ALL TELEPHONE RISERS.

10.) LEAVE 12" OF SLACK NEATLY COILED IN OUTLET BOX FOR EACH HORIZONTAL CABLE RUN.

11.) TO AVOID SOURCES OF EMI ON UNSHIELDED CABLES, MAINTAIN THE FOLLOWING MINIMUM SEPARATION DISTANCES BETWEEN CABLING PATHWAYS AND POTENTIAL SOURCES:

A. 4 FEET FROM MOTORS OR TRANSFORMERS.

B. 1 FOOT FROM CONDUIT OR CABLES USED FOR ELECTRICAL POWER DISTRIBUTION.

C. 5 INCHES FROM FLUORESCENT LIGHTING.

CABLING PATHWAYS SHOULD CROSS PERPENDICULAR TO FLUORESCENT LIGHTING AND ELECTRICAL POWER CABLES OR CONDUITS.

THESE GUIDELINES ARE NOT INTENDED TO SERVE AS A SUBSTITUTE FOR TIA/EIA 568C SERIES OF STANDARDS. CONTRACTOR SHALL BE RESPONSIBLE FOR KNOWING, UNDERSTANDING AND CONFORMING TO THE SPECIFICATIONS CONTAINED WITHIN ALL OF THE FOLLOWING STANDARDS:

- ANSI/TIA–568–C.0, GENERIC TELECOMMUNICATIONS CABLING FOR CUSTOMER PREMISES.
- ANSI/TIA/EIA 568–C.1, COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING STANDARDS.
- ANSI/TIA–568–C.2, BALANCED TWISTED–PAIR TELECOMMUNICATIONS CABLING AND COMPONENTS STANDARD.
- ANSI/TIA–568–C.3, OPTICAL FIBER CABLING COMPONENTS STANDARD.
- ANSI/TIA/EIA–569 – COMMERCIAL BUILDING STANDARD FOR TELECOMMUNICATIONS INFRASTRUCTURE OF COMMERCIAL BUILDINGS.
- ANSI/TIA/EIA–606 – ADMINISTRATION STANDARD FOR THE TELECOMMUNICATIONS INFRASTRUCTURE OF COMMERCIAL BUILDINGS.
- ANSI/TIA/EIA–607 – COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS.

H JUNCTION BOX AND CONDUIT NOTES

1.) REFER TO RISER DIAGRAM, FLOOR PLAN AND SYMBOL LEGEND FOR OUTLET CONDUIT REQUIREMENTS.

2.) PROVIDE A PULL BOX FOR EVERY 100' OF STRAIGHT CONDUIT RUNS. ALSO LOCATE ONE PULL BOX FOR EVERY TWO NINETY DEGREE BENDS OR SIMILAR ANGLES. ACCESS TO THE PULL BOX LOCATIONS SHALL BE COORDINATED WITH THE DESIGN TEAM AND GENERAL CONTRACTOR.

3.) PULL BOX LOCATIONS ARE SHOWN FOR COORDINATION PURPOSES ONLY. THE PATHWAY OF THE RELATED CONDUIT WILL BE DETERMINED BY THE MEP FIRM AND FIELD CONDITIONS.

4.) PROVIDE PULL STRING IN ALL CONDUITS.

5.) ALL OUTLET CONDUITS SHALL BE STUBBED TO ACCESSIBLE CEILING AREA CONTIGUOUS TO CABLE DESTINATION ROOM TO PROVIDE FULLY ACCESSIBLE CABLE PATHWAY.

6.) ALL CONDUITS SHALL BE CLEARLY MARKED ON EACH END WITH TAPE, LABEL, OR PAINT AS TO DESIGNATE IT SPECIFICALLY FOR DATA/VOICE, TV OR SECURITY USE ONLY.

7.) IF APPROVED BY G.C. (BOX ELIMINATORS MAY BE USED IN LIEU OF BACK BOXES) CABLES MAY BE ROUTED THROUGH WALL. CABLES SHALL BE PLENUM RATED.

8.) ALL CONDUITS SHALL BE EMT UNLESS OTHERWISE NOTED.

I ELECTRICAL AND MECHANICAL NOTES

1.) ANY ELECTRICAL POWER DEVICE LOCATIONS INDICATED HEREIN ARE INTENDED FOR INCORPORATION INTO THE PROJECT ELECTRICAL DRAWINGS AS PART OF THE ELECTRICAL DESIGN.

2.) ESTIMATED HEAT LOADS ARE SHOWN FOR REFERENCE ONLY AND ARE INTENDED FOR THE INCORPORATION INTO THE PROJECT MECHANICAL DRAWINGS AS PART OF THE MECHANICAL DESIGN.

3.) ALL MDF, IDF AND AV ROOMS TO MAINTAIN 70°F AND LESS THAN 60% RH.

J FIBER INFRASTRUCTURE INSTALLATION NOTES

1.) HORIZONTAL FIBER CABLE, IF APPLICABLE, SHALL BE 50/125 MICRON MULTI–MODE FIBER.

2.) THE OPTICAL FIBER CABLE CONSTRUCTION SHALL CONSIST OF 50/125 MM OR SINGLEMODE OPTICAL FIBERS OR A COMBINATION OF THESE MEDIA. INDIVIDUAL FIBERS AND GROUPS OF FIBERS SHALL BE IDENTIFIABLE IN ACCORDANCE WITH ANSI/TIA/EIA–598–A.

3.) FIBER ENCLOSURES SHALL BE SUPPLIED IN APPROPRIATE PORT CONFIGURATION AS REQUIRED FOR HORIZONTAL AND RISER FIBER CABLES. ALL FIBER ENCLOSURES AND TERMINATIONS SHALL BE CLEARLY LABELED INDICATING THE FLOOR, CLOSET DESIGNATION AND PORT NUMBER SERVED.

4.) ALL FIBER SHALL BE TERMINATED WITH "SC" STYLE CONNECTORS UNLESS NOTED OTHERWISE.

5.) THE MULTIMODE CONNECTOR OR A VISIBLE PORTION OF IT SHALL BE AQUA IN COLOR. THE SINGLEMODE CONNECTOR OR A VISIBLE PORTION OF IT SHALL BE YELLOW IN COLOR.

6.) THE OPTICAL FIBER PATCH CORD SHALL BE A TWO–FIBER CABLE, OF THE SAME FIBER TYPE AS THE OPTICAL FIBER CABLING PLANT IT IS INTENDED TO PATCH.

K GROUNDING AND BONDING

1.) THE PRIMARY PURPOSE OF THE GROUNDING AND BONDING SYSTEM IS TO CREATE A ROBUST PATH FOR EQUALIZATION OF VOLTAGES AND FOR RESULTANT SURGE CURRENTS TO DRAIN TO THEIR SOURCE. LIGHTNING, POWER–SYSTEM FAULT CURRENTS, CIRCUIT SWITCHING (MOTORS ON AND OFF), ACTIVATION OF SURGE–PROTECTION DEVICES, AND ELECTROSTATIC DISCHARGE (ESD) ARE COMMON CAUSES OF TRANSIENT VOLTAGES AND ELECTRICAL SURGES.

2.) ALL RACKS AND CABINETS SHALL BE PROPERLY GROUNDED PER NEC AND TIA/EIA STANDARDS.

3.) TGB 2"X12" BUSBAR CPI PART#13622–012 SHALL BE INSTALLED IN IDF.

4.) TMGB 4"X12" BUSBAR CPI PART#40153–012 SHALL BE INSTALLED IN MDF.

5.) INSTALL GROUND BUSBAR A MINIMUM OF 18" AFF WITH 6" CLEAR ON ALL SIDES.

6.) MINIMUM OF A #6 AWG GREEN GROUNDING CONDUCTOR TO EACH EQUIPMENT RACK(S) AND TO BONDED LADDER RACK(S).

7.) REFER TO GROUNDING DETAILS FOR ADDITIONAL INFORMATION.

L AS-BUILT DOCUMENTATION

1.) ALL AS–BUILT DRAWINGS SHALL INCLUDE FINAL DEVICE LOCATIONS, OUTLET LABELS, CABLE PATHWAYS, TERMINATION SCHEDULES FOR ALL PATCH PANELS, VOICE BLOCKS, TERMINAL BLOCKS AND ANY OTHER APPROPRIATE CABLE.

2.) SUBMIT AS–BUILT DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO FINALIZING. SUBMIT FINAL AS–BUILTS IN BOTH HARD AND SOFT COPY (XX.PDF AND XX.DWG).

3.) ONE SET OF PLASTIC LAMINATED AS–BUILTS ARE REQUIRED FOR MOUNTING IN MDF AND EACH IDF LOCATION. EACH IDF LAMINATED AS–BUILT SHALL SHOW ALL IDF OUTLETS AND RISER CABLES FED FROM A GIVEN LOCATION.

M DATA/VOICE/FIBER TESTING

1.) ALL DATA AND FULLY TERMINATED VOICE HORIZONTAL RUNS SHALL BE TESTED PER THE LATEST REVISION OF TIA/EIA 568C FOR COMPLIANCE TO GIGABIT ETHERNET USING A PENTA–SCANNER PLUS LANCAT OR FLUKE DIGITAL DSP–1000, 2000 OR 4000. TESTERS SHALL BE LEVEL II RATED (MINIMUM. ALL TESTING MUST BE REVIEWED BY CUSTOMER REPRESENTATIVE PRIOR TO ACCEPTANCE OF CABLING SYSTEM. TEST SHALL BE CONDUCTED PER THE MOST RECENTLY AVAILABLE VERSION OF SOFTWARE AND HARDWARE. TEST RESULTS SHALL BE SUBMITTED IN A DISK FORMAT. A PRINTED VERSION IN BRIEF FORMAT MAY BE REQUIRED.

2.) ALL CROSS CONNECTED TELEPHONE DROPS TO BE TESTED FOR CONTINUITY, CROSSED PAIRS AND SHORTS FROM JACK TO RISER BLOCKS AT MDF.

3.) ALL MULTI–MODE FIBER OPTIC TESTS SHALL BE PERFORMED AT THE 850nm AND 1300nm WINDOWS IN BOTH DIRECTIONS.

4.) ALL CONNECTORS SHALL BE TESTED AND THE LOSS MEASURED IN DB. CONNECTORS SHALL HAVE A LOSS OF 0.5 DB OR LESS PER MATED PAIR TO BE ACCEPTED.

5.) ALL FIBER OPTIC LINKS SHALL BE TESTED AND LOSS MEASURED IN DB/KM.

6.) A SOFT COPY OF ALL TEST RESULTS INCLUDING LINK LENGTHS SHALL BE PROVIDED BY THE CONTRACTOR TO THE OWNER. ALL EVENTS ON THE LINK, INCLUDING RETURN LOSS, SHALL BE MEASURED AND COMPLY WITH TIA/EIA 568B REQUIREMENTS.

N MATV INSTALLATION NOTES

1.) REFER TO MATV SYSTEM SPECIFICATIONS AND MATV SYSTEM COMPONENTS SPECIFICATION LIST FOR ADDITIONAL SYSTEM REQUIREMENTS. CONTRACTOR SHALL USE SPECIFIED COMPONENTS OR NTI'S APPROVED EQUIVALENT. IN EITHER CASE, THE MATV CONTRACTOR IS RESPONSIBLE FOR THE SIGNAL REQUIREMENTS INDICATED WITHIN MATV SYSTEM SPECIFICATIONS.

2.) TV OUTLET LOCATIONS FOR THE GUESTROOMS SHALL BE HOMERUN IN ACCORDANCE WITH CABLING RISER DIAGRAM. TV OUTLET LOCATIONS IN PUBLIC AND ADMIN. AREAS SHALL BE HOMERUN TO MANY SPACES TO THE NEAREST TR/IDF LOCATION.

3.) CABLING CONTRACTOR SHALL LEAVE A MINIMUM OF 2'–0" OF SLACK PRIOR TO TERMINATION ON ALL HORIZONTAL CABLE PULL AT OUTLET END.

4.) MATV IDF LOCATIONS TO BE INTERCONNECTED WITH MATV MDF VIA TWO RG–11 (UP TO 300'–0" OR HARDLINE COAX OVER 300') PLENUM RATED BACKBONE CABLES. CONTRACTOR TO LEAVE A MINIMUM OF A 6'–0" SERVICE LOOP PRIOR TO TERMINATION ON BOTH ENDS.

5.) CONTRACTOR IS RESPONSIBLE FOR LABELING ALL MATV SYSTEM COAX CABLE RUNS AS FOLLOWS:

6.) ALL LABELING INFORMATION SHALL BE RECORDED ON AS–BUILT DRAWINGS UPON PROJECT COMPLETION. THE LABELING SYSTEM SHALL DESIGNATE THE CABLES ORIGIN DESTINATION ON EACH END OF THE RUN.

7.) NO CORING OR FLOOR DRILLING IS ALLOWED PRIOR TO COORDINATION AND APPROVAL FROM GENERAL CONTRACTOR.

O APPROVED MANUFACTURERS

1.) CABLING CONTRACTOR SHALL USE THE COMPONENTS FROM A SINGLE MANUFACTURER/SOLUTION THROUGHOUT. VENDOR SHALL SUBMIT CATALOG SPECS (CUT SHEETS) FOR ALL MAJOR CABLING AND COMPONENTS. IF IT IS DESIRED TO SUBSTITUTE A CABLE OR COMPONENT DIFFERENT FROM THAT SPECIFIED HEREIN FOLLOW DIVISION 01 SUBSTITUTION PROCEDURE. BASE BIDS SHALL BE SUBMITTED USING ONLY SPECIFIED MANUFACTURERS. BID RESPONSES USING SUBSTITUTED COMPONENTS MUST BE SUBMITTED UNDER SEPARATE COVER AS AN ALTERNATE BID. INSTALLED SYSTEM SHALL BE WARRANTED FROM A SINGLE MANUFACTURER.

2.) ALTERNATE MANUFACTURERS MAY BE USED. ALTERNATE PRODUCTS SHALL BE EQUIVALENT OR BETTER WITH REGARD TO PERFORMANCE, FORM, FIT AND FUNCTION. BIDDERS SHALL SUBMIT CUT SHEET TO NTI FOR REVIEW/APPROVAL FOR ALL PROPOSED PRODUCT SUBSTITUTIONS.

P OTHER DRAWING SETS

CABLING CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND REVIEWING ALL CONSTRUCTION DOCUMENTS AS ARE NECESSARY TO BID AND COMPLETE THE INSTALLATION OF SYSTEMS SPECIFIED HEREIN. DRAWING SETS WHICH ARE NECESSARY TO ASCERTAIN COMPLETE PROJECT SCOPE INCLUDE, BUT ARE NOT LIMITED TO, ARCHITECTURAL, ELECTRICAL AND INTERIOR DESIGN SETS.

Q FIRESTOPPING

1.) PROVIDE FIRESTOP SYSTEMS CONSISTING OF A MATERIAL, OR COMBINATION OF INSTALLED MATERIALS TO RETAIN THE INTEGRITY OF FIRE RESISTANCE RATED CONSTRUCTION. FLAME, SMOKE AND/OR HOT GASES THROUGH PENETRATIONS AND PERIMETER OPENINGS IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING CODE FOR THIS PROJECT.

2.) FIRESTOPPING OF ALL FLOOR AND WALL OPENINGS, ACCORDING TO LOCAL CODES AND ORDINANCES, SHALL BE BY THE CABLING CONTRACTOR. ALL WALL OPENINGS MUST BE SLEEVED AND FIRE STOPPED.

3.) GUESTROOM LEVEL CABLES SHALL BE ROUTED TO THE APPROPRIATE IDF PER RISER CABLING DIAGRAM. CABLING CONTRACTOR IS RESPONSIBLE FOR FIRE STOPPING ALL PENETRATIONS THROUGH FIRE RATED DEMISING WALLS.

4.) ALL FIRESTOPPING MEANS AND METHODS SHALL BE U.L. LISTED AND APPROVED.

R LABELING GUIDELINES

LABELING SCHEME SHALL FOLLOW EIA/TIA 06A/568C GUIDELINES AND SHALL BE COORDINATED WITH THE CUSTOMER. LABELS SHALL BE TYPE WRITTEN AND PRINTED USING A PRE–APPROVED FORMAT. NO HAND–WRITTEN LABELS SHALL BE ALLOWED. THE LABELS AT THE PATCH PANEL SHALL BE OF THE SAME TYPE NUMBERING SCHEME AS THE WORKSTATION OUTLET.

S CABLING PATHWAY NOTE

CABLING PATHWAYS IDENTIFIED HEREIN REPRESENT A POTENTIAL CABLING ROUTE AS DETERMINED AT THE TIME OF DESIGN AND MAY NOT NECESSARILY BE THE OPTIMAL PATHWAY, DEPENDING UPON THE ACTUAL FIELD CONDITIONS. ALL CABLING PATHWAYS SHALL BE FIELD VERIFIED. IT IS ULTIMATELY THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE OPTIMAL CABLING PATHWAYS BASED UPON FIELD CONDITIONS, CODE COMPLIANCE AND COORDINATED WITH OTHER TRADES. THE OWNER SHALL NOT BE RESPONSIBLE FOR TIME ASSOCIATED WITH FIELD VERIFICATION EFFORTS FOR DETERMINING MOST VIABLE CABLING PATHWAYS.

T MATV SYSTEM SPECIFICATIONS

1.) THE MATV DISTRIBUTION SYSTEM SHALL CONSIST OF ALL EQUIPMENT, COMPONENTS AND CABLING NECESSARY TO DISTRIBUTE NTSC RF TELEVISION SIGNALS. THIS SCOPE INCLUDES, BUT IS NOT LIMITED TO:
- COAXIAL CABLE
- DISTRIBUTION AMPLIFIERS
- DISTRIBUTION PASSIVES (SPLITTERS, DIRECTIONAL COUPLERS, FILTERS)
- CABLE CONNECTORS, WALL PLATES AND ADAPTERS

2.) DISTRIBUTION SHALL BE ACCOMPLISHED VIA DEDICATED OUTLET HOMERUNS. AS THE ACTUAL INSTALLED CABLE LENGTHS CAN AFFECT THE REQUIRED TAP VALUES AND AMPLIFICATION LEVELS, THE DESIGN OF THE AMPS/TAPS MUST BE ACCOMPLISHED BY THE CONTRACTOR. ALL AMPS AND TAPS MUST BE MOUNTED IN ACCESSIBLE AREAS FOR FUTURE SERVICEABILITY.

3.) THE CONTRACTOR SHALL PROVIDE SUBMITTALS TO OWNER, OWNER'S REPRESENTATIVE AND OWNER'S MATV VENDOR(S) FOR APPROVAL PRIOR TO INSTALLATION. SUBMITTALS SHALL COMPLETELY DESCRIBE THE MATV DISTRIBUTION SYSTEM AND SHALL INCLUDE SCHEMATIC DIAGRAMS, COMPONENT AND CABLE CUT SHEETS, TAP VALUES AND OTHER PERTINENT COMPONENT SETTINGS.

4.) THE MATV DISTRIBUTION SYSTEM SHALL PROVIDE CLEAR RECEPTION OF TELEVISION SIGNALS TO ALL DESIGNATED RECEIVING LOCATIONS WITHIN THE FACILITY. REFER TO FLOOR PLANS FOR TV OUTLET LOC

STRUCTURED CABLING SYSTEM COMPONENTS SPECIFICATION LIST

DESCRIPTION	MANUFACTURER	PART NUMBER	COMMENTS
CATEGORY 6, 4 PAIR, UTP, CMP, GRAY JACKET	COMMSCOPE	6504+ GRAY	
CATEGORY 6, 4 PAIR, UTP, CMP, WHITE JACKET	COMMSCOPE	6504+ WHITE	
CATEGORY 6, 4 PAIR, UTP, CMP, BLUE JACKET	COMMSCOPE	6504+ BLUE	
CATEGORY 3, 50 PAIR, UTP, CMP	COMMSCOPE	107766040	
CATEGORY 3, 100 PAIR, UTP, CMP	COMMSCOPE	107766057	
12 FIBER, MULTIMODE, INDOOR / OUTDOOR OFNP	COMMSCOPE	Z-012-DS-5M-FSUAQ	
6 FIBER, MULTIMODE OFNP	COMMSCOPE	P-006-DS-5M-FSUAQ	
12 FIBER, MULTIMODE OFNP	COMMSCOPE	P-012-DS-5M-FSUAQ	
VERTICAL CABLE MANAGER FOR FLOOR RACKS	CPI	11729-703	
COVER FOR VERTICAL CABLE MANAGER	CPI	12188-001	
RACK MOUNT HORIZONTAL WIRE MANAGER	CPI	30139-719	
HUB SHELF, BACKBOARD MOUNT	CPI	40074-700	
FLOOR MOUNTED EQUIPMENT RACK	CPI	55053-703	
20 POSITION POWER OUTLET STRIP	CPI	12851-758	1-PER 7' FLOOR RACK
DOUBLE SIDED SHELF, 21.75" D	CPI	40108-719	
DOUBLE SIDED SHELF, 26" D	CPI	11054-719	
WALL MOUNT RACK - 48" X 19.75" X 18" DEEP	X-MARK	XWR-4819-18	
WALL MOUNT EQUIPMENT CABINET - 45" HIGH	X-MARK	XWM-4820-GD-3	
WALL MOUNT EQUIPMENT CABINET	DEMAC	WS36AXP1SSS-BLACK	
WALL MOUNT EQUIPMENT RACK - 25 RU	COMMSCOPE	RW25-18	
POWER STRIP FOR WALL MOUNT CABINET OR RACK	COMMSCOPE	760083758	(1) PER WALL MOUNT RACK/CABINET
FIRESTOP SYSTEM FOR SLOTS AND LARGE WALL PENETRATIONS	SPECIFIED TECHNOLOGIES, INC.	C-AJ-8093	OR APPROVED EQUIVALENT
WEATHERPROOF ENCLOSURE FOR OUTDOOR MOUNTED PHONES INSERT (* DENOTES COLOR)	GAI-TRONICS	MODEL 255	
RJ-45, CAT 6, 8 POSITION, T568B, PHONE JACK INSERT (* DENOTES COLOR)	LEVITON	61110-R*6	
RJ-45, CAT 6, 8 POSITION, T568B, DATA JACK INSERT (* DENOTES COLOR)	LEVITON	61110-R*6 (DENOTES COLOR)	
RJ-45, CAT 6 ENHANCED JACK	COMMSCOPE	UNJ600-XX (XX=BL-BLUE, BK-BLACK, ETC.) XX=DESIGNATES COLOR, BL-BLUE, BK-BLACK, WH-WHITE, ETC.	
F-TYPE CONNECTOR INSERTS	COMMSCOPE	108009432	
F-TYPE BULKHEAD MODULE (** DENOTES COLOR)	LEVITON	61110-R*6	* DENOTES COLOR CHOICE
BLANK INSERTS (* DENOTES COLOR)	LEVITON	41084-F*F	* DENOTES COLOR CHOICE
BLANK INSERTS - IVORY	COMMSCOPE	107067860	
FACEPLATE SINGLE GANG 1 PORT - IVORY	COMMSCOPE	108258419	
FACEPLATE SINGLE GANG 2 PORT - IVORY	COMMSCOPE	108168477	
FACEPLATE SINGLE GANG (x DENOTES NUMBER OF PORTS, yy DENOTES COLOR)	LEVITON	42080-x*S	* DENOTES COLOR CHOICE
CATEGORY 6 PATCH PANEL, 568B (pp DENOTES PORT COUNT)	LEVITON	69270-U24/U48	# DENOTES PORT QUANTITY
CATEGORY 3 TELECOM PATCH PANEL (24 PORT, 4 MALE RJ-21 CONNECTORS ON BACK)	LEVITON	49012-J24 (BP2C)	# DENOTES PORT QUANTITY
300 PAIR 110 XC DISTRIBUTION FRAME	COMMSCOPE	UNK-110WMX-5M-300PR, SEE NOTE #5	
300 PAIR 110 XC DISTRIBUTION FRAME - EXTENSION	COMMSCOPE	UNK-110WMX-5M-300PR, SEE NOTE #7	
VERTICAL CABLE MANAGER - 300 PAIR	COMMSCOPE	UNK-110WMS-BB-300PR	
VERTICAL CABLE MANAGER - 300 PAIR - EXTENSION	COMMSCOPE	UNK-110WMS-BB-300PR	
100 PAIR 110 XC BLOCKS WITH MOUNTING LEGS	COMMSCOPE	110BLK100BWL	
12 PORT WIC BOX	LEVITON	5WMNT-01C	
24 PORT CAT-6 PATCH PANEL	COMMSCOPE	UNP610-24P	
48 PORT CAT-6 ENHANCED PATCH PANEL	COMMSCOPE	UNP610-48P	
12 PORT SC ENCLOSURE - LOADED WITH ADAPTERS	COMMSCOPE	WFE-012-MFA-SC06-BK/2P	
12 PORT RACK MOUNT FIBER ENCLOSURE - LOADED - SC	COMMSCOPE	RFE-SLG-024-MFA-SC06, SEE NOTE #6	
24 PORT RACK MOUNT FIBER ENCLOSURE - LOADED - SC	COMMSCOPE	RFE-SLG-048-MFA-SC06/2U-AQ, SEE NOTE #7	
48 PORT RACK MOUNT FIBER ENCLOSURE - LOADED - SC	COMMSCOPE	RFE-SLG-048-MFA-SC06/2U-AQ, SEE NOTE #8	
1-1/4"Ø INNERDUCT	CARLON	AW4X1A	
COMMSCOPE 10 POSITION POWER OUTLET STRIP FOR FLOOR RACKS	COMMSCOPE	760083600	
COMMSCOPE 4 - POST RACK	COMMSCOPE	760082529	
72-144 PORT RACK MOUNT FIBER ENCLOSURE - UNLOADED	LEVITON	5R2UM-S06	
6 PACK SC INSERT FOR 72-144 PORT ENCLOSURE AND 12 PORT WIC BOX	LEVITON	5F1002LC	
HORIZONTAL RACK MOUNT WIRE MANAGER - 2 RU DOUBLE-SIDED	COMMSCOPE	HTK-DS-2U	
VELCRO TIE WRAPS, BACKBOARD MOUNT			
SERIES 6 COAXIAL CABLE - 60% BRAID AND 100% SHIELD	COMMSCOPE	2275V	
SERIES 11 COAXIAL CABLE - 60% BRAID AND 100% SHIELD	COMMSCOPE	2285k	
CATEGORY 6, 4 PAIR, UTP, CMP, GRAY JACKET	SUPERIOR ESSEX	77-246-3B	
CATEGORY 6, 4 PAIR, UTP, CMP, WHITE JACKET	SUPERIOR ESSEX	77-246-4B	
CATEGORY 6, 4 PAIR, UTP, CMP, BLUE JACKET	SUPERIOR ESSEX	77-246-2B	
RJ-45, 8 POSITION, T568B, PHONE/DATA JACK INSERT	LEVITON	61110-RW6	
12 PORT CAT-6, 89D WALL MOUNT PANEL, 568B	LEVITON	69586-U89	
24 PORT CATEGORY 6 PATCH PANEL, 568B	LEVITON	69270-U24	
48 PORT CATEGORY 6 PATCH PANEL, 568B	LEVITON	69270-U48	
300 PAIR 110 XC DISTRIBUTION FRAME	LEVITON	41MB2-3F4	
96 PAIR 110 XC BLOCKS WITH MOUNTING LEGS	LEVITON	41AB6-1F4	

NOTES:
1.) SOME OF THE ABOVE LISTED PRODUCTS MAY NOT BE REQUIRED FOR THIS PROJECT.
2.) CABLING CONTRACTOR IS RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PRODUCTS, AS REQUIRED, TO FURNISH OWNER WITH COMPLETE SYSTEM.
3.) USE LIMITED COMBUSTIBLE CABLES/COMPONENTS WHERE REQUIRED BY LOCAL CODES.
4.) OTHER CABLE APPROVED MANUFACTURERS: OCC, HITACHI AND BELDEN. MIDDLE ATLANTIC AND B-LINE ARE APPROVED MANUFACTURERS FOR RACKS AND CABINETS.

MATV CABLE INSTALLER RECOMMENDED COMPONENT SCHEDULE (continued)

NOTES:
1.) SOME OF THE ABOVE LISTED PRODUCTS MAY NOT BE REQUIRED FOR THIS PROJECT. CABLING CONTRACTOR IS RESPONSIBLE FOR PROVIDING AND INSTALLING ALL PRODUCTS, AS REQUIRED, TO FURNISH OWNER WITH COMPLETE SYSTEM.
2.) IT IS THE RESPONSIBILITY OF THE CABLING CONTRACTOR TO COORDINATE WITH THE OWNER AND MATV VENDOR PRIOR TO INSTALLING CABLE, TAPS ETC. TO DETERMINE WITCH SYSTEM SHALL BE USED.
3.) RG-6 OR RG-11(150'-200') CABLE FROM TV OUTLET. COAX CABLES SHOULD BE HOMERUN TO EVERY OUTLET FROM THE APPROPRIATE IDF AS NOTED ON FLOOR PLAN AND OR RISER DIAGRAM. IN ROOM SPLITTING SHOULD BE AVOIDED. LOOP-THRU WIRING IS NOT ACCEPTABLE.
4.) CABLING SHOULD BE RG-6 60% BRAID, SOLID COPPER CONDUCTOR, SWEEP TESTED FROM 5 MHz TO 3000 MHz. RG-6 CABLE MAXIMUM LENGTH OF 150". RG-11 CABLE MAXIMUM LENGTH OF 150'-200'.
5.) ALL CABLES TO BE PROPERLY TAGGED WITH ROOM NUMBER IN IDF AND PROPERLY TERMINATED IN EACH ROOM WITH APPROVED FITTINGS.
6.) PUBLIC AREA TV LOCATIONS SHOULD BE HOMERUN TO NEAREST IDF. WALL PLATES MUST HAVE 3 MHz HIGH FREQUENCY BARREL CONNECTORS. RG-6 JUMPER CABLES WITH SHALL HAVE COMPRESSION FITTINGS MUST BE USED FOR WALL PLATE TO TV CONNECTIONS.
7.) TV LOCATIONS MUST HAVE 120V UN-SWITCHED OUTLET IN CLOSE PROXIMITY.
8.) ALTERNATE PRICING FOR DRE IF DRE SYSTEM IS SELECTED FOR MATV. ALL MATV COMPONENTS SHALL BE SWEEP TESTED FROM 5 MHz to 3,000 MHZ.

COPPER COMPONENTS SPECIFICATIONS LIST

DESCRIPTION	MANUFACTURER	PART NUMBER	COMMENTS
CATEGORY 6, 4 PAIR, UTP, CMP, GRAY JACKET	BELDEN	2413008L	
CATEGORY 6, 4 PAIR, UTP, CMP, WHITE JACKET	BELDEN	2413009U	
CATEGORY 6, 4 PAIR, UTP, CMP, BLUE JACKET	BELDEN	2413015U	
CATEGORY 6, 4 PAIR, UTP, CMP, BLACK JACKET	BELDEN	2413010A	
CATEGORY 3, 50 PAIR, UTP, CMP	BELDEN	DPLN50	
CATEGORY 3, 100 PAIR, UTP, CMP	BELDEN	DPLN100	
CATEGORY 3, 200 PAIR, UTP, CMP	BELDEN	DPLN200	
CATEGORY 6, 4 PAIR, OUTDOOR RATED	BELDEN	OSP6U010	OUTDOOR RATED CABLE FOR FLOOR BOXES IN BALLROOM
RJ-45, CAT-6, 8 POSITION, T568B, DATA JACK INSERT (* DENOTES COLOR)	BELDEN	AX1013**	
FACEPLATE, SINGLE GANG (# DENOTES NUMBER OF PORTS, * DENOTES COLOR)	BELDEN	AX102##**	
BLANK INSERTS (* DENOTES COLOR)	BELDEN	AX1022**	
WALL PHONE STYLE - FACEPLATE WITH JACK	BELDEN	AX104126 & AX101318	USED FOR ALL WALL PHONES (HOUSE AND PUBLIC) AT 48" AFF OR AS NOTED
WEATHERPROOF ENCLOSURE FOR OUTDOOR MOUNTED PHONES	GAI-TRONICS	MODEL 255	
24 PORT CATEGORY 6, PATCH PANEL, 568B	BELDEN	AX103253	
48 PORT CATEGORY 6, PATCH PANEL, 568B	BELDEN	AX103255	
66 BLOCK - 60 PAIR	LEVITON	40066-M50	
300 PAIR 110 WALL MOUNT KITS WITH FRAME	LEVITON	41AB2-3F5	
110 WALL MOUNT CABLE MANAGEMENT FRAME	LEVITON	41880-300	
100 PAIR 110 XC BLOCKS WITH MOUNTING LEGS	BELDEN	AX100693-S	
300 PAIR 110 XC BLOCKS WITH MOUNTING LEGS	BELDEN	AX100695-S	
110 BLOCK CABLE MANAGEMENT TROUGHS	BELDEN	AX100706-S	
100 PAIR 110 XC BLOCKS - RACK MOUNT KIT	LEVITON	41AB2-15F	INCLUDEDS LEGS &C5 CLIP
200 PAIR 110 XC BLOCKS - RACK MOUNT KIT	LEVITON	41DR2-200	INCLUDEDS LEGS &C5 CLIP

FIBER OPTIC COMPONENTS SPECIFICATIONS LIST

DESCRIPTION	MANUFACTURER	PART NUMBER	COMMENTS
6 STRAND 50/125 MM FIBER, OFNP-ADVANCELITE	BELDEN	B9C045	
12 STRAND 50/125 MM FIBER, OFNP-ADVANCELITE	BELDEN	B9C048	
6 STRAND SINGLE-MODE FIBER, OFNP ENHANCED	BELDEN	B9W045	
12 STRAND SINGLE-MODE FIBER, OFNP ENHANCED	BELDEN	B9W048	
ARMORLITE 6 STRAND 50/125 MM FIBER, OFNP-ADVANCELITE 1000	BELDEN	B9C230	
ARMORLITE 12 STRAND 50/125 MM FIBER, OFNP-ADVANCELITE 1000	BELDEN	B9C231	
ARMORLITE 6 STRAND SINGLE MODE FIBER, OFNP ENHANCED	BELDEN	B9W230	
ARMORLITE 12 STRAND SINGLE MODE FIBER, OFNP ENHANCED	BELDEN	B9W231	
SC SIMPLEX KEYSTONE ADAPTER INSERT (* DENOTES COLOR)	BELDEN	AX105643-EW	FOR MULTI-MODE FIBER
SC SIMPLEX KEYSTONE ADAPTER INSERT (* DENOTES COLOR)	BELDEN	AX102687	FOR SINGLE-MODE FIBER
WIC BOX WALL MOUNT CABINET, DOUBLE DOOR WITH LOCK	BELDEN	AX100540	
12 PORT RACK MOUNT FIBER ENCLOSURE - LOADED - SC	BELDEN	AX100041 + (2) AX100094	FOR MULTI-MODE FIBER
12 PORT RACK MOUNT FIBER ENCLOSURE - LOADED - SC	BELDEN	AX104126 & AX101318	FOR SINGLE-MODE FIBER
24 PORT RACK MOUNT FIBER ENCLOSURE - LOADED - SC	BELDEN	AX104126 & AX101318	
24 PORT RACK MOUNT FIBER ENCLOSURE - LOADED - SC	BELDEN	AX104126 & AX101318	
72 PORT RACK MOUNT FIBER ENCLOSURE - UNLOADED	BELDEN	AX103253	
144 PORT RACK MOUNT FIBER ENCLOSURE - UNLOADED	BELDEN	AX104683	
FSP FIBER ADAPTER PANEL - 6 STRAND SC PANEL	BELDEN	FFSU03SD	FOR MULTI-MODE FIBER
FSP FIBER ADAPTER PANEL - 12 STRAND SC PANEL	BELDEN	FFSU06SD	FOR MULTI-MODE FIBER
FSP FIBER ADAPTER PANEL - 6 STRAND SC PANEL	BELDEN	FFSU03SD	FOR SINGLE-MODE FIBER
FSP FIBER ADAPTER PANEL - 12 STRAND SC PANEL	BELDEN	FFSU06SD	FOR SINGLE-MODE FIBER
VELCRO TIE WRAPS			

MATV CABLE INSTALLER RECOMMENDED COMPONENT SCHEDULE

DESCRIPTION	MANUFACTURER	PART NUMBER	COMMENTS
SPLITTERS			
2 WAY 1 GHz DROP SPLITTER	TONER CABLE EQUIPMENT, INC.	XGVS -2	GREATER THAN 120dB RFI INTEGRITY
4 WAY 1 GHz DROP SPLITTER	TONER CABLE EQUIPMENT, INC.	XGVS -4	
6 WAY 1 GHz DROP SPLITTER	TONER CABLE EQUIPMENT, INC.	XGVS -6	
8 WAY 1 GHz DROP SPLITTER	TONER CABLE EQUIPMENT, INC.	XGVS -8	
2 WAY 1-GHZ VERTICAL SPLITTER - SOLDER BACK	PICO MACOM	TSV-2SB	GREATER THAN 130dB RFI INTEGRITY
4 WAY 1-GHZ VERTICAL SPLITTER - SOLDER BACK	PICO MACOM	TSV-4SB	
6 WAY 1-GHZ VERTICAL SPLITTER - SOLDER BACK	PICO MACOM	TSV-6SB	
8 WAY 1-GHZ VERTICAL SPLITTER - SOLDER BACK	PICO MACOM	TSV-8SB	
TAPS - DIRECTIONAL COUPLERS			
1-PORT DIRECTIONAL COUPLER, 5-1,000 MHz - SOLDER BACK	PICO MACOM	TCS-(*)-SB	(*) DENOTES TAP VALUE - 6, 9, 12, 16, 20, 24, 27, 30 dB
1-PORT DIRECTIONAL COUPLER, 5-1,000 MHz - WALL PLATE	PICO MACOM	TSCW-(*)-SB	
2-PORT DIRECTIONAL COUPLER, 5-1,000 MHz - SOLDER BACK	PICO MACOM	TSC2-(*)-SB	
4-PORT DIRECTIONAL COUPLER, 5-1,000 MHz - SOLDER BACK	PICO MACOM	TSC4-(*)-SB	
2-PORT TAP, 5-1,000 MHz	TONER CABLE EQUIPMENT, INC.	TGT2-(*)	(*) DENOTES TAP VALUE -4T, 8, 11, 14, 17, 20, 23, 26, 29, 32 dB
4-PORT TAP, 5-1,000 MHz	TONER CABLE EQUIPMENT, INC.	TGT4-(*)	
AMPLIFIERS AND ACCESSORIES			
BROADBAND INDOOR DISTRIBUTION AMPLIFIERS, 750 MHz, 30 dB GAIN	BLONDER TONGUE	BIDA 75A-30P	POWER DOUBLING
BROADBAND INDOOR DISTRIBUTION AMPLIFIERS, 860 MHz, 30 dB GAIN	BLONDER TONGUE	BIDA 86A-30P	
BROADBAND INDOOR DISTRIBUTION AMPLIFIERS, 750 MHz, 43 dB GAIN	BLONDER TONGUE	BIDA 75A-43P	
BROADBAND INDOOR DISTRIBUTION AMPLIFIERS, 860 MHz, 43 dB GAIN	BLONDER TONGUE	BIDA 86A-43P	
FIXED ATTENUATORS (PADS) 1-20 dB IN 1 dB STEP	BLONDER TONGUE	BIDA FA	STOCK NUMBER 5411A SPECIFY VALUE 3, 6, 9, 12, 18 dB
CABLE EQUALIZERS	BLONDER TONGUE	BIDA CE	STOCK NUMBER 5477 SPECIFY VALUE 3, 6, 9, 12, 18 dB
CONNECTORS			
SERIES 6 COMPRESSION CONNECTOR	PCT INTERNATION	PCT-TRS-6(*)	(*) P=PLENUM, LRA=RIGHT ANGLE
SERIES 11 COMPRESSION CONNECTOR	PCT INTERNATION	PCT-DRS-11(*)	
COAXIAL CABLES			
RG-6, 18 AWG, PLENUM	BELDEN	1829AC	CATVP, CMP RATING
RG-11, 14 AWG, PLENUM	BELDEN	1829P	

INTRUSION DETECTION SYMBOL LEGEND

SYMBOL	DESCRIPTION	ROUGH IN REQUIREMENTS	RECOMMENDED MANUFACTURER
DX-/2DX-	DOOR CONTACT ALARMS	3/4"Ø CONDUIT FROM DOOR FRAME TO ACCESSIBLE AREA IN CEILING. HOLE IN DOOR FRAME NEAR CENTER FOR ACCESS TO CONDUIT FEED.	SENTROL 1078C 3/4"
DR	DURESS ALARMS	FOR WALL MOUNT TYPE, 4"X4" BOX WITH 3/4"Ø CONDUIT STUB TO CEILING ACCESSIBLE AREA, FOR COUNTER TO DESK MOUNT - MOUNT IN MILLWORK - PROVIDE 3/4"Ø CONDUIT PATHWAY ACCESSIBLE AREA IN CEILING.	SENTROL 3040 DESK MOUNT VERSION
M	CEILING MOUNTED MOTION DETECTOR	CABLED WITH PLENUM CABLE, ACCESS HOLE THROUGH CEILING FOR CABLE ROUTING	C&K SYSTEMS
KP	SECURITY CONTROL KEY PAD	4"X4" BOX WITH SINGLE GANG MUD RING AND 3/4"Ø CONDUIT STUBBED TO ACCESSIBLE AREA IN CEILING.	ADT
SCE	SECURITY SYSTEM CONTROL ENCLOSURE	FOR HARD WIRED, POWERED SYSTEM-120 VAC IN ACCESSIBLE AREA IN CEILING SPACE ABOVE DOOR, SINGLE GANG BOX WITH MUD RING MOUNTED AT DOOR HANDLE HEIGHT APPROX. 8" TO 9" FROM OUTSIDE EDGE OF DOOR FRAME ON HANDLE SIDE AND 3/4"Ø CONDUIT STUB UP TO ACCESSIBLE AREA IN CEILING SPACE.	REFER TO DOOR HARDWARE SPECS.

CCTV SYMBOL LEGEND

SYMBOL	DESCRIPTION	ROUGH IN REQUIREMENTS	RECOMMENDED MANUFACTURER
CCTV-MD	CCTV-MINI DOME CEILING	4"X4" BOX WITH SINGLE GANG MUD RING AND 3/4"Ø CONDUIT STUBBED TO ACCESSIBLE AREA IN CEILING.	SEE SECURITY INSTALLATION DETAILS
CCTV-FIXED	FIXED CCTV CAMERA WALL OR CEILING MOUNTED	4"X4" BOX WITH SINGLE GANG MUD RING AND 3/4"Ø CONDUIT STUBBED TO ACCESSIBLE AREA IN CEILING.	SEE SECURITY INSTALLATION DETAILS
CCTV-EH	CCTV CAMERA IN EXT. WEATHERPROOF HOUSING	4"X4" BOX WITH SINGLE GANG MUD RING AND 3/4"Ø CONDUIT STUBBED TO ACCESSIBLE AREA IN CEILING.	SEE SECURITY INSTALLATION DETAILS
CCTV-360 MODOTIX Q24	CCTV CAMERA WITH 360° VIEW CEILING MOUNTED	4"X4" BOX WITH SINGLE GANG MUD RING AND 3/4"Ø CONDUIT STUBBED TO ACCESSIBLE AREA IN CEILING.	SEE SECURITY INSTALLATION DETAILS

OTHER SECURITY SYSTEM DEVICES LEGEND

SYMBOL	DESCRIPTION	ROUGH IN REQUIREMENTS	RECOMMENDED MANUFACTURER
CR	CARD READER	FOR HARD WIRED, POWERED SYSTEM-120 VAC IN ACCESSIBLE AREA IN CEILING SPACE ABOVE DOOR, SINGLE GANG BOX WITH MUD RING MOUNTED AT DOOR HANDLE HEIGHT APPROX. 8" TO 9" FROM OUTSIDE EDGE OF DOOR FRAME ON HANDLE SIDE & 3/4" CONDUIT STUB UP TO ACCESSIBLE AREA IN CEILING SPACE.	REFER TO DOOR HARDWARE SPECS.
IC BASE	INTERCOM BASE STATION	VENDOR SPECIFIC, CONSULT VENDOR FOR SPECIFICATIONS OF PROPOSED UNIT. SOME UNITS, ARPHONE FOR EXAMPLE, ARE DESIGNED TO BE FLUSH MOUNTED WITH THE WALL AND REQUIRE CUT IN THE WALL APPROXIMATELY 8" x 9" WITH THE LOW VOLTAGE CABLE ENTERING THE UNIT THROUGH THE MOUNTING HOLE.	REFER TO INTERCOM SYSTEM.
IC	INTERCOM WALL MTD. INTERCOM UNIT	4"X4" BOX WITH SINGLE GANG MUD RING AND 3/4"Ø CONDUIT STUBBED TO ACCESSIBLE AREA IN CEILING.	REFER TO INTERCOM SYSTEM.
ERAR	ELEVATOR REMOTE ACCESS READER	LOCATED INSIDE OF ELEVATOR TO BE INSTALLED & PROGRAMMED BY ELEVATOR VENDOR FOR SPECIFIC NEEDS	REFER TO DOOR HARDWARE SPECS.
TE	TELEPHONE ENTRY SYSTEM STATION	120 VAC POWER RECEPTACLE, 4 PR, CAT-6 CABLE TO NEAREST TELEPHONE BACKBOARD THROUGH 3/4"Ø EMT CONDUIT.	LINEAR AE-500
PR	PROXIMITY READER	120 VAC POWER RECEPTACLE, 4 PR, CAT-6 CABLE TO NEAREST TELEPHONE BACKBOARD THROUGH 3/4"Ø EMT CONDUIT.	

MISCELLANEOUS

ECB	SINGLE BUTTON EMERGENCY PHONE SYS. STATION	TALK A PHONE ETP-MN WALL PHONE STATION. TALK A PHONE ETP-400C PER STATION. 120 VAC POWER RECEPTACLE 4 PR, CAT-6 CABLE TO NEAREST ISP PAL AS NOTED, THROUGH 3/4"Ø EMT CONDUIT.	PROVIDE TALK A PHONE EC-8 WILL AS NEEDED.

NOTES:
1.) SOME ITEMS LISTED IN THE ABOVE TABLE MAY NOT BE INCLUDED IN THIS PROJECT. THE ABOVE ROUGH-IN REQUIREMENTS ARE INTENDED TO SERVE AS REFERENCE INFORMATION ONLY.
2.) THIS PART LIST IS INTENDED TO COMMUNICATE DESIGN INTENT. AS PART OF SUBMITTAL PROCESS, INSTALLER MUST SUBMIT A COMPLETE CUT SHEET OF FINAL PRODUCT. THIS MAY CHANGE BASED ON RECOMMENDATION OF OWNERSHIP GROUP.

DAS/FIRST RESPONDERS RADIO SYSTEMS & EMPLOYEE RADIO SYSTEM

DAS (DISTRIBUTED ANTENNAE SYSTEM)-FOR ENHANCED CELL PHONE COVERAGE

A DAS (DISTRIBUTED ANTENNAE SYSTEM) TO PROVIDE ENHANCED CELL PHONE COVERAGE MAY BE REQUIRED FOR THIS PROJECT. A SITE SURVEY WILL BE REQUIRED TO VERIFY THE NEED. FOR NEW BUILDS, ONCE THE STRUCTURE IS COMPLETE AND WALLS ARE FRAMED IN (BUT PRIOR TO CEILING AND WALL CLOSE UP) A SITE SURVEY SHOULD BE CONDUCTED BY A QUALIFIED DAS INTEGRATION COMPANY. THE PURPOSE OF THE SURVEY IS TO VERIFY THE NATIVE SIGNAL LEVELS WITHIN THE BUILDING FOR THE MAJOR CELL PHONE CARRIERS (ATT, VERIZON, SPRINT, T-MOBILE, ETC.). IN ADDITION TO MEASURING THE NATIVE SIGNAL STRENGTH, A COMPREHENSIVE DAS SURVEY WILL EMULATE THE POTENTIAL NUMBER OF SIMULTANEOUS CELL SESSIONS THAT COULD OCCUR IN THE BUILDING AND DETERMINE WHETHER OR NOT THE FULLY OCCUPIED BUILDING MAY NEGATIVELY IMPACT THE LOCAL CARRIERS MACRO NETWORK THEREBY RESULTING IN OVERALL POOR SIGNAL COVERAGE IN THE BUILDING AND POSSIBLE DROPPED CALLS BY USERS OUTSIDE THE BUILDING.

IF THE NATIVE SIGNAL LEVELS ARE NOT ADEQUATE WITHIN THE BUILDING, A HOST NEUTRAL DAS SYSTEM WILL NEED TO BE INSTALLED. IF APPLICABLE, SEE SHEET DV-XXX WITHIN OUR DRAWING SET FOR GENERAL SPECIFICATIONS AND SCHEMATIC CABLING DIAGRAMS FOR A HOST NEUTRAL DAS SYSTEM. FOR BUDGETING PURPOSES, WE SUGGEST THE GENERAL CONTRACTOR OR OWNER CARRY AN ALLOWANCE FOR THE DAS AND ERRS SYSTEMS. IF THE SURVEY REVEALS THAT NATIVE SIGNAL LEVELS ARE ADEQUATE PER THE HOTEL BRAND STANDARD REQUIREMENTS, THEN A DAS SYSTEM WILL NOT BE REQUIRED AND THE ALLOWANCE CAN BE REMOVED FROM THE BUDGET.

FIRST RESPONDERS RADIO SYSTEM

IN ADDITION TO THE DAS SYSTEM, A FIRST RESPONDERS RADIO SYSTEM MAY ALSO BE NEEDED. THE FIRST RESPONDERS RADIO SYSTEM PROVIDES ENHANCED COVERAGE FOR THE LOCAL FIRST RESPONDERS RADIOS (POLICE, FIREMEN, EMT, ETC.). LOCAL JURISDICTIONS HAVE SPECIFIC BROADCAST FREQUENCY THAT IS UTILIZED BY FIRST RESPONDERS RADIO. TYPICALLY THESE FREQUENCIES ARE IN THE 700 -900 MHZ RANGE, BUT CAN VARY. THE FREQUENCIES REQUIRED FOR THIS PROJECT MUST BE VERIFIED WITH THE LOCAL FIRE AND POLICE DEPARTMENTS. SIMILAR TO THE DAS SYSTEM EVALUATION PROCESS, THE ACTUAL REQUIREMENT FOR A FIRST RESPONDERS RADIO ENHANCEMENT SYSTEM IS DETERMINED BY PERFORMING A SITE SURVEY ONCE THE BUILDING STRUCTURE IS IN PLACE. IF A SYSTEM IS DEEMED NEEDED, IT IS FEASIBLE TO "PIGGY BACK" ON THE DAS SYSTEM BY ADDING ANTENNAE AND HEAD END EQUIPMENT TO ADD THE FIRST RESPONDERS COVERAGE ONTO THE DAS SYSTEM. HOWEVER, IT MAY BE MORE COST EFFECTIVE TO HAVE A SEPARATE, DEDICATED FIRST RESPONDERS SYSTEM DEPLOYED. A QUALIFIED, LOCAL INTEGRATION COMPANY CAN PROVIDE THE SURVEY AND PRICING FOR THE SYSTEM INSTALLATION. IF THE SURVEY REVEALS THAT NATIVE SIGNAL LEVELS ARE ADEQUATE PER THE LOCAL CODE REQUIREMENTS, THEN A FIRST RESPONDERS RADIO SYSTEM WILL NOT BE REQUIRED AND THE ALLOWANCE CAN BE REMOVED FROM THE BUDGET.

EMPLOYEE/STAFF COMMUNICATIONS SYSTEM

EMPLOYEE COMMUNICATIONS SYSTEMS CAN RANGE FROM HAND HELD RADIOS TO CLIP ON CELL PHONES THAT ARE ISSUED TO STAFF MEMBERS. THE EMPLOYEE COMMUNICATIONS SYSTEM PLAN FOR THE PROJECT SHOULD BE VERIFIED WITH THE HOTEL OPERATIONS STAFF. IF A RADIO SYSTEM IS TO BE DEPLOYED, THE SYSTEM IS TYPICALLY PROCURED AND INSTALLED IN A DESIGN/BUILD FASHION. RADIO SYSTEMS CONSIST OF A BASE STATION (TYPICALLY LOCATED IN THE SECURITY OFFICE), REPEATERS, ANTENNAE (TYPICALLY ONE ON THE ROOF AND ONE IN THE ENGINEERING SHOP) AND 2-WAY PORTABLE RADIOS WITH A MINIMUM OF 4 CHANNELS FOR THE VARIOUS PROPERTY DEPARTMENT USE (SECURITY, ENGINEERING, HOUSEKEEPING, ETC.). OFTEN THIS SYSTEM IS OWNER SUPPLIED AS PART OF THE OSE (OPERATING SYSTEMS AND SUPPLIES) BUT RESPONSIBILITY FOR THE INSTALLATION OF THIS SYSTEM SHOULD BE VERIFIED WITH THE OVERALL PROJECT MANAGER.

RESPONSIBILITY MATRIX

CABLING CONTRACTOR TO PROVIDE	SECURITY CONTRACTOR TO PROVIDE	ELECTRICAL CONTRACTOR TO PROVIDE
- CAT6 CABLES - CAT6 JACKS - COAX CABLES - FACEPLATE - PATCH PANEL - WALL MOUNT RACK - WIRE MANAGER - COMPRESSION CONNECTOR - FIRESTOPPING - J-HOOK - MISCELLANEOUS: (PANELS, CABLE, MOUNTING HARDWARE, SOFTWARE, JACKS, LADDER RACK, ETC... AND ANY OTHER RELAYED COMPONENT TO DELIVER A COMPLETE SYSTEM TO THE CLIENT).	- DOOR CONTACTS (AS NEEDED) - SECURITY SYSTEM - ALL CABLES FOR SECURITY SYSTEM - CCTV CAMERAS - CCTV CAMERAS MOUNTS - SECURITY PoE SWITCHES - TAMPER SWITCH - MISCELLANEOUS: (PANELS, CABLE, MOUNTING HARDWARE, SOFTWARE, ETC... AND ANY OTHER RELAYED COMPONENT TO DELIVER COMPLETE SYSTEM TO THE CLIENT). NOTE: ANY CCTV CAMERA EXPOSED TO WEATHER SHALL BE IN A WEATHERPROOF HOUSING	- 4X4 BACK BOXES - 4X4 SINGLE GANG MUD RING - CONDUITS - SLEEVES - PULL STRING - KNOX BOX - MISCELLANEOUS: (LABELS CONDUIT, HAND HOLE, SITE CONDUITS, VERTICAL CONDUIT ETC... AND ANY OTHER RELAYED COMPONENT TO DELIVER A COMPLETE PATHWAY SYSTEM TO THE CLIENT).

NOTE: ULTIMATELY THE GENERAL CONTRACTOR IS RESPONSIBLE TO ENSURE PROPER COORDINATION BETWEEN DISCIPLINES OCCURS TO DELIVER COMPLETE SYSTEM TO THE CLIENT.

CABLE INFRASTRUCTURE SYMBOL LEGEND

SYMBOL	DESCRIPTION	BACKBOX REQ.	CONDUIT REQ.	POWER REQS.	# JACKS	# CABLES	TERMINATION AT CLOSET END	COMMENTS
(2)	2 PORT ADMIN AREA OUTLET	1	6	9	2-RJ45	2	2 CABLES TO PATCH PANEL	ADMIN DATA CABLES TO BE TERMINATED ON TO DEDICATED PATCH PANELS.
(4)	4 PORT ADMIN AREA OUTLET	1	6	9	4-RJ45	4	4 CABLES TO PATCH P

LEGEND

—J—J—	PROPOSED CABLING PATHWAY ROUTE. SUPPORT CABLES EVERY 4'-0" WITH J-HOOKS SECURED TO STRUCTURE. PROVIDE SLEEVING AS REQUIRED.
WN ▼	WIRELESS NODE ACCESS POINT – RJ-45 & CAT-6, 4 PAIR CABLE. MOUNT OUTLET IN BISCUIT BOX. PROVIDE ACCESS PANEL WHEN MOUNTED ABOVE HARD CEILING. SEE 11/DV9.05. PROVIDE 15'-0" SERVICE LOOP AT OUTLET END.
ZH ▼	ZIGBEE HUB ACCESS POINT – RJ-45 & CAT-6, 4 PAIR CABLE. MOUNT OUTLET IN BISCUIT BOX. PROVIDE ACCESS PANEL WHEN MOUNTED ABOVE HARD CEILING. SEE 12/DV9.05. PROVIDE 15'-0" SERVICE LOOP AT OUTLET END.

KEYED NOTES

1. INSTALL (3) 4"ø SLEEVES OVER DOOR FOR CABLING PATHWAY TO IDF. FIRESTOP AS REQUIRED PER LOCAL CODE.
2. WIRELESS NODE/ZIGBEE HUB LOCATION. PROVIDE ACCESS PANEL WHERE REQUIRED.
3. COORDINATE LOCATION/HEIGHT WITH INTERIOR DESIGN (ID) DRAWINGS.

1 TOWER - FIFTH FLOOR PLAN - STRUCTURED CABLING SYSTEM/SECURITY

DV1.01-T5 SCALE : 1/8" = 1'-0" 2019-06-18 PLAN

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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

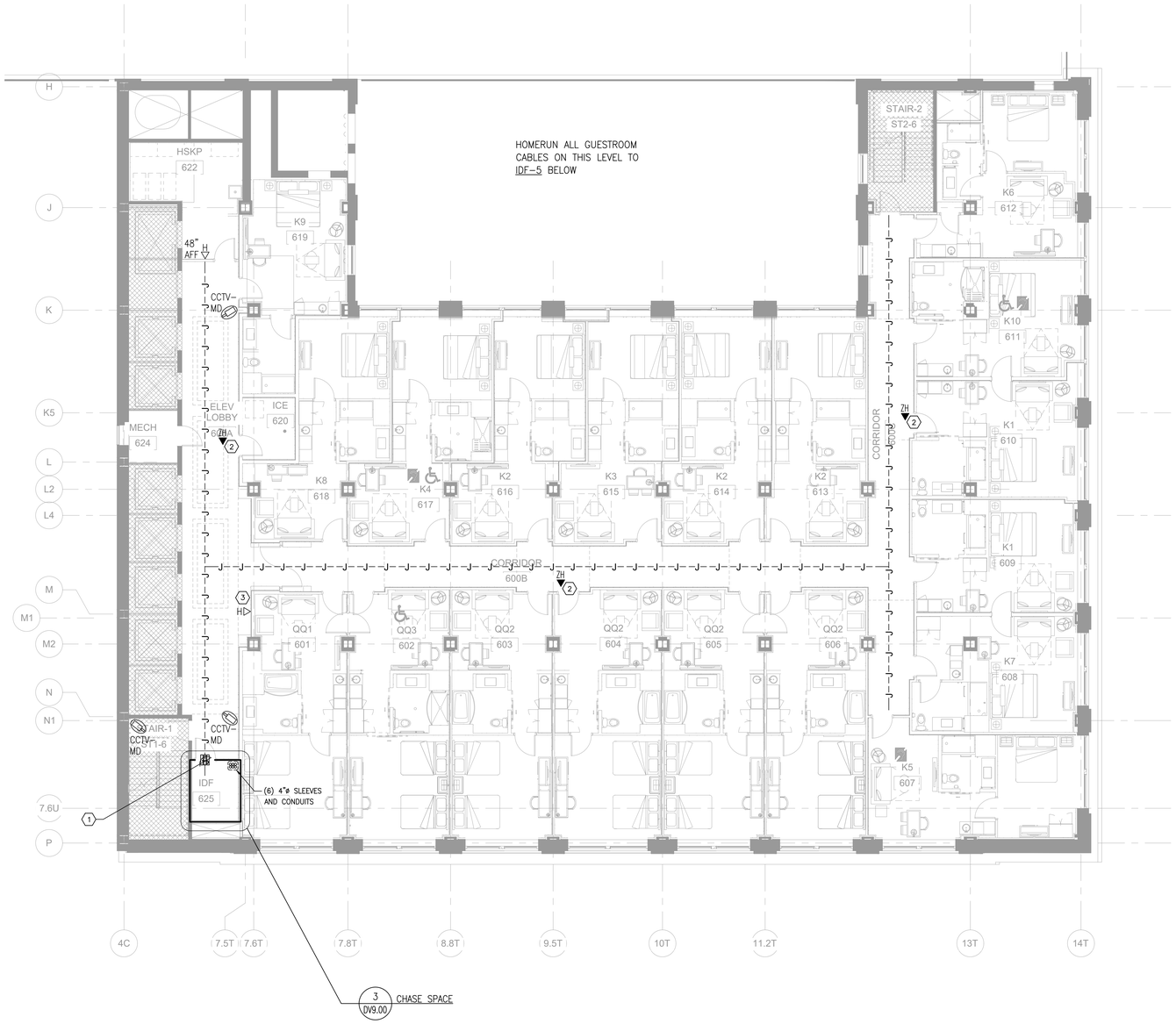
Project No.: 18A023
Drawn By: MJSessum
Checked By: JCook
Scale: See Drawing
Issue Date: August 06, 2019

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Fifth Floor Plan

DV1.01-T5

NTI JOB NO. 19-7510



LEGEND

—J——J—	PROPOSED CABLING PATHWAY ROUTE. SUPPORT CABLES EVERY 4'-0" WITH J-HOOKS SECURED TO STRUCTURE. PROVIDE SLEEVING AS REQUIRED.
WN ▼	WIRELESS NODE ACCESS POINT – RJ-45 & CAT-6, 4 PAIR CABLE. MOUNT OUTLET IN BISCUIT BOX. PROVIDE ACCESS PANEL WHEN MOUNTED ABOVE HARD CEILING. SEE 11/DV9.05. PROVIDE 15'-0" SERVICE LOOP AT OUTLET END.
ZH ▼	ZIGBEE HUB ACCESS POINT – RJ-45 & CAT-6, 4 PAIR CABLE. MOUNT OUTLET IN BISCUIT BOX. PROVIDE ACCESS PANEL WHEN MOUNTED ABOVE HARD CEILING. SEE 12/DV9.05. PROVIDE 15'-0" SERVICE LOOP AT OUTLET END.

KEYED NOTES

1. INSTALL (2) 4"ø SLEEVES OVER DOOR FOR CABLING PATHWAY TO IDF. FIRESTOP AS REQUIRED PER LOCAL CODE.
2. WIRELESS NODE/ZIGBEE HUB LOCATION. PROVIDE ACCESS PANEL WHERE REQUIRED.
3. COORDINATE LOCATION/HEIGHT WITH INTERIOR DESIGN (ID) DRAWINGS.

1 TOWER - SIXTH FLOOR PLAN - STRUCTURED CABLING SYSTEM/SECURITY

DV1.01-T6 SCALE : 1/8" = 1'-0"

2019-06-18 PLAN

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FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: MJSessum
Checked By: JCook
Scale: See Drawing
Issue Date: August 06, 2019

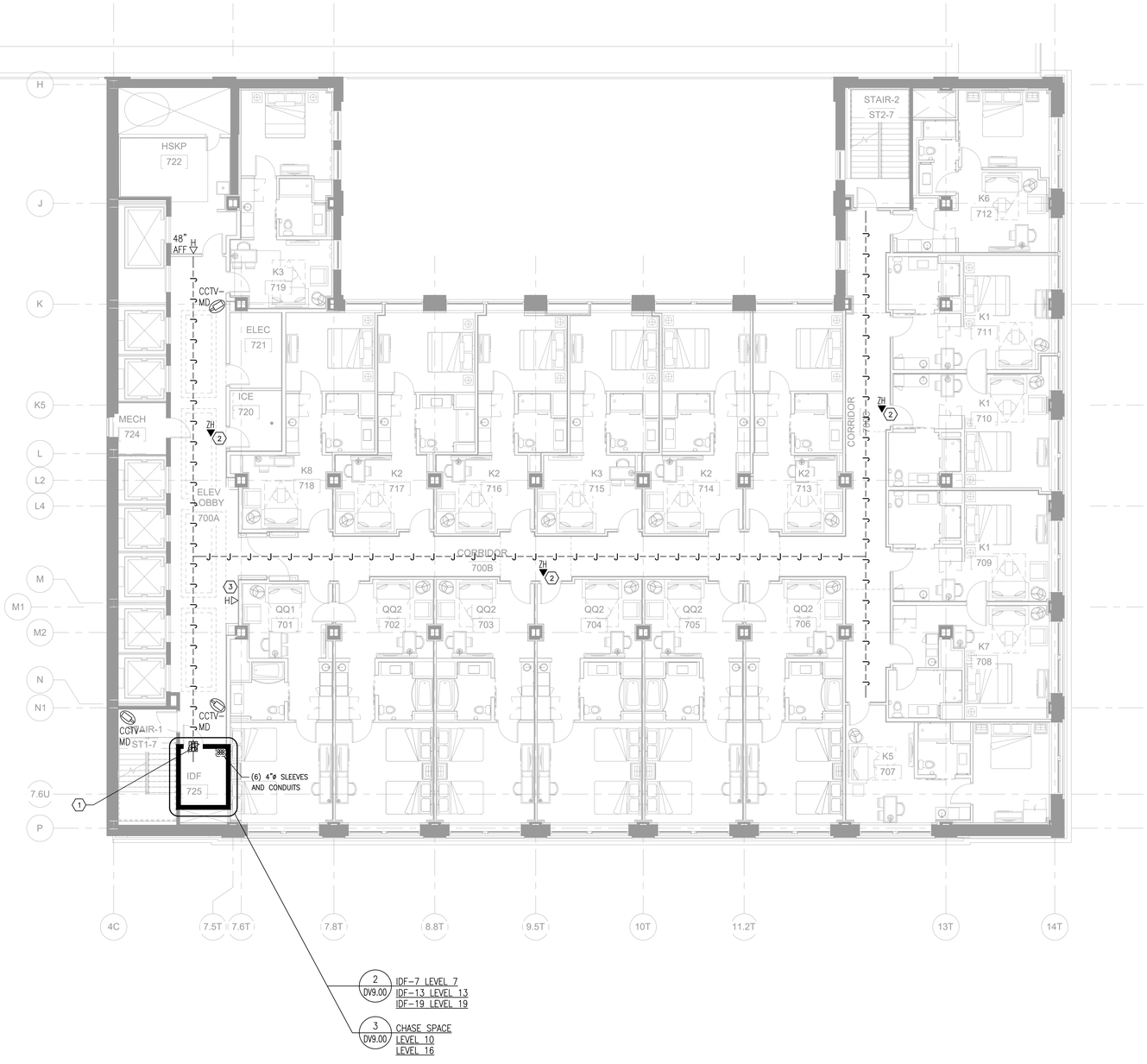
REVISION SCHEDULE

Rev. #	Revision Description	Issue Date

Tower - Sixth Floor Plan

DV1.01-T6

NTI JOB NO. 19-7510



LEGEND

—J——J—	PROPOSED CABLING PATHWAY ROUTE. SUPPORT CABLES EVERY 4'-0" WITH J-HOOKS SECURED TO STRUCTURE. PROVIDE SLEEVING AS REQUIRED.
WN ▼	WIRELESS NODE ACCESS POINT – RJ-45 & CAT-6, 4 PAIR CABLE. MOUNT OUTLET IN BISCUIT BOX. PROVIDE ACCESS PANEL WHEN MOUNTED ABOVE HARD CEILING. SEE 11/DV9.05. PROVIDE 15'-0" SERVICE LOOP AT OUTLET END.
ZH ▼	ZIGBEE HUB ACCESS POINT – RJ-45 & CAT-6, 4 PAIR CABLE. MOUNT OUTLET IN BISCUIT BOX. PROVIDE ACCESS PANEL WHEN MOUNTED ABOVE HARD CEILING. SEE 12/DV9.05. PROVIDE 15'-0" SERVICE LOOP AT OUTLET END.

KEYED NOTES

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2. WIRELESS NODE/ZIGBEE HUB LOCATION. PROVIDE ACCESS PANEL WHERE REQUIRED.
3. COORDINATE LOCATION/HEIGHT WITH INTERIOR DESIGN (ID) DRAWINGS.

ZONING NOTES

1) 7th FLOOR – HOMERUN ALL CABLES ON SEVENTH FLOOR TO IDF-7, SAME LEVEL.
2) 10th FLOOR – HOMERUN ALL CABLES ON TENTH FLOOR TO IDF-9, LEVEL BELOW.
3) 13th FLOOR – HOMERUN ALL CABLES ON THIRTEENTH FLOOR TO IDF-13, SAME LEVEL.
4) 16th FLOOR – HOMERUN ALL CABLES ON SIXTEENTH FLOOR TO IDF-15, LEVEL BELOW.
5) 19th FLOOR – HOMERUN ALL CABLES ON NINETEENTH FLOOR TO IDF-19, SAME LEVEL.

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FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: MJSessum
Checked By: JCook
Scale: See Drawing
Issue Date: August 06, 2019

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plans - 7th, 10th, 13th, 16th, 19th

DV1.01-T7

NTI JOB NO. 19-7510

1 TOWER - FLOOR PLANS - 7th, 10th, 13th, 16th 19th - STRUCTURED CABLING / SECURITY

DV1.01-T7 SCALE : 1/8" = 1'-0" 2019-08-02 PLAN

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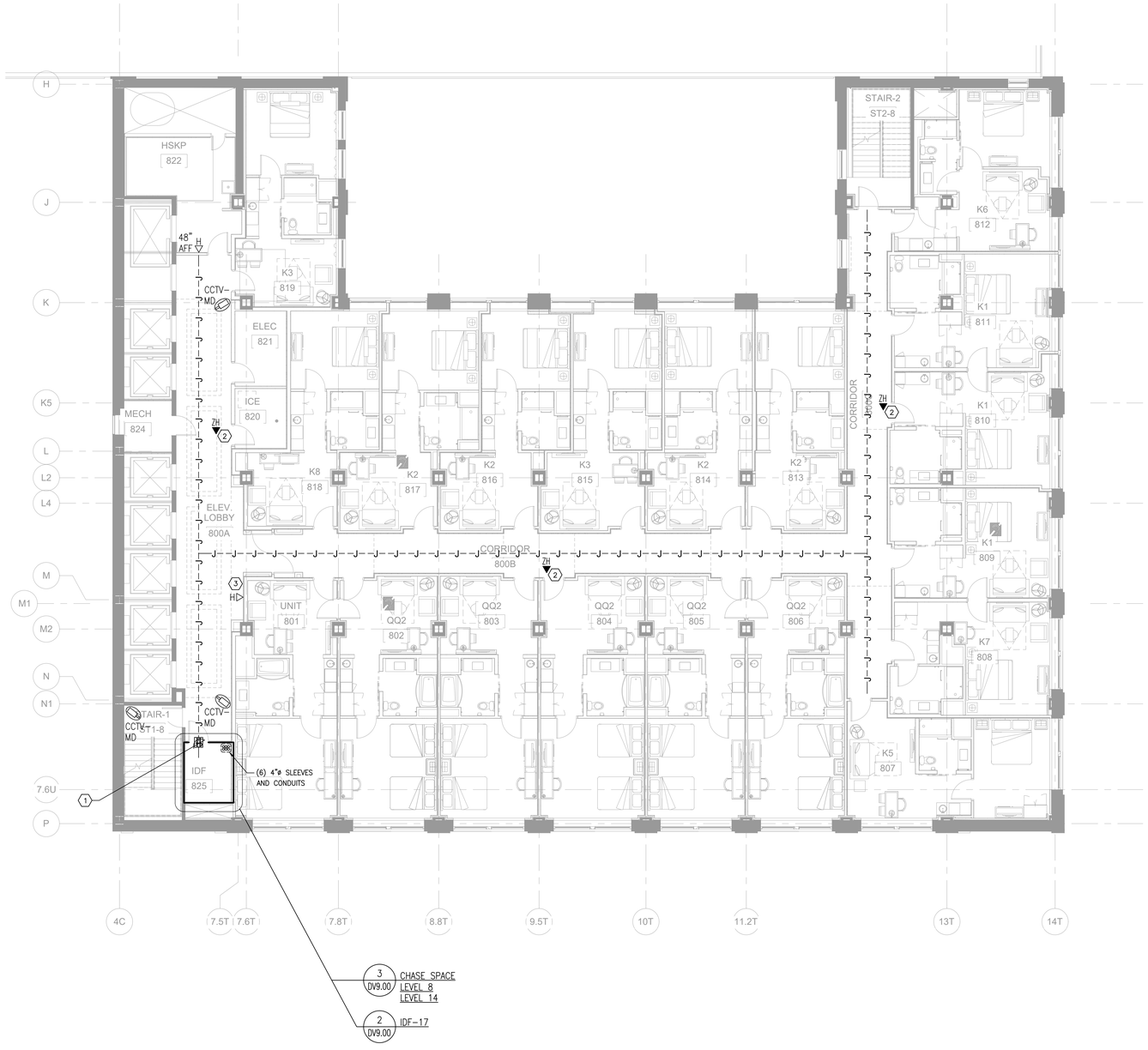

LEGEND

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ZH ▼	ZIGBEE HUB ACCESS POINT – RJ-45 & CAT-6, 4 PAIR CABLE. MOUNT OUTLET IN BISCUIT BOX. PROVIDE ACCESS PANEL WHEN MOUNTED ABOVE HARD CEILING. SEE 12/DV9.05. PROVIDE 15'-0" SERVICE LOOP AT OUTLET END.

KEYED NOTES

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2. WIRELESS NODE/ZIGBEE HUB LOCATION. PROVIDE ACCESS PANEL WHERE REQUIRED.
3. COORDINATE LOCATION/HEIGHT WITH INTERIOR DESIGN (ID) DRAWINGS.

ZONING NOTES

1) 8th FLOOR – HOMERUN ALL CABLES ON EIGHTH FLOOR TO IDF-7, LEVEL BELOW.
2) 14th FLOOR – HOMERUN ALL CABLES ON FOURTEENTH FLOOR TO IDF-13, LEVEL BELOW.
3) 17th FLOOR – HOMERUN ALL CABLES ON SEVENTEENTH FLOOR TO IDF-17, SAME LEVEL.

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FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: MJSessum
Checked By: JCook
Scale: See Drawing
Issue Date: August 06, 2019

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Floor Plans - 8th, 14th, 17th

DV1.01-T8

NTI JOB NO: 19-7510

1 TOWER - FLOOR PLANS - 8th, 14th 17th - STRUCTURED CABLING SYSTEM/SECURITY

DV1.01-T8 SCALE : 1/8" = 1'-0" 2019-08-02 PLAN

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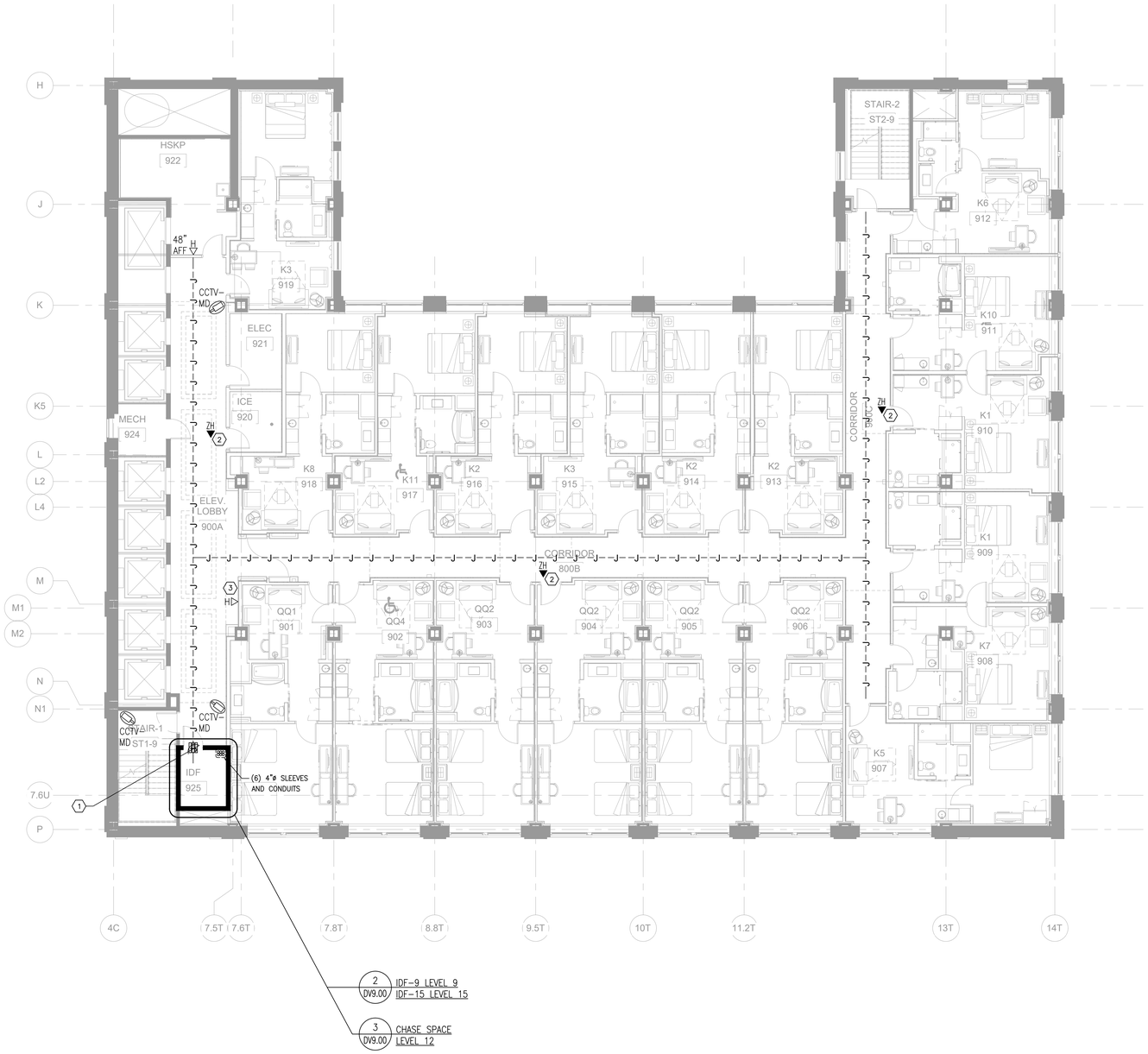

LEGEND

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WN ▼	WIRELESS NODE ACCESS POINT – RJ-45 & CAT-6, 4 PAIR CABLE. MOUNT OUTLET IN BISCUIT BOX. PROVIDE ACCESS PANEL WHEN MOUNTED ABOVE HARD CEILING. SEE 11/DV9.05. PROVIDE 15'-0" SERVICE LOOP AT OUTLET END.
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KEYED NOTES

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3. COORDINATE LOCATION/HEIGHT WITH INTERIOR DESIGN (ID) DRAWINGS.

ZONING NOTES

1) 9th FLOOR – HOMERUN ALL CABLES ON NINETEENTH FLOOR TO IDF-9, SAME LEVEL.
2) 12th FLOOR – HOMERUN ALL CABLES ON TWELFTH FLOOR TO IDF-11, LEVEL BELOW.
3) 15th FLOOR – HOMERUN ALL CABLES ON FIFTEENTH FLOOR TO IDF-15, SAME LEVEL.

1 TOWER - FLOOR PLANS - 9th, 12th, 15th - STRUCTURED CABLING SYSTEM/SECURITY

DV1.01-T9 SCALE : 1/8" = 1'-0" 2019-08-02 PLAN

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Project No.: 18A023
Drawn By: MJSessum
Checked By: JCook
Scale: See Drawing
Issue Date: August 06, 2019

REVISION SCHEDULE

Rev. #	Revision Description	Issue Date

Tower - Floor Plans - 9th, 12th, 15th

DV1.01-T9

NTI JOB NO. 19-7510

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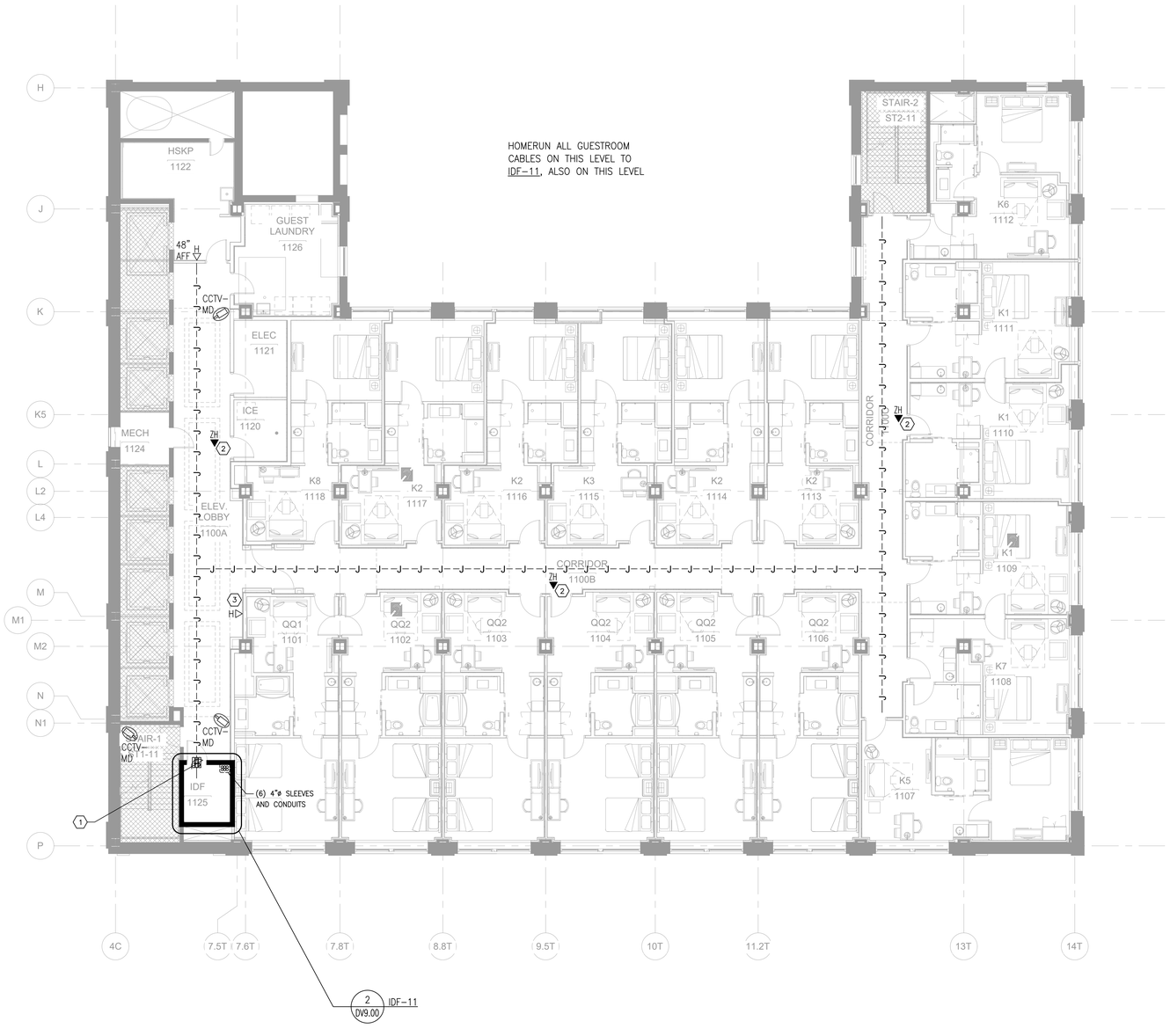

LEGEND

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KEYED NOTES

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1 TOWER - ELEVENTH FLOOR PLAN - STRUCTURED CABLING SYSTEM/SECURITY

DV1.01-T11 SCALE : 1/8" = 1'-0" 2019-06-18 PLAN

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Checked By: JCook
Scale: See Drawing
Issue Date: August 06, 2019

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Eleventh Floor Plan

DV1.01-T11

NTI JOB NO. 19-7510

USER: BNORMAN PLOTTED: 9/8/2020, 3:18 PM N:\2019\19-7510 embassy suites v kansas city\DV\DV1.01-T11.dwg LAYOUT: DV1.01-T11

LEGEND

–J––J–	PROPOSED CABLING PATHWAY ROUTE. SUPPORT CABLES EVERY 4'–0" WITH J–HOOKS SECURED TO STRUCTURE. PROVIDE SLEEVING AS REQUIRED.
WN ▼	WIRELESS NODE ACCESS POINT – RJ–45 & CAT–6, 4 PAIR CABLE. MOUNT OUTLET IN BISCUIT BOX. PROVIDE ACCESS PANEL WHEN MOUNTED ABOVE HARD CEILING. SEE 11/DV9.05. PROVIDE 15'–0" SERVICE LOOP AT OUTLET END.
ZH ▼	ZIGBEE HUB ACCESS POINT – RJ–45 & CAT–6, 4 PAIR CABLE. MOUNT OUTLET IN BISCUIT BOX. PROVIDE ACCESS PANEL WHEN MOUNTED ABOVE HARD CEILING. SEE 12/DV9.05. PROVIDE 15'–0" SERVICE LOOP AT OUTLET END.

KEYED NOTES

1. INSTALL (2) 4"ø SLEEVES OVER DOOR FOR CABLING PATHWAY TO IDF. FIRESTOP AS REQUIRED PER LOCAL CODE.
2. WIRELESS NODE/ZIGBEE HUB LOCATION. PROVIDE ACCESS PANEL WHERE REQUIRED.
3. COORDINATE LOCATION/HEIGHT WITH INTERIOR DESIGN (ID) DRAWINGS.

1 TOWER - EIGHTEENTH FLOOR PLAN - STRUCTURED CABLING SYSTEM/SECURITY

DV1.01-T18 SCALE : 1/8" = 1'-0" 2019-06-18 PLAN

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BICSI ID# 102331
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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: MJSessum
Checked By: JCook
Scale: See Drawing
Issue Date: August 06, 2019

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Tower - Eighteenth Floor Plan

DV1.01-T18

NTI JOB NO. 19-7510

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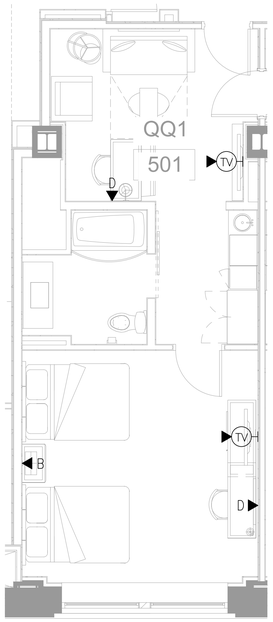

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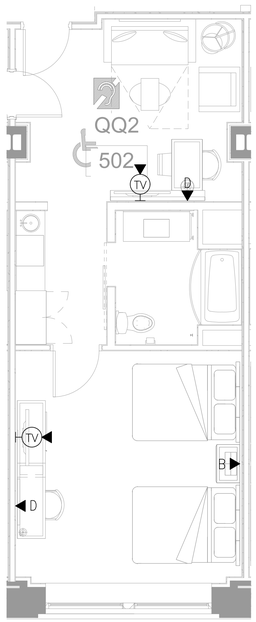
DV7.00	SCALE : 1/4" = 1'-0"	2019-08-05 PLAN



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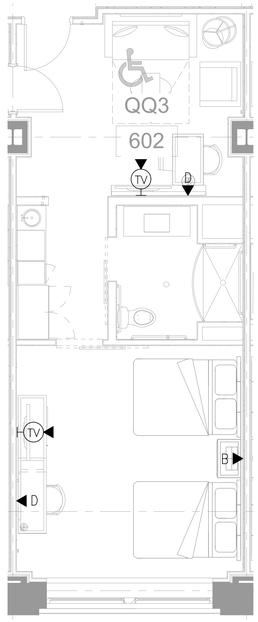

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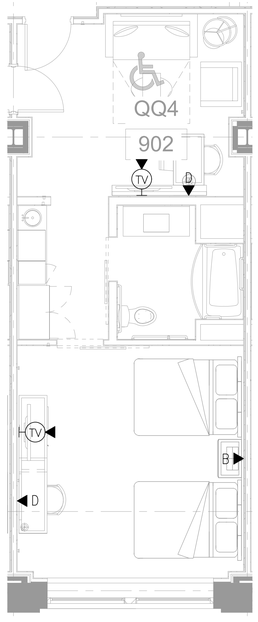

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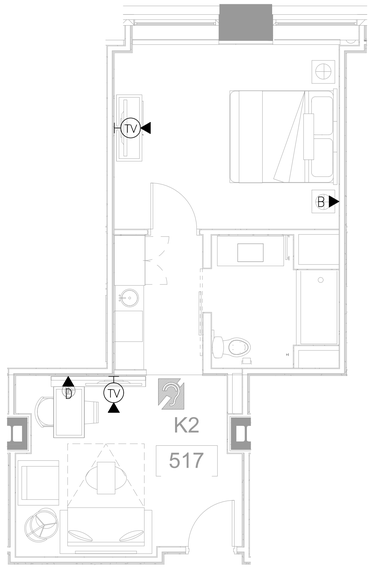

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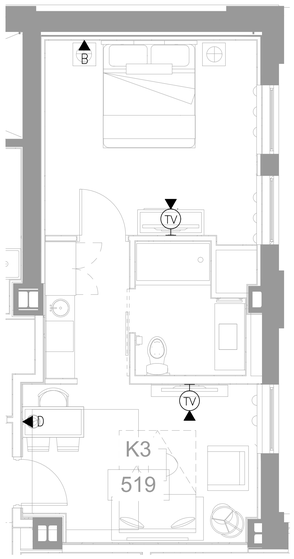

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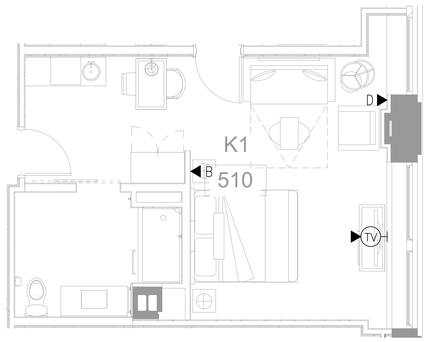

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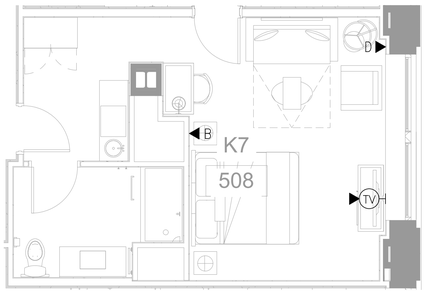

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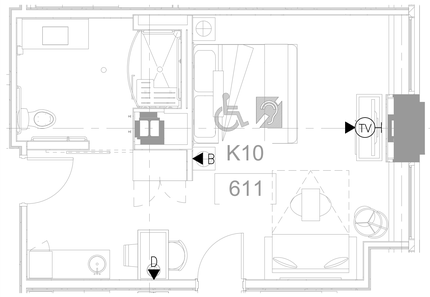


9	K 10	
DV7.00	SCALE : 1/4" = 1'-0"	2019-08-05 PLAN

10	NOT USED
DV7.00	

LEGEND

B — BED OUTLET VOICE – (1) CAT-6, (1) RJ-45 PLUG.

D — DESK OUTLET DATA/VOICE – (1) CAT-6, (1) RJ-45 PLUG.

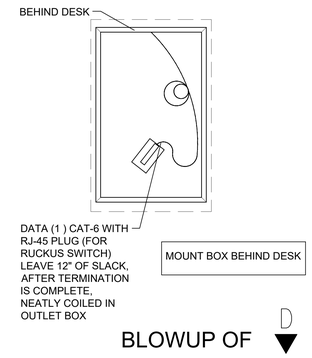
TV — TV OUTLET TV/DATA – (1) CAT-6, (1) RJ-45, (1) RG-6 AND (1) F-CONNECTOR – PROVIDE DEDUCT ALTERNATE FOR COAXIAL CABLE AND CONNECTOR

GENERAL NOTES

1.) VERIFY ALL FINAL OUTLET LOCATIONS AND QUANTITIES WITH ARCHITECTURAL AND INTERIOR DESIGN DRAWINGS.

2.) REFER TO GUESTROOM CONDUIT REQUIREMENTS ON 2/DV9.01.

3.) ALL CABLES HOMERUN TO DESIGNATED IDF ROOM. SEE DV9.01 FOR IDF ROOM ZONES.



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Enlarged Guestroom Plans

DV7.00

NTI JOB NO. 19-7510

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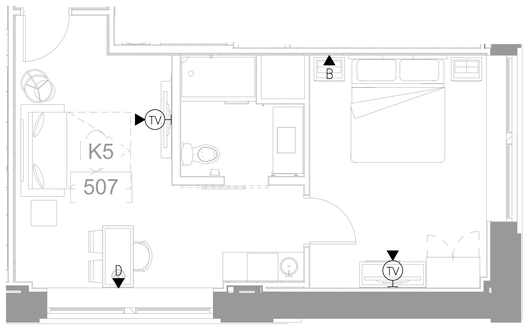
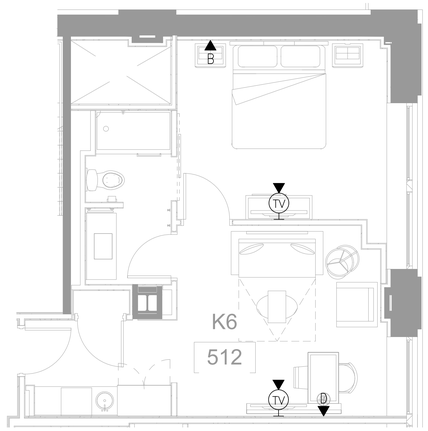


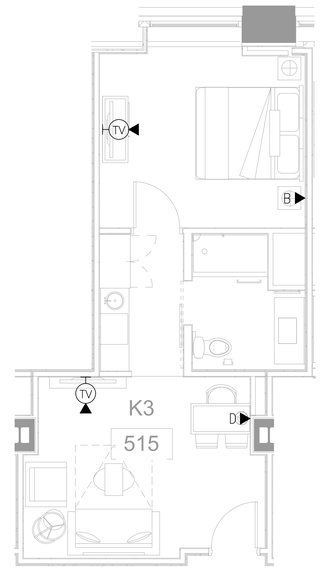
1 K 5

DV7.01 SCALE : 1/4" = 1'-0" 2019-08-05 PLAN



2 K 6

DV7.01 SCALE : 1/4" = 1'-0" 2019-08-05 PLAN



3 K 3

DV7.01 SCALE : 1/4" = 1'-0" 2019-08-05 PLAN

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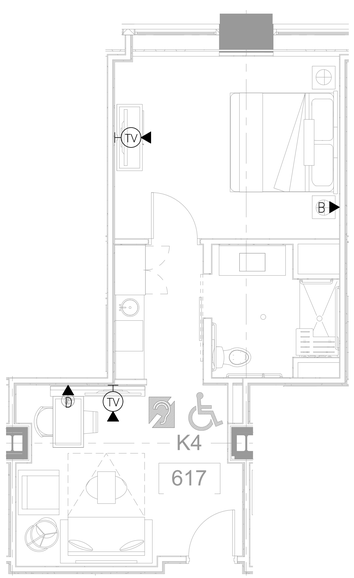
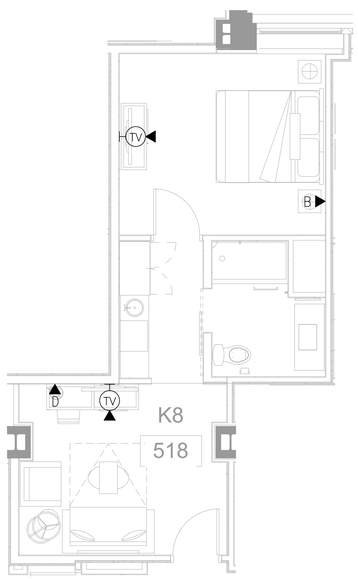


4 KING-J

DV7.01 SCALE : 1/4" = 1'-0" 2019-08-05 PLAN



5 KING-K-ADA

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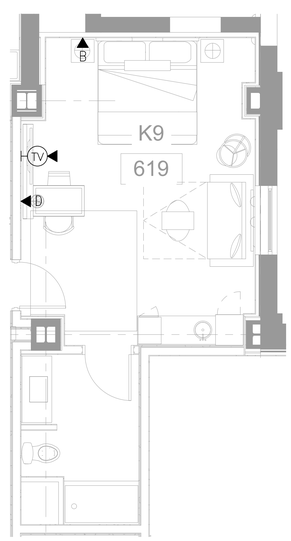
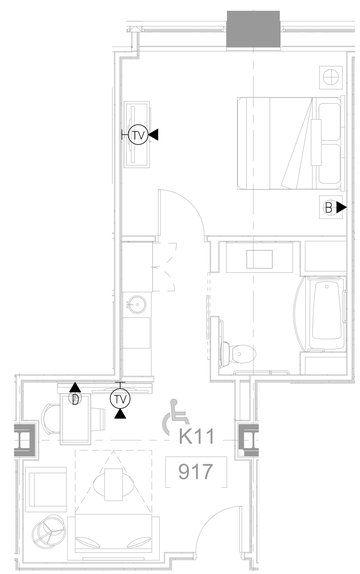


6 KING-L

DV7.01 SCALE : 1/4" = 1'-0" 2019-08-05 PLAN



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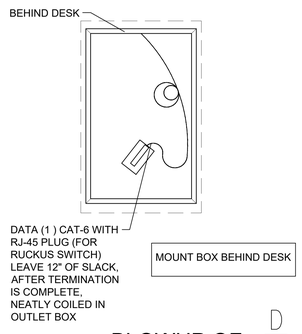
DV7.01 SCALE : 1/4" = 1'-0" 2019-08-05 PLAN



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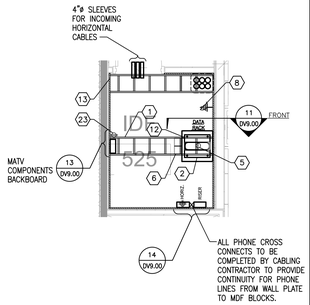


SPACE REQUIREMENTS :

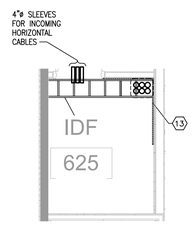
HVAC – ESTIMATE HEAT LOAD – ?,000 BTU/H, FOR DV, AV & MATV EQUIPMENT ONLY, MAINTAIN 68°F, MAX. 50% RH. DEDICATED THERMOSTAT, STAND-ALONE SYSTEM.
– GROUNDING BUS BAR, CONNECTED TO TELECOM GROUNDING SYSTEM.

1	MDF ROOM (LEVEL ?)
DV9.00	SCALE : 1/4" = 1'-0" 2019-06-19 PLAN

SPACE REQUIREMENTS :

HVAC – ESTIMATE HEAT LOAD – 4,000 BTU/H, FOR DV, AV & MATV EQUIPMENT ONLY, MAINTAIN 68°F, MAX. 50% RH. DEDICATED THERMOSTAT, STAND-ALONE SYSTEM.
– GROUNDING BUS BAR, CONNECTED TO TELECOM GROUNDING SYSTEM.

2	IDF-5 (TYPICAL GUEST LEVEL IDF)
DV9.00	SCALE : 1/4" = 1'-0" 2019-06-19 PLAN



SPACE REQUIREMENTS :

HVAC – NO HEAT LOAD NEEDED.

– NO GROUNDING SYSTEM NEEDED.

3	CHASE (TYPICAL GUEST LEVEL CHASE)
DV9.00	SCALE : 1/4" = 1'-0" 2019-06-19 PLAN

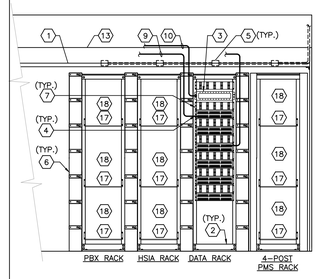
4	NOT USED
DV9.00	

5	NOT USED
DV9.00	

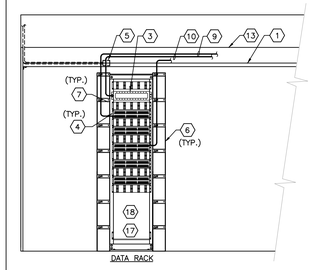
6	NOT USED
DV9.00	

7	NOT USED
DV9.00	

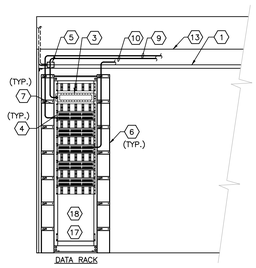
8	NOT USED
DV9.00	



9	FRONT VIEW - RACK ELEVATION
DV9.00	NOT TO SCALE



10	FRONT VIEW - RACK ELEVATION
DV9.00	NOT TO SCALE



11	FRONT VIEW - RACK ELEVATION
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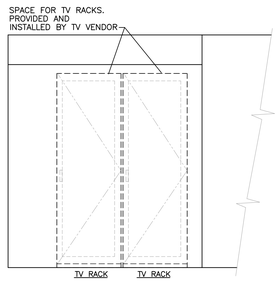

12	TV RACKS ELEVATION
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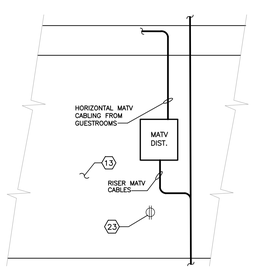
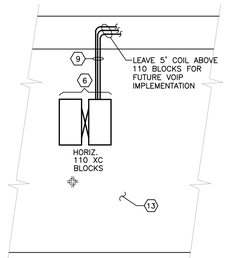
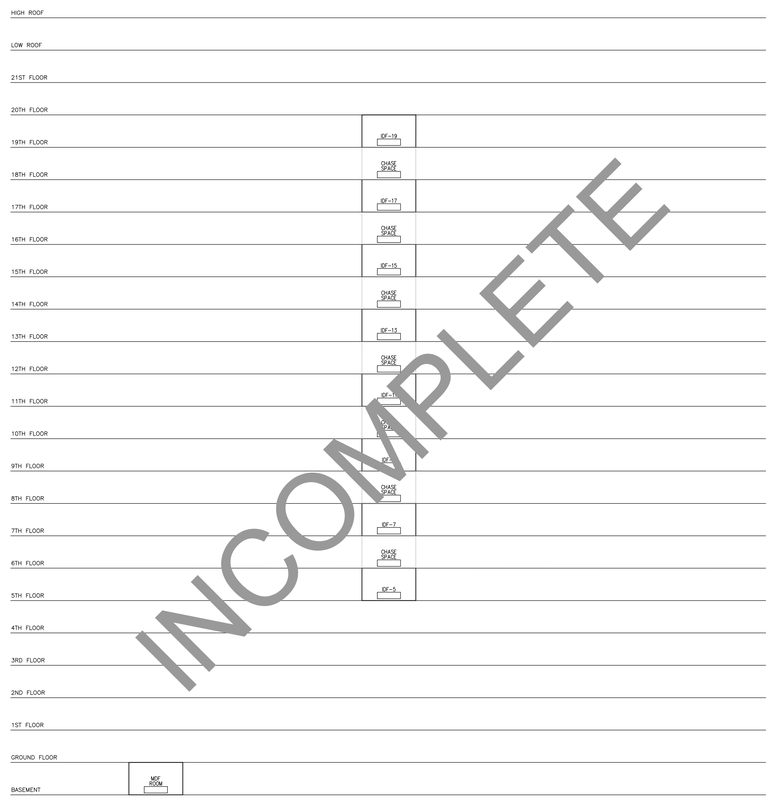


13	MATV BACKBOARD ELEVATION
DV9.00	NOT TO SCALE



14	110 BLOCKS ELEVATION
DV9.00	NOT TO SCALE



15	TELECOMMUNICATIONS GROUNDING RISER DIAGRAM
DV9.00	NOT TO SCALE

INCOMPLETE

LAN CLOSET INSTALLATION NOTES

1.) THE LAN COMPUTER/TELEPHONE RM. SHALL HAVE APPROPRIATE NUMBER OF EQUIPMENT RACKS INSTALLED AS PER DRAWINGS. FLOOR MOUNTED RACKS SHALL BE CPI #55053-503 OR EQUIVALENT. FLOOR RACKS MUST BE FASTENED TO CONC. FLOOR, AND FASTENED TO LADDER RACK WITH PROPER CPI HARDWARE. ALL RACKS & FRAMES SHALL BE INSTALLED ACCORDING TO ALL APPLICABLE LOCAL BUILDING CODES.

2.) PATCH PANELS SHALL BE 48-PORT HIGH-DENSITY, 2U AND SHALL BE INSTALLED IN EQUIPMENT RACKS AS SHOWN ON ELEVATIONS.CONTRACTOR SHALL INSTALL PANELS IN SUFFICIENT QUANTITY & PORT CONFIGURATION TO TERMINATE ALL INCOMING HORIZONTAL DATA CABLES AND TELEPHONE PATCH SYSTEM CABLES. ADMIN. OUTLET DATA CABLES TO BE TERMINATED ON DEDICATED PATCH PANELS.

3.) EQUIPMENT RACKS MUST BE SUPPORTED OVERHEAD WITH 18"(W) x 6"(D) CABLE TRAY FROM RACKS TO WALL ACCORDING TO PLANS CODES. DRAWING DETAILS. CABLE TRAY TO BE MP HUSKY OR EQUIVALENT. LADDER RACK MAY BE USED IN IDF ROOMS WITH CEILINGS LESS THAN 8'-0". MAINTAIN A MINIMUM OF 18" CLEARANCE FROM ANY OVERHEAD SPRINKLER SYSTEMS.

4.) VERTICAL WIRE MANAGEMENT SHALL BE CPI#11729-503, TO BE USED BETWEEN EACH RACK AND ON ENDS OF RACK(S).

5.) HORIZONTAL WIRE MANAGEMENT, 2 RACK UNITS (3.5"), TO BE USED BETWEEN EACH PATCH PANEL, ABOVE THE TOP PANEL & BELOW THE BOTTOM PANEL FOR EACH PANEL LINEUP.

6.) FOR FLOOR RACKS, A 70" CPI POWER STRIP WITH A MINIMUM OF (10) OUTLETS SHALL BE FASTENED VERTICALLY TO THE REAR OF CPI RACKS TO PROVIDE POWER TO EQUIPMENT. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF POWER RECEPTACLES. COORDINATE INSTALLATION OF POWER SUPPLY CIRCUITS WITH ELECTRICAL CONTRACTOR. ONE CIRCUIT PER IS REQUIRED. ELECTRICAL CONTRACTOR TO STRAP CONDUIT TO UNDERSIDE OF LADDER RACK WITH PROPER INSTALLATION METHOD AND HARDWARE. POWER CABLES FROM EQUIPMENT RACK TO WALL OUTLETS WILL NOT BE PERMITTED.

7.) ALL IDF & MDF CROSS-CONNECT FIELDS SHALL BE OF THE 110 TYPE BLOCKS IN A SUFFICIENT QUANTITY TO FULLY TERMINATE ALL HORIZONTAL VOICE CABLES. VERTICAL CROSS-CONNECT CABLE MANAGEMENT TROUGHS MANUFACTURED BY THE SAME MANUFACTURER AS THE 110 BLOCKS MUST BE USED BETWEEN 110 BLOCKS AND VERTICAL BLOCK ARRAYS. D-RINGS WILL NOT BE PERMITTED FOR CABLE MANAGEMENT IN THE 110 BLOCK FIELD. REAR CABLE TROUGH TYPE ARRANGEMENT IS REQUIRED FOR THE 110 BLOCKS. REAR FEED AND CABLE DRESSING IN THE CABLE TROUGHS IS REQUIRED FOR ALL CABLE, BOTH WORKSTATION AND RISERS.

8.) ALL PHONE CROSS CONNECTS TO BE COMPLETED BY CABLING CONTRACTOR TO PROVIDE CONTINUITY FOR PHONE LINES FROM WALL PLATE TO MDF BLOCKS.

9.) ALL EQUIPMENT RACKS AND HARDWARE MUST BE GROUNDED PER TIA/EIA & NEC GUIDELINES. RACKS SHALL HAVE VERTICAL GROUND STRIPS.

10.) UPS UNITS CAPABLE OF MAINTAINING POWER FOR A MINIMUM OF FIFTEEN MINUTES REQUIRED FOR ALL IT EQUIPMENT IN ALL IDF AND MDF ROOMS, TO BE PROVIDED AND INSTALLED BY OSE EQUIPMENT VENDORS.

Sizing of the TBB

TBB length linear M (FEET)	TBB Size (AWG)
less than 8 (26)	2
8 – 10 (27 – 33)	2
10 – 13 (34 – 41)	1
13 – 16 (42 – 52)	1/0
16 – 20 (53 – 66)	2/0
greater than 20 (66)	3/0

LEGEND :

TGB TELECOMMUNICATIONS GROUNDING BUSBAR.

TMGB TELECOMMUNICATIONS MAIN GROUNDING BUSBAR.

NOTE :

THE TBB SHALL BE A COPPER CONDUCTOR. THE MIN. TBB CONDUCTOR SIZE SHALL BE A NO. 6 AWG. THE TBB SHOULD BE SIZED BY THE ELECTRICAL ENGINEER. THE TBB MAY BE INSULATED AND, IF SO, THE INSULATION SHALL MEET THE FIRE RATINGS OF ITS PATHWAY. THE SIZING OF THE TBB IS NOT INTENDED TO ACCOUNT FOR THE REDUCTION OR CONTROL OF ELECTROMAGNETIC INTERFERENCE. (FROM J-STD-607-A).

DRAWING NOTES :

1.) TGB 2"X12" BUSBAR CPI PART #13622-012 TO BE INSTALLED IN IDF.

2.) TMGB 4"X12" BUSBAR CPI PART #40153-012 TO BE INSTALLED IN MDF.

3.) INSTALL GROUND BUSBAR A MINIMUM OF 18"AFF WITH 6" CLEAR ON ALL SIDES.

SHOWN FOR REFERENCE ONLY. VERIFY FINAL GROUNDING SYSTEM DESIGN WITH ELECTRICAL ENGINEER.

KEYED NOTES

1. 18"(WIDE) LADDER RACK. MOUNT ABOVE EQUIPMENT RACKS. INSTALLED BY CABLING CONTRACTOR.
2. FLOOR MOUNTED EQUIPMENT RELAY RACK, 7'(H) x 19"(W) BLACK, (CPI #55059-703) OR APPROVED EQUIVALENT.
3. RACK MOUNT FIBER ENCLOSURE LOADED WITH 'SC' MULTIMODE BULKHEADS – SUPPLY AS NEEDED TO TERMINATE ALL INCOMING/OUTGOING FIBER CABLES.
4. 48 PORT CAT-6 DATA PATCH PANEL RACK MOUNTED SUPPLY AS NEEDED TO TERMINATE ALL INCOMING HORIZONTAL DATA CABLES AND DATA RISER CABLES. (CAT-3 RATED PANELS MAY BE USED FOR "TELEPHONE TRUNK PANELS").
5. 120V AC/120 TWIST LOCK OUTLET. ON DEDICATED EMERGENCY POWER, SUPPLY TWO OUTLETS ON DEDICATED CIRCUIT PER RACK, COORDINATE INSTALLATION WITH ELECTRICAL CONTRACTOR.
6. VERTICAL CABLE MANAGER (CPI #11729-703) WITH COVER (CPI #12188-001) OR APPROVED EQUIVALENT.
7. 2 UNIT HORIZONTAL CABLE MANAGER, 3.5" HIGH RACK MOUNTED.
8. GROUND BUS BAR FOR COMMUNICATIONS EQUIPMENT GROUND.
9. INCOMING 4 PAIR, CAT-6, HORIZONTAL CABLES.
10. INCOMING FIBER CABLES, SEE CABLING RISER DIAGRAM FOR EXACT REQUIREMENTS.
11. TELEPHONE TRUNK PANEL SEE 12/DV9.05. SUPPLY AS NEEDED TO ACCOMMODATE ALL ANALOG CABLES.
12. 20A RATED 70" POWER STRIP (CPI #12851-758) WITH FACTORY INSTALLED 20A TWIST LOCK PLUG AND WITH 6.5" STAND OFF BRACKETS, SEE DETAIL 1/DV904.
13. 3/4" AC GRADE PLYWOOD (MOUNT WITH BOTTOM 6" OFF THE FLOOR), 8 FEET HIGH, FIRE RATED OR TREATED ON ALL SIDES WITH TWO COATS OF FIRE RESISTANT PAINT TYPICAL TO ALL WALLS.
14. 20 AMP 120VAC QUAD RECEPTACLE ON DEDICATED EMERGENCY POWER CIRCUIT.
15. 20 AMP 120VAC. DUPLEX RECEPTACLE ON DEDICATED CIRCUIT. COORDINATE FINAL REQUIREMENTS WITH MATV SERVICE PROVIDER.
16. 300 OR 900 PAIR CAT-6 RATED 110 XC BLOCKS, MOUNTED IN CROSS-CONNECT DISTRIBUTION FRAMES WITH VERTICAL CABLE MANAGEMENT FRAMES BETWEEN, SUPPLY AS NEEDED.
17. DOUBLE SIDED SHELF, MIN. 21" DEEP, CENTER LOADED (CPI 40108-719).
18. RACKS AND/OR RACK SPACE TO BE LEFT OPEN TO BE POPULATED BY OTHERS.
19. AV CABINET, SEE AV DIAGRAMS FOR DETAILS.
20. 20 AMP 120VAC. DUPLEX RECEPTACLE ON DEDICATED CIRCUIT.
21. COORDINATE WITH AV DRAWINGS.
22. 4-POST PMS RACK. PMS SYSTEM FLOOR MOUNT CPI 15218-703.
23. CONVENIENCE 120 V 20 AMP DUPLEX OUTLETS EVERY 6' AROUND THE ROOM. CAN BE DAISY CHAINED TOGETHER ON (1) ONE COMMON DEDICATED CIRCUIT.
24. WALL MOUNT EQUIPMENT RACK, 72"Hx25"D. CPI PART NUMBER 11792-725 (OR EQUIVALENT)

GENERAL NOTES

1.) ALL HORIZONTAL TO BACKBONE CROSS CONNECTING TO BE PERFORMED BY CABLING CONTRACTOR. REFER TO DETAILS FOR CROSS-CONNECTING REQUIREMENTS FOR TELEPHONE PATCHING SYSTEM PATCH PANELS.

2.) HEAT LOADS LISTED HEREIN REPRESENT KNOWN LOADS FOR DATA/TEL. SYSTEM EQUIPMENT IN RESPECTIVE ROOMS AT TIME OF DESIGN. MECHANICAL SYSTEMS DESIGNER SHOULD VERIFY HEAT LOADS WITH OTHER DESIGNERS FOR SHARED EQUIPMENT SPACES. MECHANICAL SYSTEMS ARE TO BE SIZED BY MECHANICAL ENGINEER AND SPECIFIED ON MECHANICAL DRAWINGS.

3.) HVAC SYSTEMS FOR EQUIPMENT ROOMS SHALL BE DEDICATED SYSTEMS. WHERE NOT FEASIBLE, ROOMS SHALL BE ON DEDICATED ZONE WITH INDEPENDENT THERMOSTAT CONTROL.

4.) ALL EQUIPMENT ROOMS SHALL HAVE:
- –NO CEILING TILES
- –TILE OR SEALED CONCRETE FLOOR (NO CARPET)
- –NO WATER LEAK POTENTIAL SPACES ABOVE (POOL, KITCHEN, BATHROOM, ETC.)
- –HIGH-TEMP FIRE PROTECTION HEADS

5.) RACK ELEVATIONS ARE SHOWN FOR REFERENCE ONLY. CABLING CONTRACTOR IS RESPONSIBLE FOR VERIFYING AND PROVIDING APPROPRIATE NUMBER OF PANELS AS NECESSARY TO TERMINATE ALL HORIZONTAL AND BACKBONE CABLES WITHIN EACH TEL./ELEC.-IDF AND EQUIPMENT ROOM.

6.) **MDF AND IDFs FOR HOTEL EQUIPMENT ROOMS SHALL BE ON GENERATOR POWER CIRCUITS.**

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FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By:
Checked By:
Scale: See Drawing
Issue Date: August 06, 2019

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Enlarged Equipment Room Layouts

DV9.00

NTI JOB NO. 19-7510

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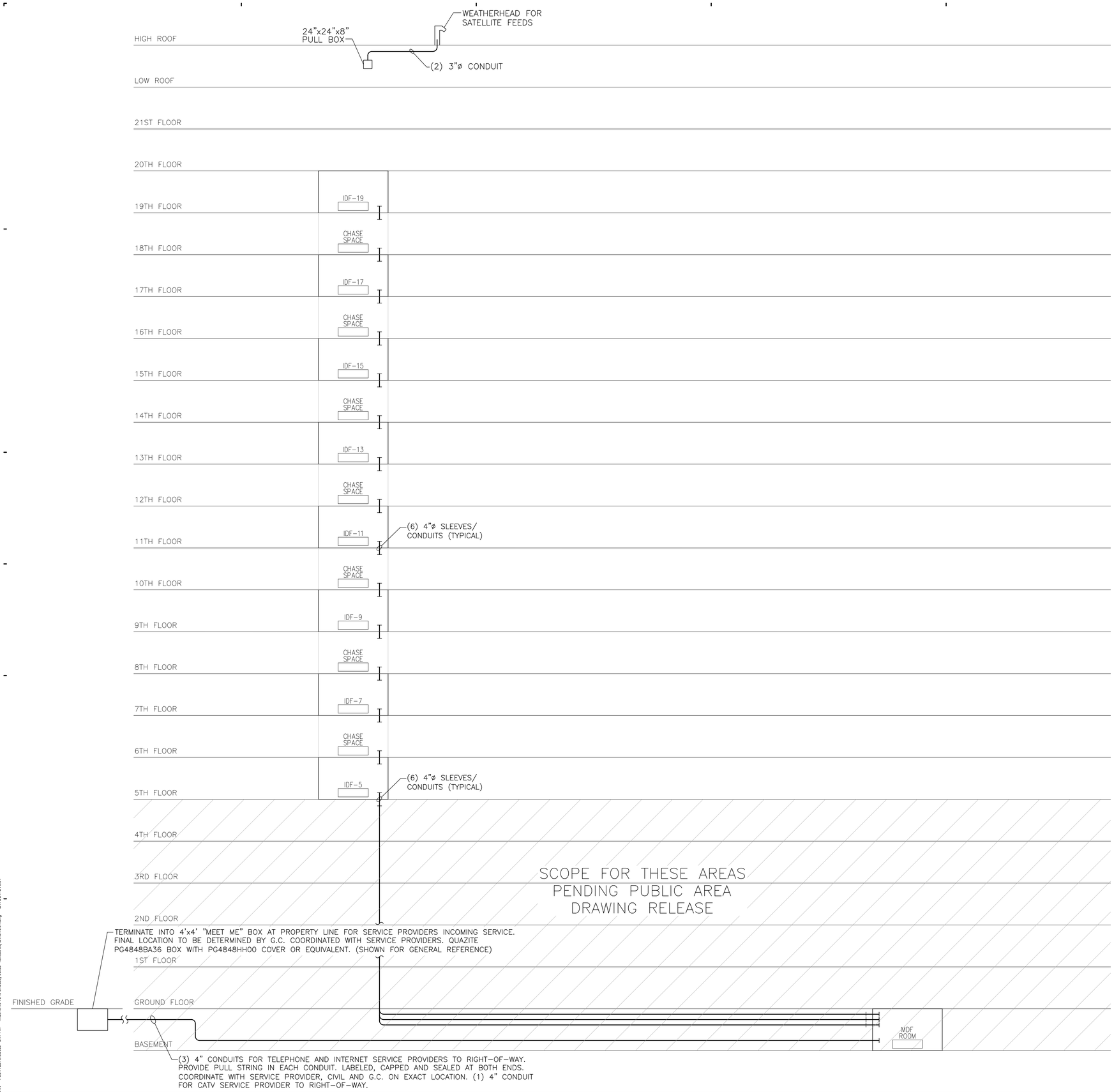


1 DATA/VOICE/MATV CONDUIT RISER DIAGRAM - STRUCTURED CABLING SYSTEM/SECURITY

DV9.01 NOT TO SCALE

CONDUIT NOTES

1.) CONDUIT RUNS SHALL CONTAIN NO MORE THAN TWO (2) 90 DEGREE BENDS AND HAVE AN AGGREGATE BEND OF NO MORE THAN 180 DEGREES WITHOUT A PULL BOX. PULL BOXES SHALL BE INSTALLED IN STRAIGHT CONDUIT SECTIONS ONLY.

2.) ALL CONDUIT STUBS SHALL BE REAMED AND BUSHED.

3.) ALL CONDUITS SHALL CONTAIN PULL STRING.

4.) ALL CONDUITS TO BE ROUTED OVERHEAD, NOT UNDERGROUND OR BELOW GROUND FLOOR SLAB – EXCEPT FOR INCOMING SERVICE CONDUITS AND DEMARC EXTENSION.

5.) LABEL ALL CONDUIT ENDS WITH DESTINATION.

GENERAL NOTES

1.) LABEL ALL CONDUIT ENDS WITH DESTINATION.

2.) ALL CONDUITS SHALL CONTAIN PULL STRING.

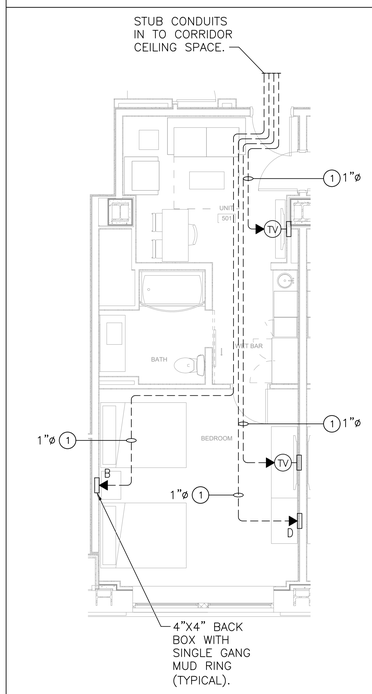
3.) ALL CONDUITS SHALL BE ROUTED OVERHEAD, NOT UNDERGROUND OR BELOW GROUND FLOOR SLAB – EXCEPT FOR INCOMING SERVICE CONDUITS.

4.) ALL CONDUIT RUNS SHALL CONTAIN A PULL BOX FOR EVERY 180° OF BENDS. ALL SWEEPS SHALL BE 48" RGS DOUBLE WRAPPED WITH 10 MIL TAPE FOR UNDERGROUND INSTALLATION.

5.) ALL CONDUITS STUBS FOR OUTLET BOXES SHALL STUB TO ACCESSIBLE CEILING SPACE CONTIGUOUS TO DESTINATION CLOSET.

6.) ALL BELOW GRADE CONDUITS SHALL BE SCHEDULE 40 PVC.

7.) INCOMING SERVICE AND OTHER BELOW GRADE CONDUITS SHALL HAVE 4" SEPARATION FROM ADJACENT CONDUITS AND SHALL STUB 4" AFF.



1 ROUTE ONE CONDUIT FROM EACH OUTLET LOCATION TO CORRIDOR CEILING SPACE. RACEWAY SHALL BE FLEXIBLE NON-METALLIC (SMURF TUBE).

2 INSTALL 4"x4" OUTLET BOX WITH SINGLE GANG MUD RING, AT OUTLET LOCATION (TYPICAL).

DEDUCT ALTERNATE :
ALL CABLES WILL BE FREE RUN WITHIN WALLS. PROVIDE GROMMET PROTECTION THROUGH STUD OPENINGS. SEE DETAILS 17 & 23 ON DV9.05.

2 RACEWAY SYSTEM FOR (TYP.) GUESTROOM

DV9.01 NOT TO SCALE

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Project No.: 18A023
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Checked By: JCook
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Data/Voice/MATV Conduit Riser Diagram

DV9.01

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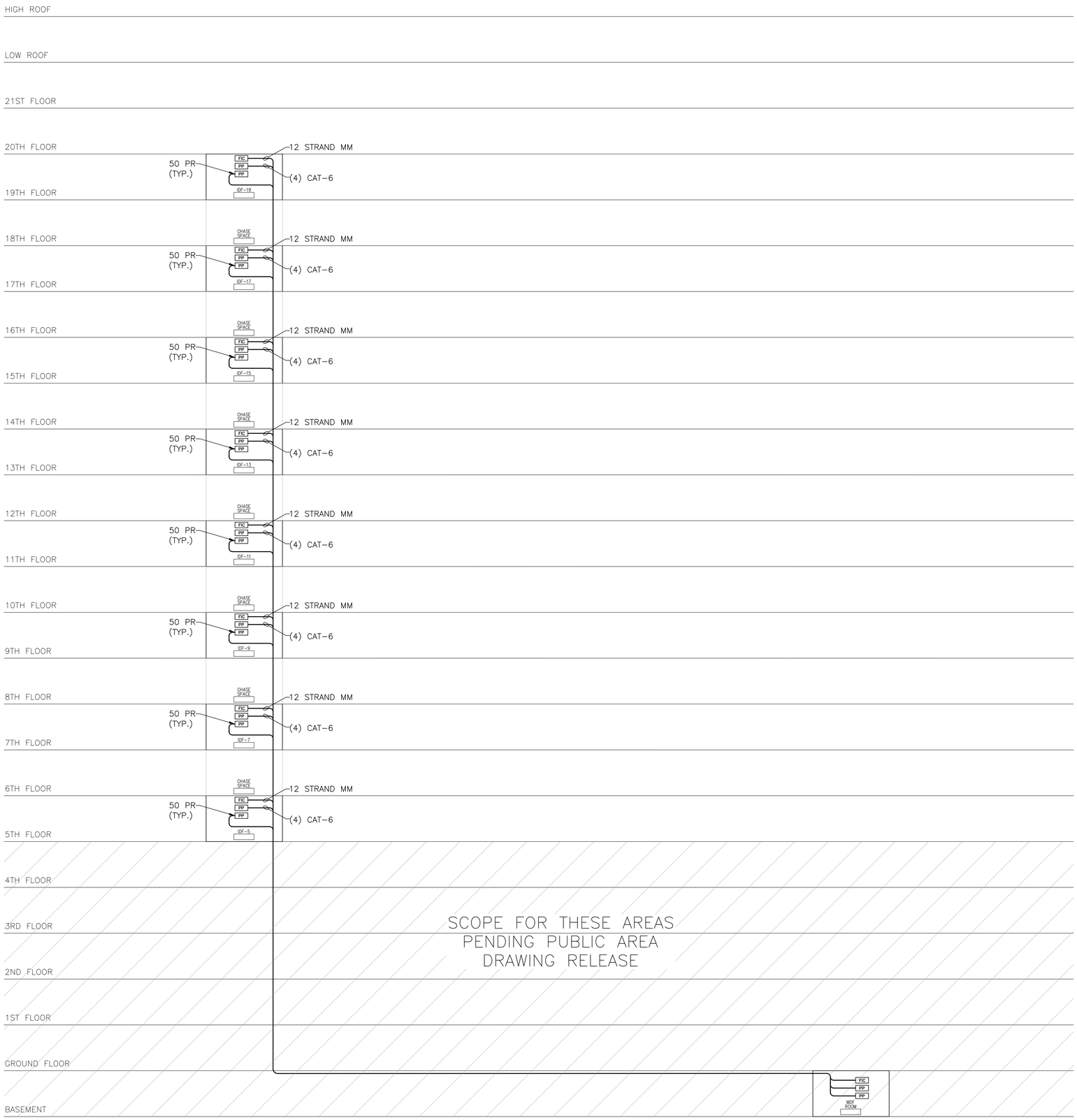


1 DATA/VOICE CABLING RISER DIAGRAM - STRUCTURED CABLING SYSTEM/SECURITY

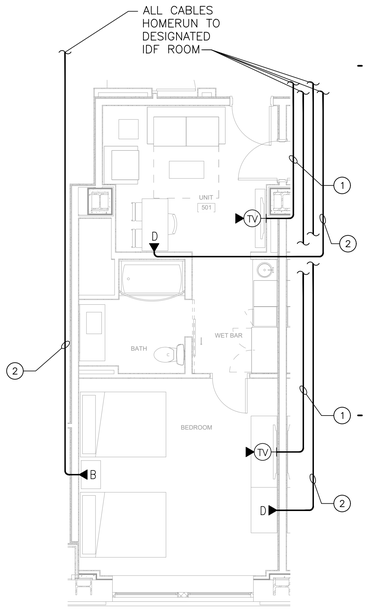
DV9.02 NOT TO SCALE

LEGEND

	110 BLOCKS
PP	CAT-6 PATCH PANEL
FIC	FIBER INTERCONNECT CABINET

NOTE

HOMERUN ALL RISER CABLES TO MDF ROOM.



1 (1) CAT-6 4 PR CABLE AND (1) RG-6 COAX CABLE (QUOTE RG-6 AS DEDUCT ALTERNATE).

2 (1) CAT-6 4 PR CABLE.

2 CABLING FOR (TYP.) GUESTROOM

DV9.02 NOT TO SCALE

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Data/Voice Cabling Riser Diagram

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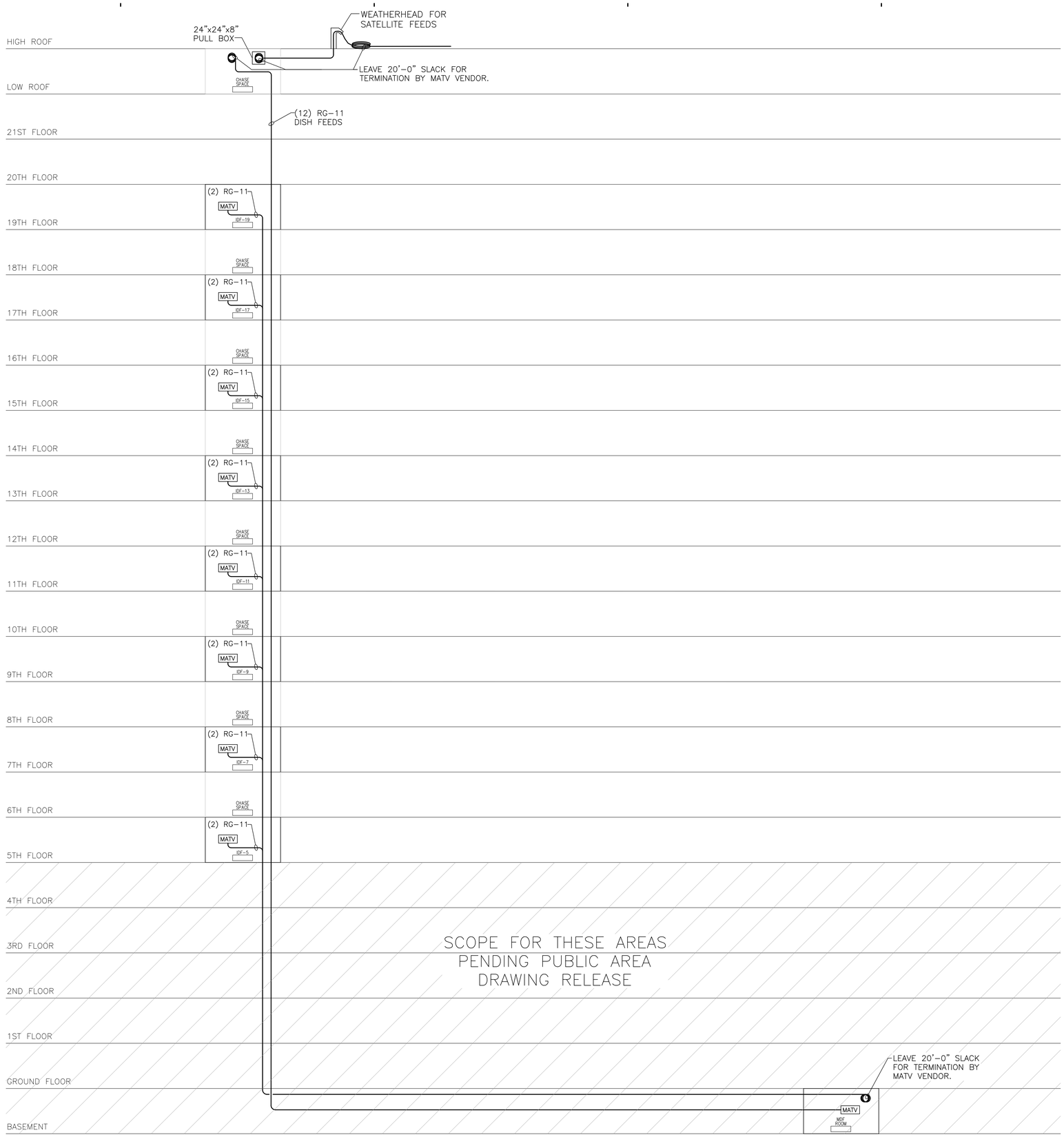

1 MATV CABLING RISER DIAGRAM - STRUCTURED CABLING SYSTEM/SECURITY

DV9.03 NOT TO SCALE

LEGEND

MATV — MATV DISTRIBUTION COMPONENTS

NOTES

1) HOMERUN ALL RISER CABLES TO MDF ROOM.
2) QUOTE DEDUCT ALTERNATE FOR COAXIAL RISERS FOR GUESTROOM LEVELS.

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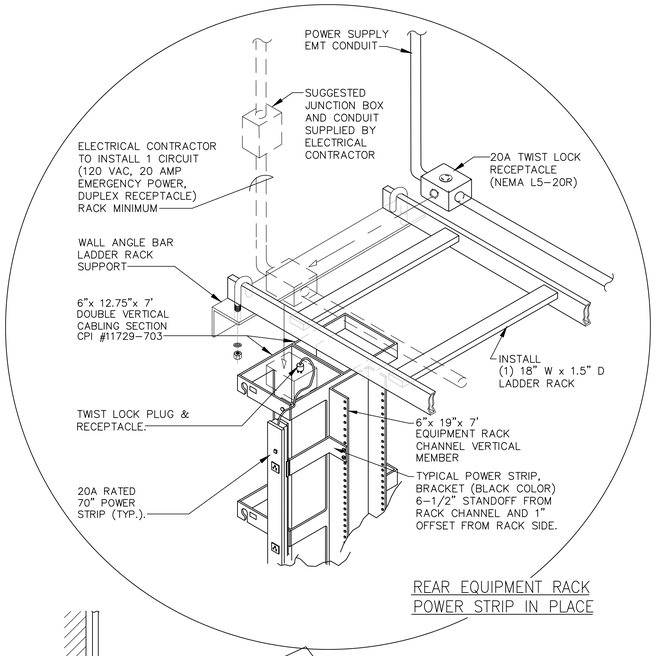
MATV Cabling Riser Diagram

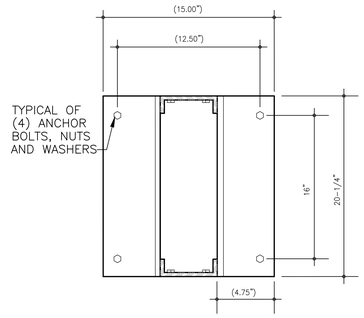
DV9.03

NTI JOB NO. 19-7510

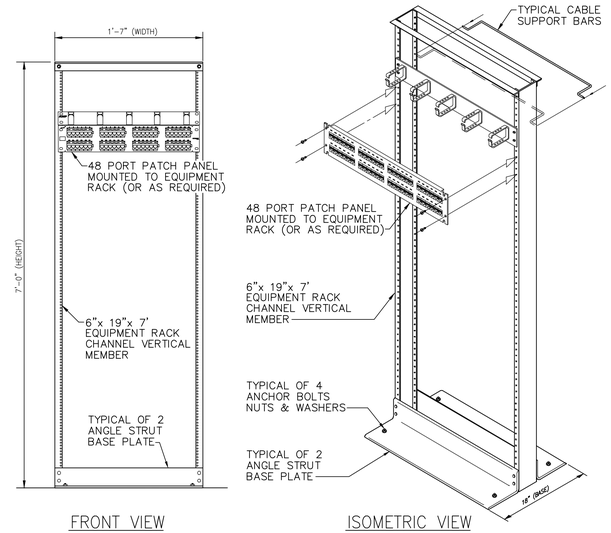
USER: BNORMAN PLOTTED: 8/8/2020 - 3:17 PM N:\2019\19-7510 embassy suites - kansas city\DV\DV9.03.dwg LAYOUT: DV9.03



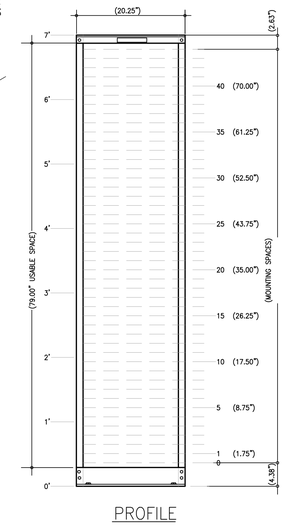
REAR EQUIPMENT RACK POWER STRIP IN PLACE



TOP VIEW

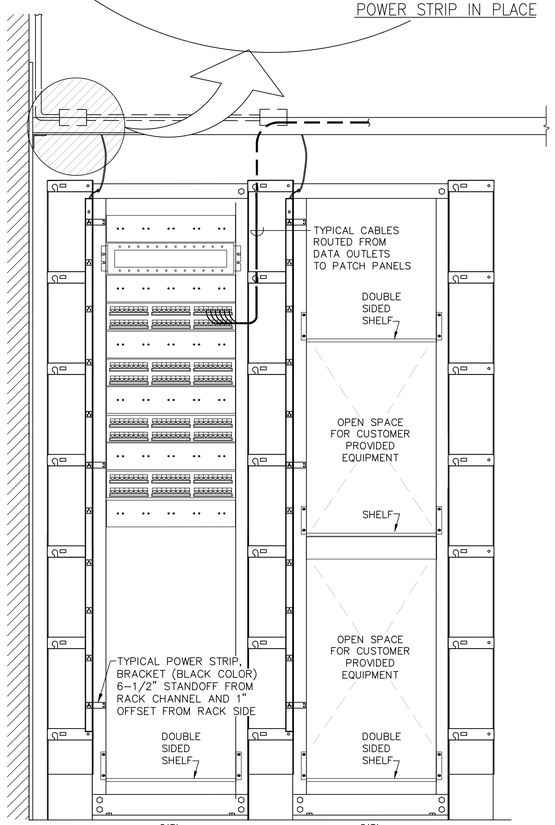


FRONT VIEW ISOMETRIC VIEW

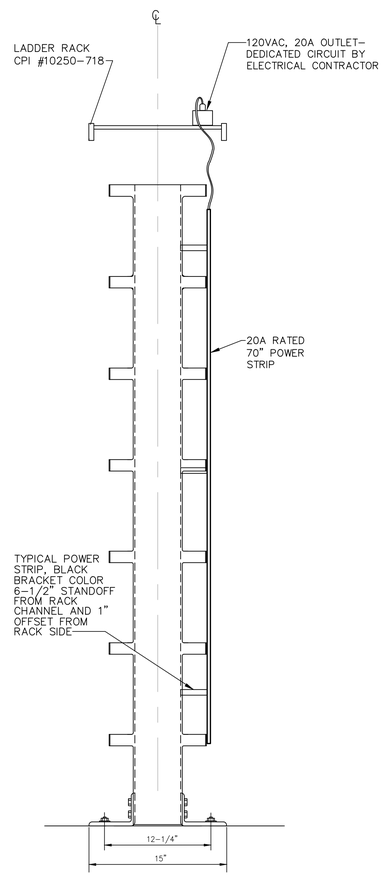


PROFILE

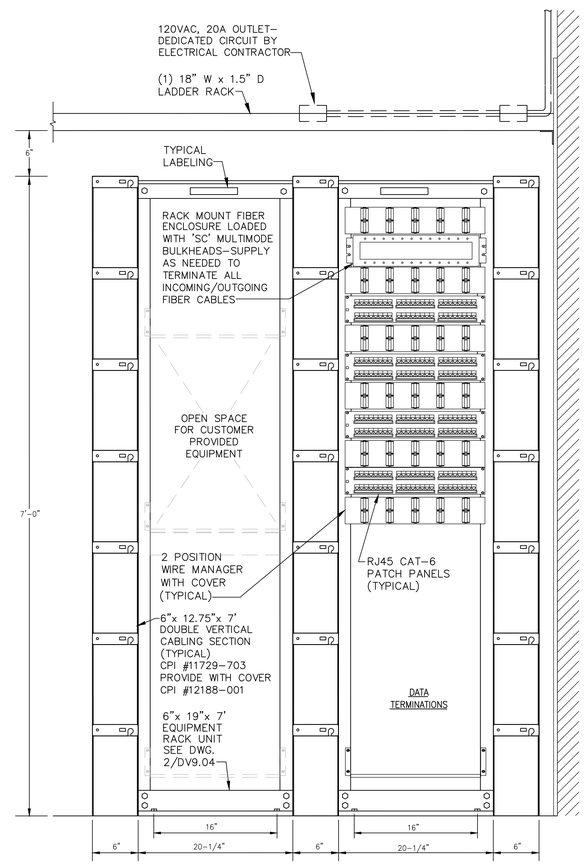
2	EQUIPMENT RACK ELEVATIONS - SPECIAL SYSTEMS
DV9.04	NOT TO SCALE



REAR RACK & PANEL VIEW



SECTION RACK & PANEL VIEW



FRONT RACK & PANEL VIEW

SHEET NOTES :
1.) BRAND AND MODELS SHOWN ARE FOR REFERENCE ONLY. CONTRACTOR MAY PROVIDE EQUIVALENT PRODUCTS, COMPONENTS AND SYSTEMS.
2.) SHOWN FOR REFERENCE TO DEMONSTRATE EQUIPMENT RACK BUILD OUT IN EQUIPMENT ROOMS. COMPONENTS AND SYSTEMS.

1	EQUIPMENT RACK DETAIL - STRUCTURED CABLING SYSTEM/SECURITY
DV9.04	NOT TO SCALE

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Delta Quad Holdings, LLC
Owner

Rau Construction Co.
Construction Manager
9101 West 110th Street, Suite 150
Overland Park, Kansas 66210
Phone: (913) 642-6000
Website: www.website.com

Lawson Elser, Inc.
Structural Engineer
650 East Carmel Drive, Suite 150
Carmel, Indiana 46032
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Website: www.lawsonelser.com

Hoss & Brown Engineers, Inc.
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Website: www.h-be.com

SK Design Group, Inc.
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4600 College Boulevard, Suite 100
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Phone: (913) 451-1818
Website: www.skdesigngroup.net

Matchline Design Group, LLC
Interior Design
10300 North Central Expressway, Suite 335
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CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: MJSessum
Checked By: JCook
Scale: See Drawing
Issue Date: August 06, 2019

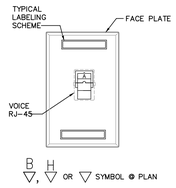
REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Equipment Rack Details

DV9.04

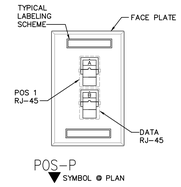
NTI JOB NO. 19-7510

USER: BNORMAN PLOTTED: 9/8/2020 - 3:17 PM N:\2019\19-7510 embassy suites - kansas city\DV\DV9.04.dwg LAYOUT: DV9.04



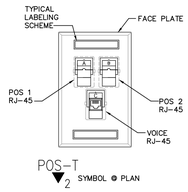
NOTE:
TO BE CABLED WITH (1) CAT-6, (4) PAIR CABLE. HOUSE PHONE OUTLETS MOUNTED AT 48"AFF OR HIGHER SHALL USE STAINLESS STEEL WALL MOUNT COVER PLATE.

1	1-POSITION VOICE OUTLET
DV9.05	NOT TO SCALE



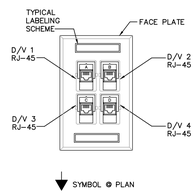
NOTE:
TO BE CABLED WITH (2) 4 PAIR, CAT-6 UTP CABLES.

2	POINT OF SALE (POS) PRINTER OUTLET
DV9.05	NOT TO SCALE



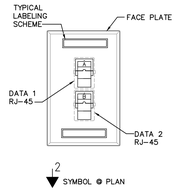
NOTE:
TO BE CABLED WITH (2) 4 PAIR, CAT-6 UTP CABLES. TERMINATE AT IDF ON PATCH PANEL.

3	POINT OF SALE (POS) TERMINAL OUTLET
DV9.05	NOT TO SCALE



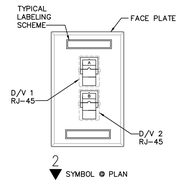
NOTE :
TO BE CABLED WITH (4) CAT-6, (4) PAIR, UTP CABLES. ONE CABLE FOR EACH MULTI-USE JACK. ALL CABLE TO TERMINATE ON TO PATCH PANEL IN DESIGNATED IDF.

4	4 POSITION DATA OUTLET – ADMIN.
DV9.05	NOT TO SCALE



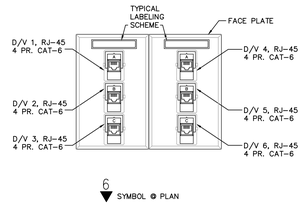
NOTE:
TO BE CABLED WITH (2) CAT-6, (4) PAIR, UTP CABLES. ONE CABLE FOR EACH JACK. TERMINATE ON PATCH PANELS.

5	2 POSITION DATA OUTLET – ADMIN.
DV9.05	NOT TO SCALE



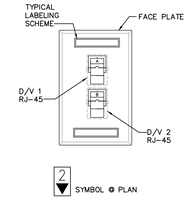
NOTE:
TO BE CABLED WITH (2) CAT-6, (4) PAIR, UTP CABLES. ONE CABLE PER JACK. TERMINATE ON PATCH PANEL. REFER TO 12/DV9.05 FOR PATCHING REQUIREMENTS.

6	2-POSITION DATA/VOICE MULTI-USE OUTLET
DV9.05	NOT TO SCALE



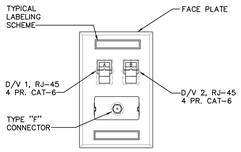
NOTE:
TO BE CABLED WITH (6) 4 PAIR CAT-6 CABLES.

6A	6-POSITION DATA/VOICE MULTI-USE OUTLET
DV9.05	NOT TO SCALE



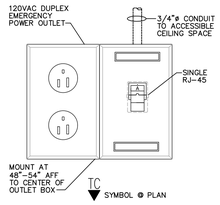
NOTE:
TO BE CABLED WITH (2) CAT-6, (4) PAIR, UTP CABLES. ONE CABLE PER JACK. TERMINATE ON PATCH PANEL.

7	DATA/VOICE MULTI-USE FLOOR OUTLET
DV9.05	NOT TO SCALE



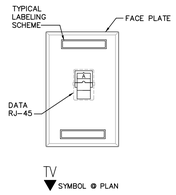
NOTE:
TO BE CABLED WITH (2) 4 PAIR CAT-6 CABLES AND (1) RG-6/RG-11 CABLE.

8	MULTI-USE DATA/TV OUTLET
DV9.05	NOT TO SCALE



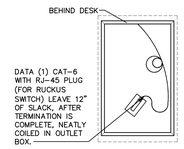
NOTE:
MOUNT IN COMMON DOUBLE GANG BACK BOX WITH SEPERATOR BETWEEN DATA AND POWER. HOMERUN CAT-6 CABLE TO LOCAL IDF.

9	TIMECLOCK OUTLET
DV9.05	NOT TO SCALE



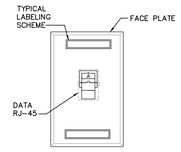
NOTE:
TO BE CABLED WITH (1) CAT-6, (4) PAIR, UTP CABLES. HOMERUN TO DIGITAL SIGNAGE HEADEND.

9A	TV OUTLET
DV9.05	NOT TO SCALE



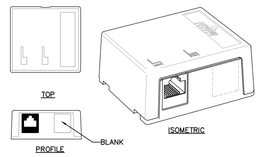
NOTE:
TO BE CABLED WITH (1) CAT-6, (4) PAIR, UTP CABLE. TERMINATE WITH PLUG AT OUTLET END AND ONTO PATCH PANEL AT IDF END.

10	DESK OUTLET
DV9.05	NOT TO SCALE



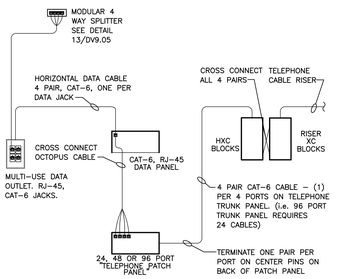
NOTE:
TO BE CABLED WITH (1) CAT-6, (4) PAIR, UTP CABLES. HOMERUN TO DIGITAL SIGNAGE HEADEND.

11	DIGITAL SIGNAGE OUTLET
DV9.05	NOT TO SCALE

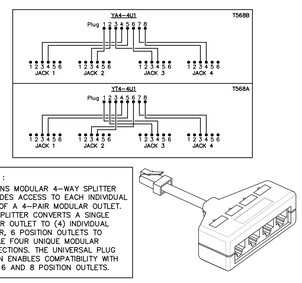


NOTE:
(1) 4 PAIR, CAT-6 CABLE. HOMERUN TO THE RESPECTIVE IDF. TERMINATE AT CLOSET ON TO PATCH PANEL. GROUP ALL WIRELESS NODES TOGETHER ON THE PATCH PANEL.

11A	WIRELESS NODE OR ZIGBEE HUB OUTLET
DV9.05	NOT TO SCALE

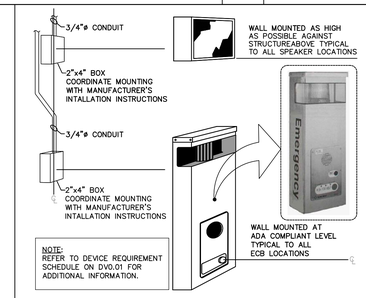


12	TELEPHONE DIALTONE PATCHING SYSTEM
DV9.05	NOT TO SCALE



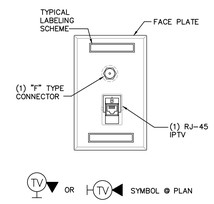
NOTE :
SIEMONS MODULAR 4-WAY SPLITTER PROVIDES ACCESS TO EACH INDIVIDUAL PAIR OF A 4-PAIR MODULAR OUTLET. THE SPLITTER CONVERTS A SINGLE 4-PAIR OUTLET TO (4) INDIVIDUAL 1-PAIR, 6 POSITION OUTLETS TO ENABLE FOUR UNIQUE MODULAR CONNECTIONS. THE UNIVERSAL PLUG DESIGN ENABLES COMPATIBILITY WITH BOTH 6 AND 8 POSITION OUTLETS.

13	SIEMONS MODULAR 4-WAY SPLITTER
DV9.05	NOT TO SCALE



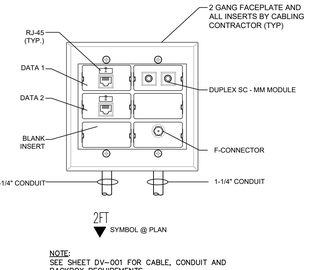
NOTE:
REFER TO DEVICE REQUIREMENT SCHEDULE ON DV0.01 FOR ADDITIONAL INFORMATION.

14	EMERGENCY CALL BOX OUTLET
DV9.05	NOT TO SCALE



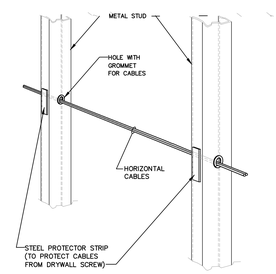
NOTE:
TO BE CABLED WITH (1) RG-6 CABLE AND (1) CAT-6 CABLE HOMERUN TO IDF.

15	COAX/IPTV OUTLET
DV9.05	NOT TO SCALE

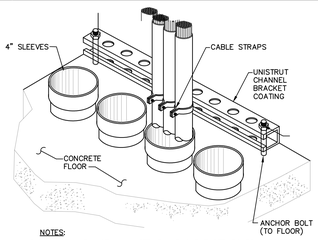


NOTE:
SEE SHEET DV-001 FOR CABLE, CONDUIT AND BACKBOX REQUIREMENTS.

16	2 PORT DATA, TV, FIBER OUTLET
DV9.05	NOT TO SCALE

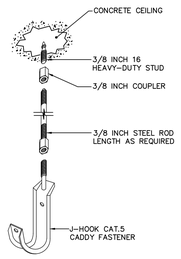


17	STUD OPENINGS DETAIL
DV9.05	NOT TO SCALE

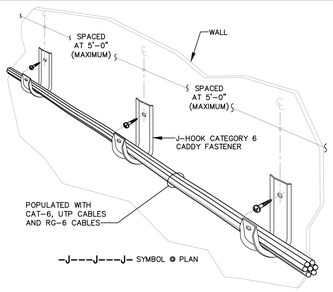


NOTES:
1.) PROVIDE AND INSTALL UNISTRUT AND CABLE STRAPS TO SUPPORT RISER CABLES.
2.) ALTERNATE LAYOUT :
USE OPEN SLAB BLOCK-OUT WITH FIRE-STOP PILLOWS USE VERTICALLY INSTALLED CABLE TRAY TO SUPPORT CABLES.

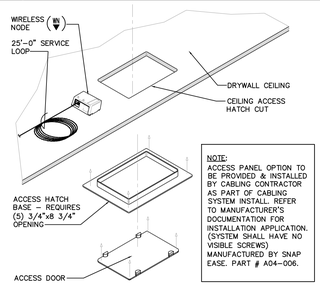
18	UNISTRUT CHANNEL BRACKET
DV9.05	NOT TO SCALE



19	WORKSTATION CABLE SUPPORT
DV9.05	NOT TO SCALE

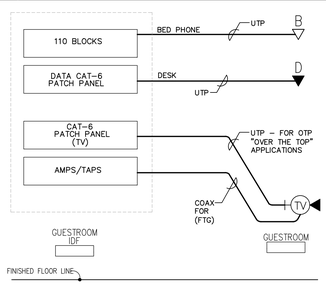


20	J-HOOK CABLE SUPPORT (WALL MOUNTED)
DV9.05	NOT TO SCALE

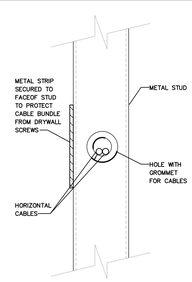


NOTE:
ACCESS PANEL OPTION TO BE PROVIDED & INSTALLED BY CABLING CONTRACTOR AS PART OF CABLING SYSTEM INSTALL. REFER TO MANUFACTURER'S DOCUMENTATION FOR INSTALLATION APPLICATION. (SYSTEM SHALL HAVE NO VISIBLE SCREWS) MANUFACTURED BY SNAP EASE. PART # A04-006.

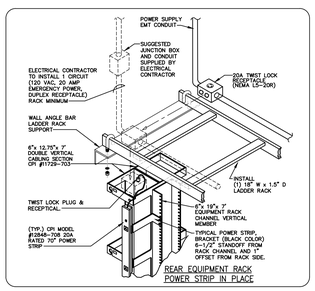
21	ACCESS PANEL
DV9.05	NOT TO SCALE

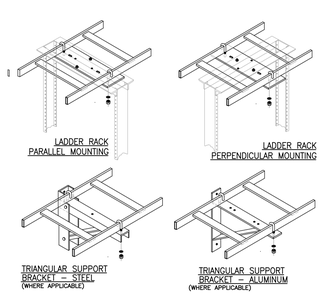


22	GUESTROOM VOICE/DATA CABLING SCHEMATIC
DV9.05	NOT TO SCALE (IF VoIP IS USED)

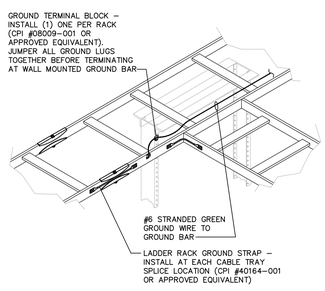


23	STUD OPENING
DV9.05	NOT TO SCALE

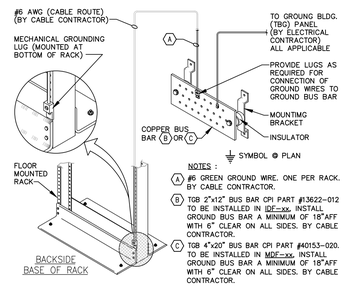




24	LADDER RACK DETAILS
DV9.05	NOT TO SCALE

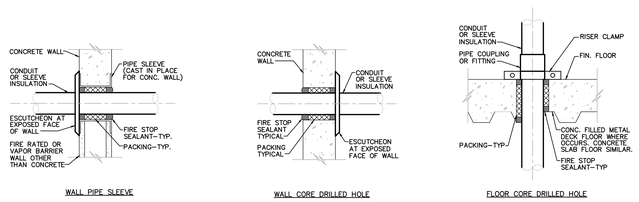


25	LADDER RACK GROUNDING DETAIL
DV9.05	NOT TO SCALE



NOTES :
(A) #6 GREEN GROUND WIRE. ONE PER RACK. BY CABLE CONTRACTOR.
(B) TGB 2"x12" BUS BAR CPI PART #13622-012 TO BE INSTALLED IN IDF-xx. INSTALL GROUND BUS BAR A MINIMUM OF 18"AFF WITH 6" CLEAR ON ALL SIDES. BY CABLE CONTRACTOR.
(C) TGB 4"x20" BUS BAR CPI PART #40153-020. TO BE INSTALLED IN MDF-xx. INSTALL GROUND BUS BAR A MINIMUM OF 18"AFF WITH 6" CLEAR ON ALL SIDES. BY CABLE CONTRACTOR.

26	GROUNDING BUS BAR DETAIL
DV9.05	NOT TO SCALE



27	CONDUIT OR SLEEVE PENETRATION THRU WALL AND FLOOR
DV9.05	NOT TO SCALE

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JEFF A COOK
BICSI ID# 102331
EXPIRES 12-31-21
RCDD

CERTIFICATION

FOR CONSTRUCTION

The Grand Reserve

925 Grand Boulevard
Kansas City, MO 64198

Project No.: 18A023
Drawn By: MJSessum
Checked By: JCook
Scale: See Drawing
Issue Date: August 06, 2019

REVISION SCHEDULE		
Rev. #	Revision Description	Issue Date

Installation Details

DV9.05

NTI JOB NO. 19-7510

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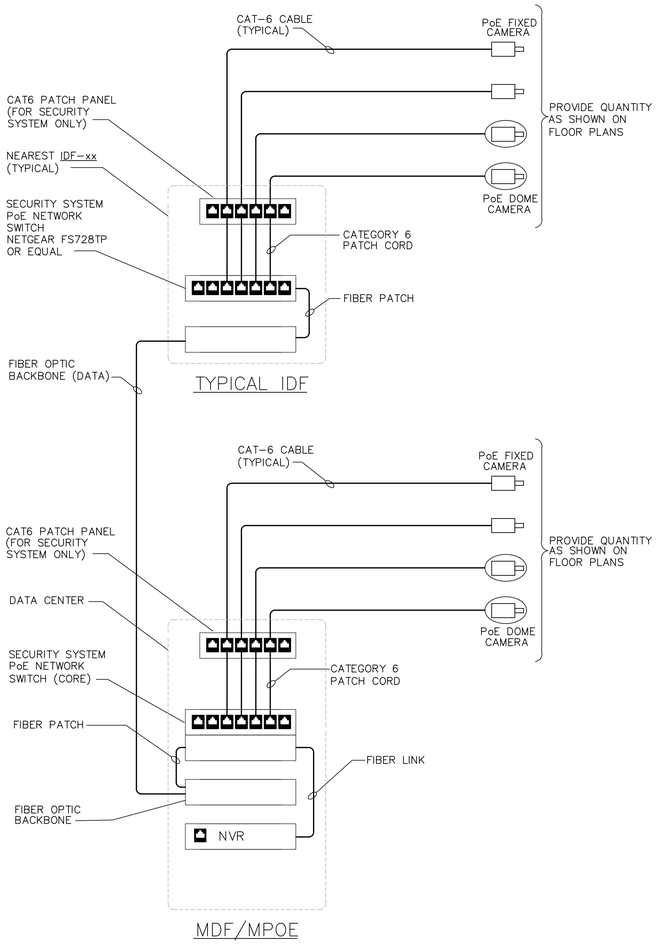
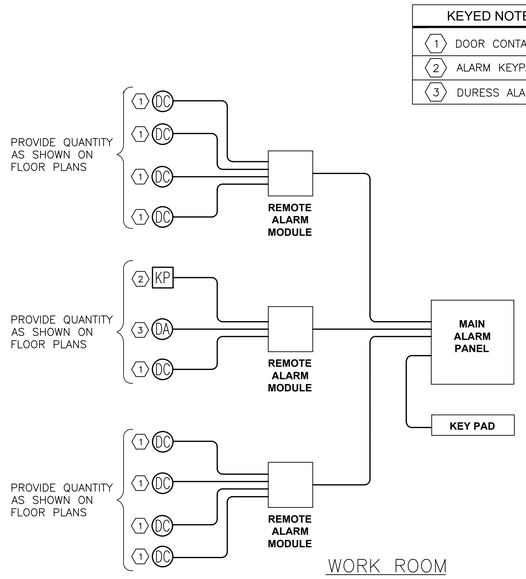


1 CCTV SCHEMATIC DIAGRAM
DV9.06 NOT TO SCALE



2 ALARM SYSTEM RISER DIAGRAM/SECURITY DETAIL
DV9.06 NOT TO SCALE

INTRUSION DETECTION SYSTEM

1.) INTRUSION DETECTION AND HOLDUP/DURESS ALARM PANELS AND KEYPADS SHALL BE LOCATED AS SHOWN ON THE FLOOR PLANS.

2.) ALARM ANNUNCIATION SHALL OCCUR AT THE CENTRAL MONITORING STATION IN THE WORKROOM AND SHALL PROVIDE AUDIBLE AND VISUAL INDICATION OF ACTIVATION OF DOOR CONTACT ALARMS.

3.) ALL CABLING TO AND FROM CONTACTS SHALL BE CONCEALED WITHIN WALLS AND ACCESSIBLE ACCESSIBLE CEILING SPACES. PLENUM RATED CABLE SHALL BE USED THROUGHOUT.

4.) ALL FIRE RATED WALL AND FLOOR PENETRATIONS SHALL BE FIRE STOPPED PER LOCAL CODES AND ORDINANCES.

5.) UPON RECEIPT OF A DOOR CONTACT VIOLATION THE SYSTEM SHALL:
A) ACTIVATE AN AUDIBLE ALARM AT THE MAIN ALARM CONTROL PANEL.
B) PROVIDE LOCATION INFORMATION ON LCD DISPLAYS.
C) ENTER THE EVENT IN THE ALARM LOG WITH TIME AND DATE STAMP.

6.) AN ALARM CONDITION SHALL BE ACKNOWLEDGED PRIOR TO CLEARING THE ALARM. THIS SHALL BE ACCOMPLISHED AT EITHER KEYPAD LOCATION.

7.) THE AUDIBLE ALARM AT THE MAIN CONTROL PANEL SHALL BE CAPABLE OF SILENCING PRIOR TO ACKNOWLEDGMENT.

8.) THE INTRUSION DETECTION SYSTEM SHALL HAVE FOLLOWING CAPABILITIES:

GENERAL FUNCTIONS
A) OPERATOR SECURITY LEVELS TO RESTRICT ACCESS TO CERTAIN INFORMATION AND CONTROL FUNCTIONS.
B) REMOTE/OFFSITE MONITORING CAPABILITY.
C) MANUAL OVERRIDE OF CONTACTS.
D) DOOR CONTACT TIME-OF-DAY SCHEDULE FOR ACTIVATION/ DEACTIVATION.

ALARMS
A) ALARM LOG WITH SUMMARY REPORTS. INCLUDES FILTERING AND SORTING OPTIONS.
B) AUDIBLE TONES AT WORKSTATION IN THE EVENT OF AN ALARM.
C) USER-DEFINED ALARMS AND ALARM PRIORITIES.
D) DOOR OPEN FOR DEFINED PERIOD OF TIME (ADJUSTABLE) – ALL OR SELECTED SET OF DOORS.

REPORTS

A) AUTOMATIC REPORT GENERATION FOR PRINTING AND DISPLAYING ON MONITOR.
A) ALARM EVENT – SEARCH AND QUERY THE ALARM LOG.
B) ALARM DURATION – INDICATES LENGTH OF TIME A GIVEN EVENT HAS BEEN IN ALARM.

9.) THE HOLDUP ALARM SYSTEM SHALL CONSIST OF ALARM SWITCHES CONNECTED TO AUDIBLE AND VISUAL ANNUNCIATORS/KEYPADS IN:
A) WORKROOM
B) BEHIND FRONT DESK

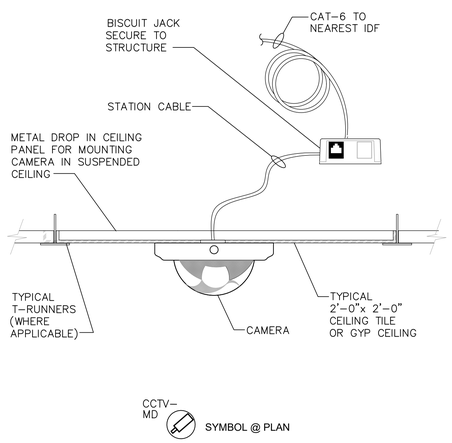
SYSTEM SHOULD AUTOMATICALLY NOTIFY POLICE OR 24 HR SECURITY MONITORING 3RD PARTY COMPANY UPON TRIGGERING OF HOLDUP ALARMS.

10.) TRAINING: PROVIDE INSTRUCTORS EXPERIENCED IN OPERATION AND MAINTENANCE PROCEDURES. PROVIDE INSTRUCTION AT MUTUALLY AGREED-ON TIMES. FOR EQUIPMENT THAT REQUIRES SEASONAL OPERATION, PROVIDE SIMILAR INSTRUCTION AT THE START OF EACH SEASON. SCHEDULE TRAINING WITH OWNER, THROUGH GENERAL CONTRACTOR WITH AT LEAST SEVEN DAYS ADVANCED NOTICE. PROVIDE NOTIFICATION OF DATES, TIMES, LENGTH OF INSTRUCTION, AND COURSE CONTENT. CONTENT SHALL INCLUDE SYSTEM DESIGN AND OPERATIONAL PHILOSOPHY, REVIEW OF SYSTEM DOCUMENTATION, OPERATIONS, ADJUSTMENTS, TROUBLESHOOTING, MAINTENANCE, AND REPAIR.

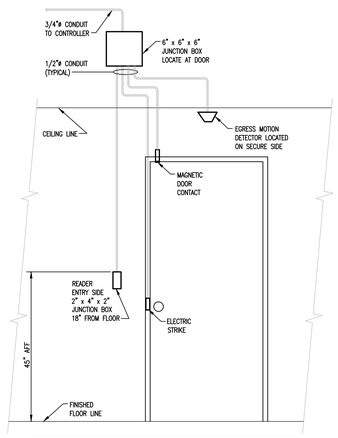
11.) INTRUSION DETECTION SYSTEM CONTRACTOR IS RESPONSIBLE FOR ALL NECESSARY CONNECTORS, CABLING, HARDWARE MODULES, ACCESSORIES, SOFTWARE, INITIAL PROGRAMMING, AND TRAINING REQUIRED FOR A COMPLETE AND OPERATIONAL INTRUSION DETECTION SYSTEM.

CCTV/ALARM SYSTEM COMPONENT SCHEDULE

DESCRIPTION	MANUFACTURER	PART NUMBER
VIDEO MANAGEMENT SOFTWARE	AXIS	CAMERA STATION
NVR, 32-CH, 16TB	AXIS	S1032(QUANTITY AS REQUIRED)
WORK STATION/ TERMINAL	AXIS	S9002
HIGH RESOLUTION COLOR MONITORS	SAMSUNG	27"(ITEMIZE PRICE FOR ADDITIONAL MONITORS)
CAMERAS-FIXED INDOOR MINI DOME	AXIS	M3045-V
CAMERAS – OUTDOOR – FIXED	AXIS	M3025-VE
POE NETWORK SWITCH	AXIS	T8516
SURGE PROTECTION	AXIS	T8061

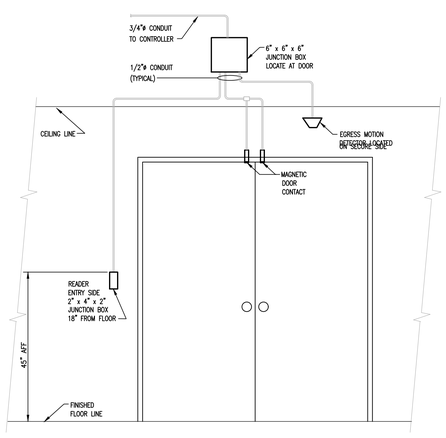


3 CCTV CAMERA DETAIL
DV9.06 NOT TO SCALE



NOTE :
FOR REFERENCE ONLY. REFER TO DOOR HARDWARE SCHEDULE FOR MORE INFORMATION. FOR MEANS OF EGRESS DOORS IN THE DIRECTION OF EGRESS CONNECT TO FIRE ALARM SYSTEM FOR RELEASE UPON ACTIVATION.

4 SINGLE DOOR CONDUIT ELEVATION
DV9.06 NOT TO SCALE



NOTE :
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5 DOUBLE DOOR CONDUIT ELEVATION
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CCTV INSTALLATION

1.) PROVIDE SHOP DRAWINGS PRIOR ANY INSTALLATION OR PURCHASE ACTIVITIES. COMPONENT SPECIFICATION SCHEDULE ABOVE IS INCLUDED FOR REFERENCE. ALTERNATE SOLUTIONS OR MANUFACTURES PRODUCTS MAY BE PROPOSED. CUT SHEETS MUST BE SUBMITTED FOR ALL PRODUCTS PROPOSED, PRIOR TO PURCHASING ANY EQUIPMENT. SUBMIT A COMPLETE NETWORK DIAGRAM DEPICTING ALL CAMERAS, NETWORK SWITCHES, ETC., ALL COMPONENTS OF THE NETWORK FOR REVIEW AND APPROVAL BY NTI. NETWORK DIAGRAM SHOULD INCLUDE ALL LABELING INFORMATION FOR CAMERAS AND INFORMATION REGARDING IP ADDRESSING AND LICENSING REQUIREMENTS.
2.) INSTALLER TO PROVIDE AND INSTALL ALL COMPONENTS FOR COMPLETE SYSTEM, INCLUDING ALL CABLING, TRANSCEIVERS, PATCH PANELS, NETWORK SWITCHES, CAMERAS, RECORDERS, VIDEO STORAGE AND VIDEO MANAGEMENT SOFTWARE.
3.) CCTV SYSTEM TO HAVE COMPLETE SEPARATE DEDICATED NETWORK. ALL NETWORK EDGE SWITCHES AND CORE SWITCH TO BE PROVIDED AND INSTALLED AS PART OF SYSTEM, AND SHALL BE POWERED VIA UPS UNITS.
4.) CAMERAS TO BE CONFIGURED TO RECORD ON MOTION – RECORD AT MINIMUM OF 15FPS AND MINIMUM RESOLUTION OF 20IR-704X240 NTSC. PROVIDE STORAGE CAPACITY FOR MINIMUM OF 30 DAYS OF VIDEO.
5.) VIDEO MANAGEMENT SOFTWARE MUST INCLUDE "SMART PHONE" VIEWER APP CAPABILITY TO ALLOW FOR PASSWORD PROTECTED REMOTE VIEWING OF CAMERAS AND PLAYBACK OF RECORDED VIDEO VIA SMART PHONES & TABLETS. (IOS AND ANDROID COMPATIBLE).
6.) PROVIDE A MINIMUM OF (2) HIGH RES MONITORS IN SECURITY ROOM OR WORK ROOM. CONFIGURE TO PROVIDE OVERALL VIEWING AND "POP UP" IMAGES TRIGGERED BY MOTION DETECTION.

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Security Installation Details

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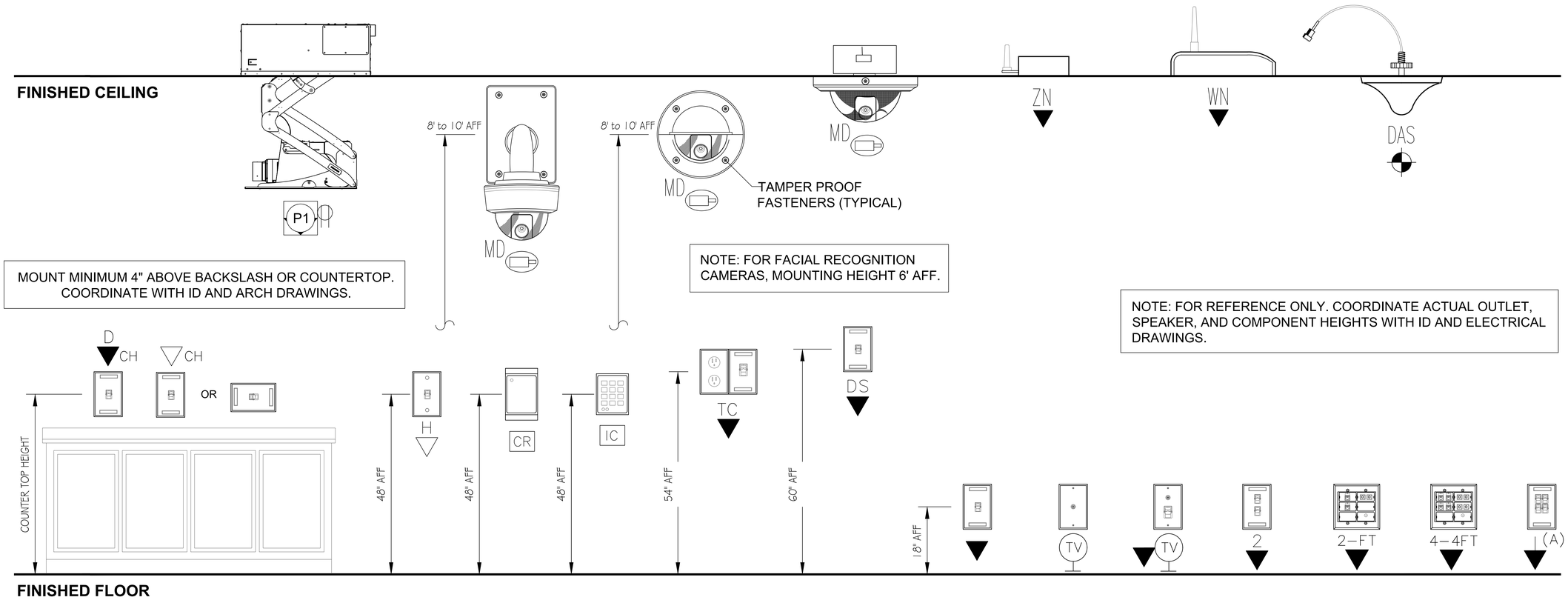

1 TYPICAL COMPONENT ELEVATIONS
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Typical Component Elevations

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