

**Meridian Airport Authority, Dean Aircraft Services
Hangar Additions & Alterations**

ADDENDUM NO. 4

TO: All Bidders on the Above Referenced Product
FROM: Davis Purdy Architects, PLLC
DATE: March 17, 2020
SUBJECT: **ADDENDUM NO. 4**

ACKNOWLEDGEMENT OF RECEIPT OF ADDENDUM IS REQUIRED ON BID FORM.

Clarifications and revisions to Contract Documents for the referenced project are as follows:

- 1. CLARIFICATION:** Pollution coverage should be One Million Dollars (\$1,000,000.00) in lieu of previously stated Five Million Dollars (\$5,000,000.00). Business interruption is to cover the Meridian Airport Authority, should the construction activities damage and limit use of the existing building. Should there be a problem obtaining any of the insurance coverage contractors should state what coverage is not included in bid.
- 2. CLARIFICATION:** Alternate no. 6. – Alternate Pipe Rail design to match design for Pipe Rail in Stair No. 2.
- 3. CLARIFICATION:** PEMB Standing-Seam Metal Roof Panels shall be as follows: 18 inchwide panel with a nominal thickness of 24 gauge. All roof metal panels **MUST** be fabricated to be continuous and full length of roof with **NO EXCEPTIONS**. On-site fabrication may be required to achieve full length panels.
- 4. CLARIFICATION:** Stair No. 1 & Stair No. 2. - All sight exposed welds to be ground smooth, primed and painted. There are no AESS (Architecturally Exposed Structural Steel) requirements.

5. **CLARIFICATION:** The item listed as *Unit-Price No. 6: Inlets with Frame and Grate* is the new cast-in-place inlet shown in the apron area on C-105 and does not include any pipe
6. **CLARIFICATION:** Flooring in Shop Office 1 (Room 114) and Shop Office 2 (Room 118) to be Carpet 1. Flooring in Storage Room (Room 116) and Men's Restroom (Room 113) to be Epoxy Coated Concrete.
7. **CLARIFICATION:** Addendum No. 9. – Exit Signs in Base Bid, Alternate 1, Alternate 2, and Alternate 3 are to be considered.
8. **CLARIFICATION:** The Door Hardware allowance is intended to include the Store-front and Monolithic Glass door hardware
9. **CLARIFICATION:** There are no intumescent painted beams.

GENERAL MECH/PLUMBING CLARIFICATIONS

10. **CLARIFICATION:** All fire protection plans are for reference only. All requirements needed for a full functioning system in accordance with NFPA 11, NFPA 13 and NFPA 409, current editions, shall be provided and installed by the fire protection contractor. This includes any items not shown on the plans, i.e. tanks sizes, piping sizes, outside air, interlocks, heat detectors, valves, alarms, etc. Plans and calculations are to be stamped by a Fire Protection Engineer and submitted for review. If anything is required per the Fire Protection Engineers stamped drawings it is to be provided and installed by the Fire Protection Contractor.
11. **CLARIFICATION:** Testing for the foam system is to be per NFPA 409, latest edition, and per specifications added in all addendum.
12. **CLARIFICATION:** All preparation and cleaning for testing the hanger foam system is to be done by the fire protection contractor. Foam used for the test is to be vacuumed and disposed of off site by the fire protection contractor.
13. **CLARIFICATION:** All piping in the existing pump house is to be replaced for the new pumps (750 gpm to 1,500 gpm) as calculated and designed by stamped drawings from Fire Protection Engineer.
14. **CLARIFICATION:** All items for the foam releasing system, detectors at the roof, manual pull stations, alarms, etc. that are required for the foam releasing system shall be provided and installed by the fire protection contractor. Coordination with the fire alarm contractor is encouraged to ensure all items are installed by properly li-

censed contractors. If there are any gaps in the scope the fire protection contractor is responsible to ensure all items are covered.

- 15. CLARIFICATION:** Locations of all remote panels will be coordinated after award.
- 16. CLARIFICATION:** Owner has right of refusal of all demolished items. All demolished equipment to be turned over to owner.
- 17. CLARIFICATION:** The time being allowed between the demo of the existing system and the new system coming online will be coordinated during construction (after award). The goal is to ensure the shortest downtime possible.
- 18. CLARIFICATION:** A reserve tank for foam was added in addendum 2. Provide and install a reserve tank for the foam system with reserve foam to comply with NFPA 11 and NFPA 409 latest edition.
- 19. CLARIFICATION:** All units (HVLS Fans, Air Turnover Units, etc.) in Hanger to be shutdown upon fire protection system activation. Fire protection contractor shall provide and install all interlocks required to shutdown all units.
- 20. CLARIFICATION:** New storage tanks and concrete pads are to match existing and to be provided and installed under this contract.
- 21. CLARIFICATION:** All exposed fire protection piping, elbows and all accessories to be painted RED.
- 22. CLARIFICATION:** Existing GST electronic fill line water level sensing system to be replaced with new system. New system to match existing type.
- 23. CLARIFICATION:** Waste piping from Parts Wash and trench drain in hanger to oil/water separator to be equal to Spears lab waste piping.

GENERAL ELECTRICAL CLARIFICATIONS

- 24. CLARIFICATION:** All LED lighting shall be 5,000K
- 25. CLARIFICATION:** Switchboard breakers shall not require ground fault protection.
- 26. CLARIFICATION:** Minimize roof penetrations for lightning protection system.

SPECIFICATIONS

- 27. REPLACE:** Replace Specification section **00 41 13 – Bid Form** dated 2/28/20 with new Specification Section 00 41 13 – Bid Form dated 3/17/20. The following portion of Specification Section 00 41 13 has been modified:
 - a. 1.6 ACKNOWLEDGEMENT OF ADDENDA**
Specification Section 00 41 13 – Bid Form is attached.

- 28. CLARIFICATION:** Specification section **00 43 73 – Proposed Schedule of Values Form** indicates that the proposed schedule of values is required to be submitted with Bid Form. The Proposed Schedule of Values shall be submitted not later than 24 hrs. after bid opening.
- 29. ADD:** Add the following to specification section **04 26 13 – Masonry Veneer, Part 2 – Products, 2.2 Brick, B. Clay Faced Brick:** Add
8. Manufacturers: Subject to compliance requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Cherokee Brick
 - b. Columbus Brick
 - c. Henry Brick Co.
 - d. Meridian Brick
- 30. CLARIFICATION:** All Type 2 Ceiling Grids on First Floor to be 15/16 with Square Edge Tiles. All Type 2 Ceiling Grids on Second Floor to be 9/16 with Tegular Edge Tiles. All Wet Area Ceilings Grids to be 15/16 with Square edge tiles.
- 31. ADD:** add the following to specification section **09 51 23 – Acoustical Tile Ceilings, Part 2 – Products, 2.5 Acoustical Tiles: Type 2:**
- G. Edge/Joint Detail: Beveled Tegular
- 32. REPLACE:** Replace the following from specification section **09 51 23 – Acoustical Tile Ceilings, Part 2 – Products, 2.6 Metal Suspension System:**
- “for types 1, 2, and wet area ceiling tiles” with: “for all Type 1, and Type 2 on Second Floor only”
- 33. ADD:** add the following to specification section **09 51 23 – Acoustical Tile Ceilings, Part 2 – Products:**
- 2.7 Metal Suspension System for all wet area ceiling tiles, and Type 2 on First Floor only

A. Basis-of-Design Product: Subject to compliance with requirements, provide Prelude XL 15/16 by Armstrong World Industries, Inc. or comparable product by one of the following:

1. Armstrong World Industries, Inc.
2. CertainTeed Corporation
3. Chicago Metallic Corporation
4. United States Gypsum Company

B. Structural Classification: Heavy-duty System

C. Access: Upward

D. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

34. DELETE: Delete the following to specification section **12 48 13 – Entrance Floor Mats and Frames**. There are no entrance mats in this project.

35. ADD: Add specification section **21 13 20 – Foam Fire Extinguishing for Aircraft Hangars**. Specification section 21 13 20 is attached.

36. ADD: Add specification section **22 11 13 – Facility Water Distribution Piping**. Specification section 22 11 13 is attached.

DRAWINGS

37. MODIFY: Modify the following Electrical sheets dated 2/14/20 with the modifications indicated on same sheets dated 3/17/20. The following sheets are also attached.

a. E-000 ELECTRICAL LEGEND

- i. Modified fixture schedule

b. E-002 ELECTRICAL RENOVATION SITE PLAN

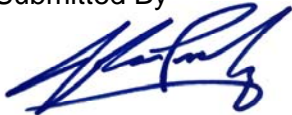
- i. Parking Lot Fixtures and Poles have been removed. Parking Lot Lights shall be mounted on the building as shown now.
- ii. Removed Timer

- c. E-101 PARTIAL LIGHTING PLAN 1ST FLOOR PART A**
 - i. Modified notes for exterior lighting controls, and added photocell to control exterior some exterior fixtures.
 - ii. Modified how hangar fixtures are controlled. Modified Contactor detail to reflect this change.
 - d. E-102 PARTIAL LIGHTING PLAN 1ST FLOOR PART B**
 - e. E-103 PARTIAL LIGHTING PLAN 2ND FLOOR PART D**
 - i. Modified exterior fixtures controls.
 - f. E-104 PARTIAL LIGHTING PLAN 2ND & 3RD FLOOR**
 - i. Modified exterior fixtures controls.
 - g. E-105 PARTIAL LIGHTING PLAN 3RD FLOOR**
 - i. Modified exterior fixtures controls.
 - h. E-202 PARTIAL POWER PLAN 1ST FLOOR PART B**
 - i. Modified Receptacle mounting heights.
 - ii. Added Data Devices.
 - iii. Added Data and Power to Stair 103 & Street Entrance 119.
 - iv. Added Addition Data and Power to New Parts 117.
 - i. E-204 PARTIAL POWER PLAN 2ND FLOOR PART D**
 - i. Added Data Devices.
 - j. E-205 PARTIAL POWER PLAN 2ND & 3RD – FLOOR PART D & E**
 - i. Added Data Devices.
 - ii. Modified Power and Data layout in Log Room 231.
 - k. E-301 PARTIAL AUXILIARY PLAN 1ST FLOOR PART A**
 - i. Added Fire Alarm Devices and notes describing the devices.
 - l. E-500 ELECTRICAL PANEL SCHEDULES**
 - i. Modified Panel Schedules.
 - m. E-501 ELECTRICAL PANEL SCHEDULES**
 - i. Modified Panel Schedules.
- 38. ADD:** Add the following Architectural sheets dated 3/17/20:
- a. AD4-410**
 - b. AD4-413**
 - c. A-003 LEVEL 01 FIRE RATING PLAN**

d. A-004 LEVEL 02 & 03 FIRE RATING PLAN

Sheets AD2-112, AD2-403, A-810, and A-811 are attached.

Submitted By



John L. Purdy, AIA

Davis Purdy Architects, PLLC

March 17, 2020

**ACKNOWLEDGEMENT OF RECEIPT OF THIS ADDENDUM IS
REQUIRED AND SHALL BE INDICATED ON BID FORM**

SECTION 00 41 13
BID FORM – STIPULATED SUM (SINGLE-PRIME CONTRACT)

00 41 13 BID FORM - STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.1 BID INFORMATION

- A. Bidder: _____.
- B. Project Name: MAA – Dean Aircraft Service Hangar Additions & Alterations
- C. Project Location: 2913 Highway 11 South, Meridian, MS 39307
- D. Owner: Meridian Airport Authority
- E. Architect: Davis Purdy Architects, PLLC
- F. Architect Project Number: 19-006

1.2 CERTIFICATIONS AND BASE BID

- A. Base Bid, Single-Prime (All Trades) Contract: The undersigned Bidder, having carefully examined the Procurement and Contracting Requirements, Conditions of the Contract, Drawings, Specifications, and all subsequent Addenda, as prepared by **Davis Purdy, Architects, PLLC** and Architect's consultants, having visited the site, and being familiar with all conditions and requirements of the Work, hereby agrees to furnish all material, labor, equipment and services, including all scheduled allowances, necessary to complete the construction of the above-named project, according to the requirements of the Procurement and Contracting Documents, for the stipulated sum of:

- 1. _____ Dollars
(\$ _____).
- 2. The above amount may be modified by amounts indicated by the Bidder on the attached Document 00 43 22 "Unit Prices Form" and Document 00 43 22 "Alternates Form."

1.3 BID GUARANTEE

- A. The undersigned Bidder agrees to execute a contract for this Work in the above amount and to furnish surety as specified within 10 days after a written Notice of Award, if offered within 60 days after receipt of bids, and on failure to do so agrees to forfeit to Owner the attached cash, cashier's check, certified check, U.S. money order, or bid bond, as liquidated damages for such failure, in the following amount constituting five percent (5%) of the Base Bid amount above:

- 1. _____ Dollars
(\$ _____).

SECTION 00 41 13

BID FORM – STIPULATED SUM (SINGLE-PRIME CONTRACT)

- B. In the event Owner does not offer Notice of Award within the time limits stated above, Owner will return to the undersigned the cash, cashier's check, certified check, U.S. money order, or bid bond.

1.4 SUBCONTRACTORS AND SUPPLIERS

- A. The following companies shall execute subcontracts for the portions of the Work indicated:

- 1. Site Work: _____.
- 2. Concrete Work: _____.
- 3. Steel Work: _____.
- 4. Metal Building Work: _____.
- 5. Miscellaneous Metal: _____.
- 6. Roofing Work: _____.
- 7. Plumbing Work: _____.
- 8. Mechanical Work: _____.
- 9. Electrical Work: _____.

1.5 TIME OF COMPLETION

- A. The undersigned Bidder proposes and agrees hereby to commence the Work of the Contract Documents on a date specified in a written Notice to Proceed to be issued by Architect and shall fully complete the Work within 16 months. The time is calculated by calendar days and does not include any weather delay days.

1.6 ACKNOWLEDGEMENT OF ADDENDA

- A. The undersigned Bidder acknowledges receipt of and use of the following Addenda in the preparation of this Bid:

- 1. Addendum No. 1, dated _____.
- 2. Addendum No. 2, dated _____.
- 3. Addendum No. 3, dated _____.
- 4. Addendum No. 4, dated _____.

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BID FORM – STIPULATED SUM (SINGLE-PRIME CONTRACT)

1.7 BID SUPPLEMENTS

- A. The following supplements are a part of this Bid Form and are attached hereto.
 - 1. Bid Form Supplement - Alternates.
 - 2. Bid Form Supplement - Unit Prices.
 - 3. Bid Form Supplement - Bid Bond Form (AIA Document A310).

1.8 CONTRACTOR'S LICENSE

- A. The undersigned further states that it is a duly licensed contractor, for the type of work proposed, in the state of Mississippi, and that all fees, permits, etc., pursuant to submitting this proposal have been paid in full.

1.9 SUBMISSION OF BID

- A. Respectfully submitted this ____ day of _____, 2020.
- B. Submitted By _____ (Name of bidding firm or corporation).
- C. Authorized Signature: _____ (Handwritten signature).
- D. Signed By: _____ (Type or print name).
- E. Title: _____ (Owner/Partner/President/Vice President).
- F. Witness By: _____ (Handwritten signature).
- G. Attest: _____ (Handwritten signature).
- H. By: _____ (Type or print name).
- I. Title: _____ (Corporate Secretary or Assistant Secretary).
- J. Street Address: _____.
- K. City, _____ State, _____
Zip _____.

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BID FORM – STIPULATED SUM (SINGLE-PRIME CONTRACT)

- L. Phone: _____
_____.
- M. License
No.: _____.
- N. Federal ID No.: _____ (Affix Corporate Seal
Here).

END OF SECTION 00 41 13

Section 22 13 20
FOAM WATER SYSTEMS

SECTION 211320 – FOAM WATER SYSTEMS

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. Concentrate piping and piping specialties.
 - 2. Bladder tanks and proportioning devices.
 - 3. Foam concentrate.
 - 4. Discharge devices.
 - 5. Monitoring and alarm devices.

1.3 RELATED WORK AND REQUIREMENTS

- A. All Division 21 sections.
- B. Section 230010 – Mechanical General Provisions.
- C. Division 26, Fire Alarm System Sections.

1.4 REFERENCE STANDARDS

- A. American Water Works Association (AWWA).
 - 1. AWWA C500, Metal-Seated Gate Valves for Water Supply Service
 - 2. AWWA C651, Standard for Disinfecting Water Mains
- B. American Society for Testing and Materials (ASTM).
 - 1.
 - 2. A53 Pipe, Steel, Black and Hot-Dipped, Zinc Coated.
 - 3. A135 Specification for Electric-Resistance-Welded Steel Pipe.
 - 4. A194 Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High-Temperature Service.
 - 5. A320 Specification for Alloy Steel Bolting Materials for Low-Temperature Service.
 - 6. A795 Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.

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7. B88 Seamless Copper Water Tube.
- C. American Water Works Association (AWWA).
1. DDC104 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 2. C110 Gray Iron and Ductile Iron Fittings.
 3. C111 Rubber Gasket Joints for Ductile-Iron and Grey-Iron Pressure: Pipe and Fittings.
 4. C151 Thickness of Ductile-Iron Pipe – Centrifugally Cast.
 5. C200 Steel Water Pipe 6” and larger.
 6. C500, Metal-Seated Gate Valves for Water Supply Service
 7. C503 Wet-Barrel Fire Hydrants.
 8. AWWA C651, Standard for Disinfecting Water Mains
- D. International Association of Plumbing and Mechanical Officials (IAPMO).
1. PS 31 Backflow Prevention Devices.
- E. National Fire Protection Association (NFPA).
1. NFPA 11 - Standard for Low-, Medium- and High- Expansion Foam
 2. NFPA 13 - Standard for the Installation of Sprinkler Systems
 3. NFPA 14 - Standard for the Installation of Standpipes and Hose Systems
 4. NFPA 15 - Standard for Water Spray Fixed Systems for Fire Protection
 5. NFPA 16 - Standard for Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
 6. NFPA 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances
 7. NFPA 30 - Flammable and Combustible Liquids Code
 8. NFPA 70 - National Electrical Code
 9. NFPA 72 - National Fire Alarm and Signaling Code
 10. NFPA 409 - Standard on Aircraft Hangars
- F. Society for Protective Coatings (SEC)
1. SSPC Paint 22 - Paint Specification No. 22 Epoxy-Polyamide Paints (Primer, Intermediate, and Topcoat)
 2. SSPC Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II
 3. SSPC SP 3 - Power Tool Cleaning
 4. SSPC SP 6/NACE No.3 - Commercial Blast Cleaning
 5. SSPC SP 11 - Power Tool Cleaning to Bare Metal
- G. Underwriter’s Laboratory (UL).
1. UL 262- Gate Valves for Fire-Protection Service
 2. UL 789- UL Standard for Safety Indicator Posts for Fire-Protection Service
 3. UL Fire Prot Dir - Fire Protection Equipment Directory Indicator Post for Fire-Protection Service.

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1.5 COORDINATION/SPECIAL CONSIDERATIONS

- A. Coordinate with other trades all equipment locations, pipe, duct and conduit run's, electrical outlets and fixtures, air inlets and outlets, and structural and architectural features. Provide information on location of piping and bracing to all other trades as required for a completely coordinated project.
- B. Coordinate Work among the trades in accordance with Division 01 avoid any interference with the effectiveness of the fire protection system. Shop drawings shall include elevations of equipment and piping to assure coordination. The fire protection system shall be coordinated with other trades to assure that conflicts will not arise with structural, mechanical, electrical or architectural features of the building.
- C. Coordinate with the fire alarm contractor to ensure full awareness of the location of control valves, flow switches, tamper switches, and alarm and signal switches.

1.6 DESIGN REQUIREMENTS

- A. Design and provide a new automatic aqueous film forming foam (AFFF) pre-action sprinkler system and under-wing supplemental protection system. System shall provide uniform distribution of AFFF solution to provide complete coverage throughout the building as shown on the plans. The design, equipment, materials, installation, and workmanship shall be in strict accordance with the required and advisory provisions of NFPA 11, NFPA 13, NFPA 14, NFPA 15, NFPA 16, NFPA 24, NFPA 30, NFPA 70, NFPA 72, and NFPA 409, except as modified herein. Each system [shall be designed for earthquakes and] shall include all materials, accessories and equipment necessary to provide each system complete and ready for use. Design and install each system to give full consideration to blind spaces, piping, electrical equipment, ductwork, and all other construction and equipment to provide complete coverage in accordance with the drawings to be submitted for approval. Devices and equipment for fire protection service shall be of a make and type listed by the Underwriter's Laboratories Inc. in the UL Fire Prot Dir, or approved by the Factory Mutual System and listed in FM APP GUIDE. In the publications referred to herein, the advisory provisions shall be considered to be mandatory, as though the word "shall" had been substituted for "should" wherever it appears. Begin work at the point indicated.
- B. This section is a performance specification section only. The design build fire protection contractor shall be fully responsible for the design and to provide necessary equipment and hardware per the Authority Having Jurisdiction (AHJ) and Owner's Insurance Underwriter's requirements. Furnish all labor, materials, tools, and equipment to complete the foam water system as hereinafter described, ready for service to the entire satisfaction of the Owner, Architect, AHJ and Owner's Insurance Underwriter. Provide hydraulically calculated systems in accordance with the AHJ and Owner's insurance requirements. Design shall be done by a registered Fire Protection Engineer and fully stamped calculations, drawings, details, etc. shall be submitted for review.

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- C. The fire sprinkler system shall fully comply with the Mississippi Conveyance Safety Act (MCSA).
- D. Verify electrical requirements of alarm valves, flow switches, valve supervision switches, alarm bells and pumps with electrical contractor.

1.7 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- B. 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.
- C. FM Global Compliance: Provide components that are FM Approved and that are listed in FM's "Approval Guide."
- D. UL Compliance: Provide equipment listed in UL's "Fire Protection Equipment Directory."
- E. Prior to commencing work, submit data showing that the Contractor has successfully installed automatic foam fire extinguishing sprinkler systems of the same type and design as specified herein. Include the names and locations of at least two installations where the Contractor, or the subcontractor referred to above, has installed such systems. Indicate the type and design of each system and certify that the system has performed satisfactorily for a period of at least 18 months.
- F. Qualifications of System Technician: Installation drawings, shop drawing and as-built drawings shall be prepared, by or under the supervision of, an individual who is experienced with the types of works specified herein, and is currently certified by the National Institute for Certification in Engineering Technologies (NICET) as an engineering technician with minimum Level-III certification in Special Hazard System program. Contractor shall submit data for approval showing the name and certification of all involved individuals with such qualifications at or prior to submittal of drawings.
- G. Fire stop penetrations with an approved material as prescribed in the International Building Code (IBC).

1.8 SUBMITTALS

- A. See Section 230010 Mechanical General Provisions.
- B. Submit product data, O&M data, and samples and show item on shop and coordination drawings according to the following table.
 - 1. "R" means required.

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2. “R2” means required only for products and equipment differing for the specified manufacturer and model and for “or equals” where specified.

Item	Product Data	O&M Manual	Samples	Shop Drawing
Pipe, Fittings and Mechanical Couplings	R			R
Pre-Action Valves	R	R		R
Valves, including gate, check and globe	R	R		R
Water motor alarms	R	R		R
Sprinkler Heads	R	R		R
Monitor Nozzles	R	R		R
Hose and Nozzles	R	R		R
Pipe Hangers and Support	R	R		R
Pressure Switch	R	R		R
Fire Department Inlet Connections	R	R		R
Tank mounted air compressor	R	R		R
Air Pressure Regulating Device	R	R		R
Low Air Pressure Trouble Alarm	R	R		R
Detection Device	R	R		R
Storage Batteries	R	R		R
Alarm Bells	R	R		R
Alarm Horns	R	R		R
Annunciator Panel	R	R		R
Foam Hydrants	R	R		R
AFFF Concentrate Storage Tanks	R	R		R
Proportioning Equipment	R	R		R
AFFF Concentrate	R	R		R
Strainers	R	R		R
Manual Release Stations	R	R		R
Backflow Preventers	R	R		R
Control Panels	R	R		R
Battery Charger	R	R		R
Coordination drawings				R
AHJ approval letter				R
Insurance Underwriter’s approval letter				R
Hydraulic calculations				R
Pressure Discharge Graphs or Tables				R
Battery Standby Power Requirement Calcs				R
System Surge Analysis				R
Static and residual flow tests results				R
Test Reports		R		R
Qualifications of Installer		R		R

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AFFF Containment and Disposal Plan		R		R
Written Statement with NICET Level 3 Employee	R			

C. Submit shop drawings as follows:

1. For each hazard area, drawn to scale, and signed and sealed by a qualified fire protection professional engineer. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.
3. Design Calculations: For amount of foam concentrate required for each hazard area.
4. Plans:
 - a. Show the following:
 - 1) Foam-solution proportioning tanks and devices, piping, discharge devices, monitoring and alarm devices, and accessories.
 - 2) Method of attaching hangers to building structure.
 - 3) Fire-alarm panel.
 - 4) Equipment and furnishings.
 - b. Permit-Approved Drawings: Working plans prepared according to NFPA 16 and approved by authorities having jurisdiction. Include hydraulic calculations complying with NFPA 13.
5. AHJ approval of submittals is for permission to proceed and does not authorize design, products or installation not conforming to referenced codes and standards and this specification. Substitutions or alternates require specific approval by the Owner.
6. Upon completion of the Work, the Contractor shall provide AutoCAD Record Drawings to the Architect. Refer also to Division 01. Final approvals are subject to receipt of acceptable Record Drawings.

D. Submittals having any content that is incomplete or unclear will be returned without review or approval.

E. Provide all necessary information to ceiling suspension work of Division 09, Finishes, to provide coordinated submittals.

F. Discharge patterns and application data shall be included in submittals for sidewall, water curtain, and similar special purpose sprinklers.

G. Operating Instructions: Provide instruction charts describing operation and proper maintenance of system equipment per Division 01 and Section 230010 Mechanical General Provisions.

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure rating, temperature ratings, and capacities as required. Provide sizes and types matching piping and equipment connections; provide fittings of materials that match pipe materials used in fire protection systems.
- B. Equipment to be furnished under this specification shall be essentially standard product of manufacturer. Where two or more units of same class of equipment are required, these units shall be products of a single manufacturer. However, component parts of system need not be products of same manufacturer.
- C. Manufacturers: Subject to compliance with requirements, manufacturer offering automatic sprinklers which may be incorporated in the work include the following:
 - 1. Specialty Valves and Devices:
 - a. Badger Fire Protection, Inc.
 - b. Grinnell Corp.
 - c. Viking Corp.
 - d. Or equal.
 - 2. Water-Flow Indicators and Supervisory Switches:
 - a. Grinnell Corp.
 - b. Potter Electric Signal Co.
 - c. Viking Corp.
 - d. Or equal.
 - 3. Sprinkler, Drain, and Alarm Test Fittings:
 - a. Central Sprinkler Corp.
 - b. Grinnell Corp.
 - c. Victaulic Co.
 - d. Or equal.
 - 4. Sprinkler, Branch-Line Test Fittings:
 - a. Elkhart Brass Mfg. Co. Inc.
 - b. Smith Industries, Inc; Potter-Roemer Div.
 - c. Or equal.
 - 5. Sprinkler, Inspector's Test Fittings:
 - a. G/J Innovations, Inc.
 - b. Triple R Specialty of Ajax, Inc.

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6. Fire Department Connections:
 - a. Badger Fire Protection, Inc.
 - b. Elkhart Brass Mfg. Co., Inc.
 - c. Grinnell Corp.
 - d. Or equal.

7. Sprinklers:
 - a. Badger Fire Protection, Inc.
 - b. Grinnell Corp.
 - c. Viking Corp.
 - d. Or equal.

8. Indicator Posts and Indicator-Post, Gate Valves:
 - a. Grinnell Corp.
 - b. McWane, Inc.; Kennedy Valve Div.
 - c. Nibco, Inc.
 - d. Or equal.

9. Indicator Valves:
 - a. Grinnell Corp.
 - b. McWane, Inc.; Kennedy Valve Div.
 - c. Nibco, Inc.
 - d. Or equal.

10. Fire-Protection-Service Valves:
 - a. Grinnell Corp.
 - b. McWane, Inc.; Kennedy Valve Div.
 - c. Nibco, Inc.
 - d. Or equal.

11. Grooved-End Fittings for Steel Piping:
 - a. Victaulic Co.
 - b. Or equal.

12. Air Compressor (Dry-Pipe System):
 - a. General Air Products.
 - b. Gast Manufacturing.
 - c. Viking Corporation.
 - d. Or equal.

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2.2 DESIGN OF FOAM SYSTEMS

- A. Design of fire extinguishing foam systems shall be by hydraulic calculations for uniform distribution of AFFF solution over the protected area and shall conform to the NFPA standards listed above and to the requirements as specified herein.

2.3 SPRINKLER HEADS

- A. Heads shall have 1/2 inch orifice. No o-rings will be permitted in sprinkler heads. For deluge systems, provide open heads. For pre-action systems, the release element of each head shall be of the "high" temperature rating or higher as suitable for the individual location installed. Provide chromium plated ceiling plates and pendent sprinklers below suspended ceilings. Provide corrosion resistant sprinkler heads and sprinkler head guards as required by NFPA 13.

2.4 CABINET

- A. Provide extra sprinkler heads and sprinkler head wrench in a metal cabinet adjacent to the pre-action valve within each building. The number and types of extra sprinkler heads shall be as specified in NFPA 13.

2.5 VALVES

- A. Valves shall be operated by a detection system listed for releasing service and independent of the building fire alarm system. valve clappers shall incorporate a latching mechanism that will not be affected by changes of pressure in the water system. If 6 inch valves are used in 8 inch risers, provide smoothly tapered connections. In addition to automatic operation, arrange each valve for manual release at the valve. Provide pressure gages and other appurtenances at the valves as required by NFPA 13. Provide a detection device at the end of each actuation circuit to test the circuit and mount the device adjacent to the valve between 6 and 8 feet above the finish floor. Label each testing device to indicate the valve it activates. Provide remote manual releases (to be coordinated in field).

2.6 AFFF SOLUTION DISTRIBUTION

- A. Distribution shall be essentially uniform throughout the area in which it is assumed the sprinkler heads will open. Variation in discharge from individual heads in the hydraulically most remote area shall be between 100 and 115 percent of the specified density.

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- B. Distribution shall be essentially uniform throughout the area. Variation in discharge from individual heads shall be between 100 and 115 percent of the specified density.

2.7 AFFF SOLUTION APPLICATION DENSITY

- A. Size system to provide the specified density when the system is discharging the specified total maximum required flow. Application to horizontal surfaces below the ceiling sprinklers shall be 0.16 gallons per minute (gpm) per square foot with simultaneous operation of operating foam monitor nozzles (per fire protection engineers stamped calculations/design) and operating foam hose lines (per fire protection engineers stamped calculation/design) and with outside water hose stream requirements as required by fire protection engineers stamped calculation/design.

2.8 FRICTION LOSSES

- A. Calculate losses in pipe in accordance with the Hazen-Williams Formula with 'C' value of 100 for steel pipe [except 120 for steel pipe used in deluge systems], 150 for copper tube, and 140 for cement lined ductile iron pipe.

2.9 LOCATION OF SPRINKLER HEADS

- A. Location of heads in relation to the ceiling and spacing of sprinkler heads shall conform to NFPA 13 for extra hazard occupancy. The spacing of sprinklers on the branch lines shall be essentially uniform.

2.10 WATER SUPPLY

- A. Base hydraulic calculations on 1 fire pump running.

2.11 DURATION OF DISCHARGE

- A. Duration of foam solution over the sprinkler discharge area shall be in conformance with NFPA 409. Hose station discharge shall be in conformance with NFPA 30 and NFPA 409. Reduction of the discharge duration based on a discharge rate higher than the specified minimum is not permitted.

2.12 ELECTRIC DETECTION DEVICES

- A. Provide electric heat detectors, smoke detectors and combination ultraviolet-infrared detectors. All wiring shall be supervised and installed in protective metal conduit or tubing.

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2.13 CONTROL PANEL

- A. Modular type panel installed in a surface mounted steel cabinet with hinged door and cylinder lock. Switches and other controls shall not be accessible without the use of a key. The control panel shall be a neat, compact, factory-wired assembly containing all parts and equipment required to provide specified operating and supervisory functions of the system. Panel cabinet shall be finished on the inside and outside with factory-applied enamel finish. Provide main annunciator located on the exterior of the cabinet door or visible through the cabinet door. Provide audible trouble signal.
- B. Provide prominent engraved rigid plastic or metal identification plates, or silk-screened labels attached to the rear face of the panel viewing window, for all lamps and switches.
- C. System power shall be 120 volts AC service, transformed through a two winding isolation transformer and rectified to 24 volts DC for operation of all system initiating, actuating, signal sounding, trouble signal and fire alarm tripping circuits. System shall be electrically supervised on all circuits. A single open or ground fault condition in any detection (initiating) [or signaling] circuit shall not result in any loss of system function but shall cause the actuation of system trouble signals. A ground fault condition or single break in any other circuit shall result in the activation of the system trouble signals. Loss of AC power, a break in the standby battery power circuits, or abnormal AC power or low battery voltage shall result in the operation of the system trouble signals.
- D. The abnormal position of any system switch in the control panel shall result in the operation of the system trouble signals. Trouble signals shall operate continuously until the system has been restored to normal at the control panel. System trouble shall also be annunciated on the appropriate zone of the building fire alarm panel.
- E. Provide a 4 inch remote system trouble bell or buzzer, installed in a constantly attended area, arranged to operate in conjunction with the integral trouble signals of the panel. Provide remote bell or buzzer with a rigid plastic or metal identification sign which reads "Foam System Trouble." Lettering on identification sign shall be a minimum of one inch high.
- F. Control panel, batteries, and battery charger shall be weatherproof type or located in an area not subject to water damage. System control panel shall be UL listed or FM approved for extinguishing system control (releasing device service). Permanently label all switches.
- G. Provide panel with the following switches:
 - 1. Trouble silencing switch which transfers audible trouble signals (including remote trouble devices, if provided) to an indicating lamp. Upon correction of the trouble condition, audible signals will again sound until the switch is returned to its normal position, or the trouble signal circuit shall be automatically restored to normal upon correction of the trouble condition. The silencing switch may be a momentary action, self-resetting type.

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2. Alarm silencing switch which when activated will silence all associated alarm devices without resetting the panel, and cause operation of system trouble signals.
3. Individual zone disconnect switches which when operated will disable only their respective initiating circuit and cause operation of the system and zone trouble signals.
4. Reset switch which when activated will restore the system to normal standby status after the cause of the alarm has been corrected, and all activated initiating devices reset. Operation of reset switch shall restore activated smoke detectors to normal standby status.
5. Lamp test switch.
6. City disconnect switch which when activated will disconnect the coded device and cause operation of the system trouble signal.

2.14 MAIN ANNUNCIATOR

- A. Provide integral with the main control panel. Provide separate alarm and trouble lamps for each zone alarm initiating circuit as indicated below, located on the exterior of the cabinet door or visible through the cabinet door. Lamps shall be LED (Light Emitting Diode) type. Supervision will not be required provided a fault in the annunciator circuits results only in loss of annunciation and will not affect the normal functional operation of the remainder of the system. Each lamp shall provide specific identification of the [zone] [area] [device] by means of a permanent label. In no case shall zone identification consist of the words "Zone 1," "Zone 2," etc., but shall consist of the description of the [zone] [area] [device].

2.15 REMOTE ANNUNCIATOR PANEL

- A. Location to be coordinated in field. Panel shall duplicate all requirements specified for the main control panel annunciator, except that in lieu of individual zone trouble lamps a single common system trouble lamp may be provided. Lamps shall be LED (Light Emitting Diode) type, except lamps used in backlit panels shall be LED or neon type. Panel shall have a lamp test switch.
- B. Zone identification shall be by means of permanently attached rigid plastic or metal plate(s). Panel shall be of the interior type, flush-mounted.

2.16 AUXILLARY POWER SUPPLY

- A. Storage Batteries
 1. Provide vented wet cell nickel cadmium batteries and charger. Drycell batteries are not acceptable. House batteries in the control panel or in a well-constructed vented steel cabinet with cylinder lock, non-corrosive base, and louvered vents. Provide batteries of adequate ampere-hour rating to operate the system under supervisory conditions for 60 hours, at the end of which time batteries shall be

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capable of operating the entire system in a full alarm condition for not less than [30] [15] minutes. Provide calculations substantiating the battery capacity. Provide reliable separation between cells to prevent contact between terminals of adjacent cells and between battery terminals and other metal parts. Provide batteries with post-and-nut, "L"-blade, or similar terminals. Slip-on tab type terminals are not acceptable. When a separate battery cabinet is used, provide a fuse block for battery leads within the cabinets. Finish the cabinet on the inside and outside with enamel paint. Locate the top of the battery cabinet not more than 4 feet above floor level.

B. Battery Charger

1. Provide completely automatic high/low charging rate type charger capable of recovery of the batteries from full discharge to full charge in 24 hours or less. Provide an ammeter for recording rate of charge and a voltmeter to indicate the state of battery charge under load. Meters shall be factory installed, or factory-supplied plug-in modules. Field installation of meters other than the panel manufacturer's plug-in modules is prohibited. Provide a trouble light to indicate when batteries are manually placed on a high rate of charge as part of the unit assembly if a high-rate switch is provided. House charger in the control panel or battery cabinet.

2.17 PIPING SUPERVISION

- A. Pre-action sprinkler piping shall be supervised. A break in the piping or tubing systems resulting in loss of pneumatic pressure shall result in the activation of a trouble signal.
- B. Provide a silencing switch which transfers trouble signals to an indicating lamp and arrange so that correction of the trouble condition will automatically transfer the trouble signal from the indicating lamp back to the trouble signal until the switch is restored to normal position.

2.18 MANUAL RELEASE STATIONS

- A. Provide combined overhead system, and monitor nozzle release stations where shown, and separate hose station release stations at each hose station. Stations shall be of a type not subject to operation by jarring or vibration. Stations shall have a dual action release configuration to prevent accidental system discharge. Break-glass-front stations are not permitted; however a pull lever break-glass-rod type is acceptable.
- B. Station color shall be red. Station shall provide positive visible indication of operation. Restoration shall require use of a key or special tool. Place warning signs at each station indicating that operation of the station will cause immediate AFFF discharge. Where a building fire alarm pull station is also mounted in the vicinity of a foam release station, separate the stations by at least one meter 3 feet horizontally. Provided permanent engraved rigid plastic or metal labels to clearly distinguish foam release

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stations from building fire alarm stations, and to indicate the function of each foam release station.

- C. Stations shall be weatherproof type.

2.19 HEAT DETECTORS

- A. Designed for detection of fire by rate compensating principle. Locate detectors in accordance with their listing by UL or FM and the requirements of NFPA 72, except provide at least two detectors in all rooms of 600 square feet or larger in area. Temperature rating of detectors shall be in accordance with NFPA 72. Reduce heat detector spacing in areas with ceiling heights exceeding 10 feet, in accordance with NFPA 72.
- B. No detector shall be located closer than 12 inches to any part of any lighting fixture nor closer than 24 inches to any part of an air supply diffuser. Detectors, located in hazardous locations as defined by NFPA 70, shall be types approved for such locations. Provide with terminal screw type connections. Removal of detector head from its base shall cause activation of system trouble signal. Detectors shall be weatherproof type.
- C. Rate Compensating Detector
 - 1. Designed for surface outlet box mounting and supported independently of conduit, tubing or wiring connections.
 - 2. Detectors shall be hermetically sealed and automatically resetting type which will operate when ambient air temperature reaches detector setting regardless of rate of temperature rise. Detector operation shall not be subject to thermal time lag.

2.20 OPEN-AREA (SPOT-TYPE) SMOKE DETECTORS

- A. Designed for detection of abnormal smoke densities by the photoelectric principle. Provide necessary control and power modules required for operation integral with the main control panel.
- B. Provide detectors and associated modules which are compatible with the main control panel and suitable for use in a supervised circuit. Detector circuits shall be of the 4 wire type whereby the detector operating power is transmitted over conductors separate from the initiating circuit.
- C. Provide a separate, fused, power circuit for each smoke detection initiating circuit (zone). Failure of the power circuit shall be indicated as a trouble condition on the corresponding initiating circuit.

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- D. Malfunction of the electrical circuits to the detector or its control or power units shall result in the operation of the system trouble signals. Equip each detector with a visible indicator lamp that flashes when the detector is in the normal standby mode and glows continuously when the detector is activated. Provide remote indicator lamps for each detector that is concealed from view. Provide plug-in type detectors with tab-lock or twist-lock, quick disconnect head and separate base in which the detector base contains screw terminals for making all wiring connections. Detector head shall be removable from its base without disconnecting any wires. Removal of detector head from its base shall cause activation of system trouble signals. Provide each detector with an integral screen to prevent entrance of insects into the detection chamber(s).
- E. Photoelectric Detectors
 - 1. Operate on a multiple cell concept using an infra-red light-emitting diode (LED) light source.
- F. Detector Spacing and Location
 - 1. NFPA 72, the manufacturer's recommendations and the requirements stated herein, however, in no case shall spacing exceed 9 by 9 meters 30 by 30 feet per detector, and 9 lineal meter 30 lineal feet per detector along corridors.
Detectors shall not be placed closer than 3 feet from any air discharge or return grille, nor closer than 12 inches to any part of any lighting fixture.

2.21 COMBINATION ULTRAVIOLET-INFRARED FLAME DETECTORS

- A. Flame detectors shall operate on the dual spectrum ultraviolet-infrared (UV-IR) principle. Detector shall employ a solar-blind UV sensor with a high signal-to-noise ratio, and a narrow band IR sensor. Detector logic shall require UV and IR signals to be present, in the proper ratio or signature as emitted by a hydrocarbon fire, before the detector initiates an alarm.[Detectors shall respond within 5 seconds to a JP-4 fire 10 feet square, 150 feet from the detector. Detector shall not be activated by non-fire sources such as continuous or intermittent direct or reflected solar radiation, arc-welding, lightning, radiant heat, x-rays, artificial lighting, radio transmissions, and normal jet engine functions. Detector shall have an automatic through-the-lens self-testing feature. Malfunction of the detector circuitry, or degradation of the sensors' lens cleanliness to the point where the detector will not detect the design fire signature, shall cause operation of the system trouble signals. Logic circuits necessary for operation of the detector shall be integral to the detector or located in separate flame detector control panel(s) located adjacent to the foam system control panel(s). Each detector in alarm shall be individually annunciated by an LED on the detector or at the detector control panel.
- B. Primary and auxiliary power supply shall be taken from the foam system control panel(s). Detectors, and associated control panels if required, shall be compatible with the foam system control panel(s). Detectors and associated control panels shall be weatherproof, or housed in weatherproof enclosure(s) when in an area subject to

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system discharge and shall also be explosion-proof when located in hazardous areas as defined by NFPA 70.

- C. Detector spacing and location shall be in accordance with NFPA 72, their UL listing or FM approval, and the manufacturer's recommendations. The detector manufacturer shall determine or approve the detector layout.
- D. Detector layout drawings shall include horizontal and vertical angles for correct aiming. Locate detectors so that every portion of the protected [floor] area is within the field of view of at least three detectors, taking into account fixed obstructions. Provide detectors with manufacturer's swivel mounting bracket. Provide a permanent engraved rigid plastic or metal label at each detector location with detector aiming information (degrees horizontal and vertical) for the corresponding detector.

2.22 ELECTRICAL WORK

- A. See electrical specifications for all electrical work, control and fire alarm wiring and fire alarm systems.
- B. Wiring
 - 1. Provide control wiring and connections to fire alarm systems, under this section and conforming to NFPA 70 and NFPA 72. Wire for 120 volt circuits shall be No. 12 AWG minimum solid conductor. Wire for low voltage DC circuits shall be No. 14 AWG minimum solid conductor. All wiring shall be color coded. Wiring, conduit and devices exposed to water or foam discharge shall be weatherproof. Wiring, conduit and devices located in hazardous atmospheres, as defined by NFPA 70, shall be explosion proof. All conduit shall be minimum 20 mm 3/4 inch size.
- C. Operating Power
 - 1. Power shall be 120 volts AC service, transformed through a two winding isolation type transformer and rectified to 24 volts DC for operation of all signal initiating, signal sounding, trouble signal, and actuating (releasing) circuits. Provide secondary DC power supply for operation of system in the event of failure of the AC supply. Transfer from normal to emergency power or restoration from emergency to normal power shall be fully automatic and shall not cause transmission of a false alarm. Obtain AC operating power for control panel, and battery charger from the line side of the incoming building power source ahead of all building services. Provide independent properly fused safety switch, with provisions for locking the cover and operating handle in the "POWER ON" position for these connections and locate adjacent to the main distribution panel. Paint switch box red and suitably identify by a lettered designation.
- D. Conductor Identification

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1. Identify circuit conductors within each enclosure where a tap, splice or termination is made. Identify conductors by plastic coated self sticking printed markers or by heat-shrink type sleeves. Attach the markers in a manner that will not permit accidental detachment. Properly identify control circuit terminations.

2.23 SYSTEM ACTIVATION

A. Overhead System Activation

1. Each zone shall encompass the area protected by each riser. Upon activation of the detection system or overhead system manual release station(s), the corresponding overhead system protecting that area shall activate.

B. Monitor System Activation

1. Each zone shall encompass the monitors indicated. Upon activation of two UV-IR detectors for more than 5 seconds] or activation of a manual release station, all monitors in that zone shall be activated.

C. Hose System Activation

1. Each zone shall encompass all hose stations. Hose stations shall be activated upon activation of a hose station manual release station. Provide a manual release station at each hose station.

2.24 ALARMS

A. Water Motor Alarms

1. Provide weatherproof and guarded type alarm for each pre-action valve(s). Alarms shall sound locally on the flow of foam solution in each system to which it is connected. Mount alarms on the outside of the outer walls of each building, at locations indicated. When more than one alarm gong is provided, provide permanent engraved rigid plastic or metal signs indicating to which system each gong is connected.

B. Fire Alarm

1. Provide equipment for the automatic transmittal of an alarm over the building fire alarm system. Arrange so that the detection system and the flow of solution in each system will actuate the alarm. Activation of a single UV-IR detector shall not cause activation of the foam system but shall cause activation of the fire alarm system.

C. Pressure Switch

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1. Provide switch with SPDT contacts to automatically transmit alarms upon flow of water or AFFF. Alarm actuating device shall have mechanical diaphragm controlled retard device adjustable from 10 to 60 seconds and shall instantly recycle.

2.25 AFFF CONCENTRATE

A. Concentrate Fill Pump

1. Provide one pump to fill foam system tank. Pump shall have a minimum flow rate of 7 gpm. Pump shall be complete with 115 VAC motor, fused switch, power cord with plug and 10 foot minimum suction and clear discharge hoses.

2.26 BALANCED PRESSURE PROPORTIONING SYSTEM

- A. Self-contained, skid-mounted system, fully assembled at the factory and delivered complete and ready for use. Field connections shall be limited to water, electrical, and AFFF concentrate inputs, foam solution output, and foam concentrate return line to storage tank. Size system for required flow rate(s). The concentrate pump and all piping, valves, and fittings in contact with foam concentrate shall be of materials resistant to the corrosive effects of the AFFF concentrate. Concentrate pump shall be electric motor driven, drip proof, 240/480 volts, 60 Hz AC. Activation and operation of system shall be fully automatic, with manual over-ride and manual shut-down. Provide permanent engraved rigid plastic or corrosion resistant metal instruction plate for emergency manual operation, along with a similarly constructed label for each control device.

2.27 AFFF CONCENTRATE STORAGE TANKS

- A. Tank shall be designed for storage of AFFF concentrate at atmospheric pressure, and shall be horizontal cylindrical, fiberglass or polyethylene construction. Tank shall have the following: Drain valve located at the lowest point in the tank, connections for concentrate supply and return lines to the proportioners, top-mounted fill connections and inspection hatch, and a pressure/vacuum relief vent. All openings and tank connections shall be installed at the factory, no holes shall be made in the tank shell in the field. Tank shall include all necessary supports for free-standing installation. Provide a gage or unbreakable sight glass to permit visual determination of level of tank contents, unless liquid level is clearly visible through shell of tank.
- B. Size tank to provide sufficient AFFF concentrate for the time specified per NFPA when the system is discharging foam solution at total maximum system flow. Also provide connected reserve tank(s) of equal capacity.
- C. Permanently label each tank with its capacity, type and percentage of concentrate, which system it serves, and whether it is a main or reserve tank.

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2.28 OSCILLATING MONITOR NOZZLES

- A. Fixed, water motor operated, with override to allow manual aiming. Oscillation arc shall be adjustable from at least 0 to 165 degrees. Oscillation speed shall be adjustable from 0 to 30 degrees per second. Nozzle shall be adjustable while in operation from 30 degrees below to 80 degrees above horizontal, with lock or latching mechanism.
- B. Nozzle shall be as per plans/schedules. Provide normally open OS&Y gate valve in supply line at each monitor location.

2.29 HAND HOSE LINES

- A. Provide each hose station with flow-through reel and 1 1/2 inch hard rubber hose and nozzles. Nozzle shall have pistol-grip ball shutoff valve. Provide normally closed quarter-turn ball valve in supply line at each hose station. Nozzle flow rate shall be 60 gpm minimum.

2.30 WALL FOAM HYDRANTS

- A. Provide dual outlet connections with integral gate valves and locate about 3 feet above grade. Provide each outlet with 2 1/2 inch male National Standard hose threads with cap and chain. Hydrant shall be controlled by OS&Y gate valve located inside foam room. Provide wall escutcheon plate with "FOAM HYDRANT" in raised letters cast in plate. Hydrant shall permit testing of each pre-action system riser at full design flow without charging the system supplied by the riser.

2.31 ABOVEGROUND PIPING SYSTEMS

- A. Pipe, Fittings, and Mechanical Couplings
 - 1. NFPA 13, except steel piping shall be Schedule 40 for sizes smaller than 8 inches, and Schedule 30 or 40 for sizes 8 inches and larger. Pipe nipples 6 inches long and shorter shall be Schedule 80 steel pipe. Water motor alarm piping shall be zinc-coated steel pipe and fittings. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall only be permitted in pipe sizes 1 1/2 inches and larger. Rubber gaskets shall be UL listed for use in dry-pipe sprinkler systems. Use of restriction orifices, reducing flanges, and plain-end fittings with mechanical couplings (which utilize steel gripping devices to bite into the pipe when pressure is applied) are not permitted. Pipe and fittings in contact with AFFF concentrate shall be material resistant to the corrosive effects of AFFF concentrate as approved by the manufacturer of the proportioning system. Fittings on concentrate lines shall be flanged or welded only. Screwed or mechanical fittings will not be permitted.
- B. Jointing Material

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1. CID A-A-58092, Polytetrafluoroethylene (PTFE) tape. Pipe joint compound (pipe dope) is not acceptable.

C. Valves

1. Provide valves as required by NFPA 13 and of types approved for fire service. Gate valves shall open by counterclockwise rotation. Check valves shall be flanged clear opening swing check type with flanged inspection and access cover plate for sizes 100 mm 4 inches and larger. Provide an OS&Y valve beneath each [deluge] [pre-action] valve in each riser, when more than one valve is supplied from the same water supply pipe. Butterfly valves are not acceptable.

D. Identification Signs

1. Attach properly lettered approved metal signs conforming to NFPA 13 to each valve and alarm device. Permanently affix design data nameplates to the riser of each system.

E. Main Drains

1. Provide drain piping to discharge at safe points outside each building or to sight cones attached to drains of adequate size to readily receive the full flow from each drain under maximum pressure. Provide auxiliary drains as required by NFPA 13.

F. Pipe Sleeves

1. Provide where piping passes through walls, floors, roofs, and partitions. Secure sleeves in proper position and location during construction.
2. Provide sleeves of sufficient length to pass through entire thickness of walls, floors, roofs, and partitions. Provide not less than 1/4 inch space between exterior of piping and interior of sleeve. Firmly pack space with insulation and caulk at both ends of the sleeve with plastic waterproof cement.

G. Sleeves in Masonry and Concrete Walls, Floors, Roofs

1. ASTM A53/A53M, schedule 40 or standard weight, zinc-coated steel pipe sleeves. Extend sleeves in floor slabs 3 inches above the finished floor.

H. Sleeves in Partitions

1. Provide zinc-coated steel sheet having a nominal weight of not less than 0.90 pounds per square foot.

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I. Escutcheon Plates

1. Provide one piece or split hinge type plates for piping passing through floors, walls and ceilings, in both exposed and concealed areas. Provide chromium plated metal plates where pipe passes through finished ceilings. Provide other plates of steel or cast iron with aluminum paint finish. Securely anchor plates in place.

J. Fire Department Inlet Connections

1. Three way type with 2 1/2 inch National Standard female hose threads with plug, chain, and identifying fire department connection escutcheon plate.
Provide inlet connections about one meter 3 feet above grade.

K. Backflow Preventers

1. Reduced pressure principle type. Proof shall be furnished that each make, model/design, and size of backflow preventer being furnished for the project is approved by and has a current "Certificate of Approval" from the FCCCHR List. Listing of the particular make, model/design, and size in the current FCCCHR List will be acceptable as the required proof.

2.32 BURIED PIPING SYSTEMS

A. Pipe and Fittings

1. For pipe sizes larger than 305 mm 12 inches, method for pipe anchorage including pipe clamps and the rods shall be shown on the drawings. No velocities greater than 15 feet per second.
2. NFPA 24, outside coated cement lined ductile iron pipe and fittings for piping under the building and to a point 1.50 meters 5 feet outside the building walls. Anchor the joints in accordance with NFPA 24 using pipe clamps and steel rods.
Minimum pipe size shall be 150 mm 6 inches. Minimum depth of cover shall be 3 feet. Piping more than 5 feet outside the building walls shall be outside coated cement lined ductile iron pipe and fittings conforming to NFPA 24.

B. Valves

1. Provide as required by NFPA 24 for fire service. Gate valves shall conform to AWWA C500 or UL 262 with cast iron body and bronze trim, and shall open by counterclockwise rotation.

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C. Post Indicator Valves

1. Provide with operating nut located about 3 feet above grade. Gate valves for use with indicator post shall conform to UL 262. Indicator posts shall conform to UL 789. Paint each indicator post with one coat of primer and two coats of red enamel paint.

D. Valve Boxes

1. Except where indicator posts are provided, provide each gate valve in buried piping with an adjustable cast-iron valve box of a size suitable for the valve on which it is to be used. Boxes outside of paved areas may be of Acrylonitrile-Butadiene-Styrene (ABS) plastic or of inorganic fiber reinforced black polyolefin plastic. The head shall be round and the lid shall have the word WATER cast on it. The least diameter of the shaft of the box shall be 5 1/4 inches. Coat each cast-iron box with bituminous paint.

E. Buried Utility Warning and Identification Tape

1. Provide detectable aluminum foil plastic-backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved, with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED WATER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 12 inches below the top surface of earth or the top surface of the subgrade under pavements.

PART 3 - EXECUTION

3.1 CONNECTIONS TO EXISTING WATER SUPPLY SYSTEMS

- A. Use tapping or drilling machine valve and mechanical joint type sleeves for connections to be made under pressure. Bolt sleeves around the mains; bolt valve conforming to AWWA C500 or UL 262 to the branch. Open valve, attach drilling machine, make tap, close valve, and remove drilling machine, all without interruption of service. Notify the professional in writing at least 15 calendar days prior to the date the connections are required; approval shall be received before any service is interrupted. Furnish all material required to make connections into the existing water supply systems, and perform all excavating, backfilling, and other incidental labor as required. Furnish the labor and the tapping or drilling machine for making the actual connections to the existing systems.

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3.2 AFFF SYSTEM INSTALLATION

- A. Equipment, materials, installation, workmanship, fabrication, assembly, erection, examination, inspection, and testing shall be in accordance with the NFPA standards referenced herein. Install piping straight and true to bear evenly on hangers and supports. Conceal piping to the maximum extent possible. Piping shall be inspected, tested and approved before being concealed. Provide fittings for changes in direction of piping and for all connections. Make changes in piping sizes through standard reducing pipe fittings; do not use bushings. Cut pipe accurately and work into place without springing or forcing. Ream pipe ends and free pipe and fittings from burrs. Clean with solvent to remove all varnish and cutting oil prior to assembly. Make screw joints with PTFE tape applied to male thread only.

3.3 FIELD PAINTING

- A. Clean, prime, and paint new foam systems including valves, piping, conduit, hangers, miscellaneous metal work, and accessories. Apply coatings to clean dry surfaces using clean brushes. Clean the surfaces in accordance with SSPC SP 11. Immediately after cleaning, prime the metal surfaces with one coat of SSPC Paint 25 or SSPC Paint 25 primer applied to a minimum dry film thickness of 1.5 mils.
- B. Exercise care to avoid the painting of sprinkler heads and operating devices. Upon completion of painting, remove materials which were used to protect sprinkler heads and operating devices while painting is in process. Remove sprinkler heads and operating devices which have been inadvertently painted and provide new clean sprinkler heads and operating devices of the proper type. Finish primed surfaces as follows:
- C. Piping Labels
1. Provide permanent labels in foam rooms, spaced at 20 foot maximum intervals along pipe, indicating "WATER", "FOAM CONCENTRATE", and "FOAM SOLUTION" on corresponding piping.
- D. Field Touch-Up
1. Clean damaged areas of shop coated tanks in accordance with SSPC SP 11 and coat cleaned areas with the same materials used for the shop applied coating system.

3.4 FLUSHING

- A. Flush the piping system with potable water in accordance with NFPA 13. Continue flushing operation until water is clear, but for not less than 10 minutes.

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3.5 FIELD QUALITY CONTROL

- A. Prior to initial operation, inspect equipment and piping systems for compliance with drawings, specifications, and manufacturer's submittals. Perform tests in the presence of the professional to determine conformance with the specified requirements.

3.6 PRELIMINARY TESTS

- A. Each piping system shall be hydrostatically tested at 200 psig in accordance with NFPA 13 and shall show no leakage or reduction in gage pressure after 2 hours. The Contractor shall conduct complete preliminary tests, which shall encompass all aspects of system operation. Individually test all detectors, manual actuation stations, alarms, control panels, and all other components and accessories to demonstrate proper functioning. Test water flow alarms by flowing water through the inspector's test connection. When tests have been completed and all necessary corrections made, submit to the professional a signed and dated certificate, similar to that specified in NFPA 13, attesting to the satisfactory completion of all testing and stating that the system is in operating condition. Also include a written request for a formal inspection and test.

3.7 Formal Inspection and Tests (Acceptance Tests)

- A. The Fire Protection Engineer, will witness formal tests and approve all systems before they are accepted. The system shall be considered ready for such testing only after all necessary preliminary tests have been made and all deficiencies found have been corrected to the satisfaction of the equipment manufacturer's technical representative and written certification to this effect is received by the Division Fire Protection Engineer. Submit the request for formal inspection at least 15 working days prior to the date the inspection is to take place. The control panel(s) and detection system(s) shall be in continuous service for a "break-in" period of at least 15 consecutive days prior to the formal inspection. Experienced technicians regularly employed by the Contractor in the installation of both the mechanical and electrical portions of such systems shall be present during the inspection and shall conduct the testing. All AFFF concentrate, instruments, including UV-IR detector test lamp and function test kit, personnel, appliances and equipment for testing shall be furnished by the Contractor. All necessary tests encompassing all aspects of system operation shall be made including the following, and any deficiency found shall be corrected and the system retested at no cost to the owner.
- B. Systems and Device Testing
 - 1. The entire initiating, alarm, actuation systems shall be operated. As a minimum, operation and supervision of the following functions and devices shall be demonstrated:

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- a. All operational and supervisory functions of the control and annunciator panels.
 - b. Each manual actuation station and associated circuit(s).
 - c. All detectors and associated circuits.
 - d. All alarms and associated circuits.
 - e. All actuator circuits and system control valve(s) (without foam discharge).
 - f. Activation of the building fire evacuation alarm system.
 - g. Activation of the Base fire alarm system (receipt of fire alarm at alarm office).
 - h. All of the above tests shall then be repeated with the system on battery power only.
2. AFFF Discharge and Concentration Testing
- a. When all of the initiating, alarm, actuation, and supervisory functions of the system operate to the satisfaction of the system manufacturer's technical representative and the Division Fire Protection Engineer, a complete discharge test of each system shall be performed to demonstrate satisfactory performance, proper AFFF concentration, mechanical operation and operation of valves, release devices, alarms, and interlocks which control the protected areas. These tests shall be conducted by experienced personnel according to the equipment and AFFF manufacturers' recommendations.
 - b. Test each deluge system by full flow of foam solution from the individual systems or combination of systems to achieve maximum design flow rate for at least 60 seconds.
 - c. Test each pre-action system at their design flow rate for at least 60 seconds with temporary hose lines and nozzles connected to a test header. Furnish hose and nozzles required for tests.
 - d. Test all hose lines and monitor nozzles by full flow of foam solution for at least 60 seconds.
3. The manufacturer's representative shall test samples of foam solution taken from each system to ensure proper AFFF concentration. Provide protection for all electrical fixtures and equipment exposed to possible damage during tests and protect doors and other openings leading from the protected area(s), to prevent migration of foam solution into other areas or spaces.
- C. Flushing and Rinsing
1. After completion of tests flush all piping carrying AFFF concentrate and solution with fresh water. Piping normally containing AFFF concentrate when the system is in standby mode need not be flushed. Rinse with fresh water all equipment and building surfaces exposed to AFFF discharge.

D. Environmental Protection

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1. Provide temporary measures to prevent AFFF from entering storm drains, sanitary sewers, drainage ditches, streams and water courses. Do not allow AFFF concentrate or solution to come in contact with earth. Contain all discharged AFFF on paved surfaces. Collect all discharged AFFF and rinse and flushing water and dispose of it in an EPA – approved waste-water treatment facility which provides secondary (biological) treatment. At least 15 days prior to the date flow testing is to take place, submit written plan for AFFF containment and disposal methods(s) to the professional for approval.

E. Additional Tests

1. When deficiencies, defects or malfunctions develop during the tests required, all further testing of the system shall be suspended until proper adjustments, corrections or revisions have been made to assure proper performance of the system. If these revisions require more than a nominal delay, the professional shall be notified when the additional work has been completed, to arrange a new inspection and test of the system. All tests required shall be repeated prior to final acceptance, unless directed otherwise.

F. AFFF Concentrate Storage Tanks Fill-Up

1. Fill storage tanks including reserve tanks and piping normally containing concentrate when the system is in standby mode with Contractor furnished AFFF concentrate after acceptance of the system.

G. Manufacturer's Representative

1. Provide the services of representatives or technicians from the manufacturers of the foam system, and control panel, and UV-IR detectors, experienced in the installation and operation of the type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of the system and to provide instruction to owners personnel.

3.8 OPERATING INSTRUCTIONS

- A. Provide operating instructions at control equipment and at each remote control station. Instructions shall clearly indicate all necessary steps for the operation of the system. Submit the proposed legend for operating instructions for approval prior to installation. Instructions shall be in engraved white letters on red rigid plastic or red enameled steel backgrounds and shall be of adequate size to permit them to be easily read.

3.9 TRAINING REQUIREMENTS

- A. Prior to final acceptance, the Contractor shall provide two sessions of 4 hours each of operation and maintenance training to the Base Fire Department, Public Works and

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Civil Engineering personnel on two different days to accommodate both shifts of the Base Fire Department.

- B. Each training session shall include emergency procedures, and unique maintenance and safety requirements. Training areas will be provided by the owner in the same building as the protected areas. The training conducted shall use operation and maintenance manuals specified in paragraph entitled "Operations and Maintenance Manuals". Dates and times of the training period shall be coordinated through the professional not less than two weeks prior to the session.

END OF SECTION 211320

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SECTION 221113 - FACILITY WATER DISTRIBUTION PIPING

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 water-distribution piping and related components outside the building for water service and fire-service mains.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.3 SUBMITTALS

- A. See Section 230010 – Mechanical General Provisions.
- B. Submit product data, O&M data, and samples and show item on shop drawings (where shop drawings are required) according to the following table.
 - 1. “R” means required.
 - 2. “R2” means required only for products and equipment differing for the specified manufacturer and model and for “or equals” where specified.

Item	Product Data	O&M Manual	Samples	Shop Drawing
Piping and fitting materials	R			
Valves and valve accessories	R			
Specialties	R			
Hydrants	R	R		
System purging and disinfecting activities report.		R		

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:

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1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- D. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- E. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- F. NSF Compliance:
1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
 2. Comply with NSF 61 Annex G for materials for water-service piping and specialties for domestic water.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
1. Ensure that valves are dry and internally protected against rust and corrosion.
 2. Protect valves against damage to threaded ends and flange faces.
 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

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- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
 - 1. Notify Architect no fewer than two days in advance of proposed interruption of service.
 - 2. Do not proceed with interruption of water-distribution service without Architect's written permission.

1.7 COORDINATION

- A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE AND FITTINGS

- A. Ductile iron pipe shall be cement mortar lined and meet the requirements of ANSI A21.51 and AWWA C151. The working pressure shall be rated at 250 PSI plus a surge allowance of 100 PSI. Wall thickness shall be at least that specified by ANSI A21.50 and AWWA C150 for the specified laying conditions (Class 250 minimum).
- B. Cement mortar linings for ductile iron shall meet applicable requirements of ANSI A21.4 and AWWA C104.
- C. Ductile iron fittings shall be manufactured in accordance with ANSI A21.10, AWWA C110 and ANSI A21.11, AWWA C111 specifications and shall have a rated water working pressure for 250 PSI.

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- D. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 2. Gaskets: AWWA C111, rubber.
- E. Dimensional and material requirements for pipe ends, glands, bolts, and nuts, and gaskets for mechanical joints, where required or indicated, shall conform to AWWA C111 and ANSI A21.11.
- F. Flanges: ASME 16.1, Class 125, cast iron.
1. Bolts, nuts, washers and gaskets for flanged joints, where required or indicated, shall be as recommended in the appendix to AWWA C115 and ANSI A21.15. All fasteners and hangers shall be hot dipped galvanized type.
- G. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end.
1. Mechanically coupled joints, where required or indicated, shall be sleeve-type mechanical coupling as specified.
 2. Sleeve-type mechanical couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat, two follower rings, two resilient tapered rubber gaskets, and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circular sections free from irregularities, flat spots, and surface defects. The design shall be such as to provide for confinement and compression of the gaskets. The middle ring shall be of cast-iron and the follower ring shall be of malleable iron. Cast iron shall conform to ASTM A 48 and shall be not less than Class 25. Malleable iron shall conform to ASTM A 47. Gaskets shall be designed for long life and resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joints in AWWA C111 and ANSI A 21.11. Bolts shall be track-head type and bolts and nuts shall be either of the following: bolts conforming to the tensile requirements of ASTM A307, Grade A, with nuts conforming to the tensile requirements of ASTM A 563, Grade A; or round-head square-neck type bolts conforming to ANSI B18.5 with hex nuts conforming to ANSI B18.2.2. Bolts shall be 5/8 inch in diameter; minimum number of bolts for each coupling shall be as follows (pipe size, number of bolts): 3-inch, 3; 4-inch, 4; 6-inch, 5; 8-inch, 6; 10-inch, 7; 12-inch and 14-inch, 8; 16-inch, 9; 18-inch, 10; 20-inch, 12; 22-inch, 13; 24-inch, 14. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint.

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- H. Insulating joints, where required or indicated, shall be designed to effectively prevent metal-to-metal contact at the joint between adjacent sections of piping. Joint shall be of the flanged type with insulating gasket, insulating bolt sleeves, and insulating washers. Gasket shall be of dielectric type, full face in other respects as recommended in the Appendix to AWWA C115 and ANSI A21.15. Bolts and nut shall be galvanized and as recommended in AWWA C115 and ANSI A21.15.

2.2 Polyvinyl Chloride (PVC) PIPE AND FITTINGS

- A. Piping 3-inches and smaller: PVC, Schedule 40 Pipe: ASTM D 1785.
1. PVC, Schedule 40 Socket Fittings: ASTM D 2466.
- B. Piping 4-inches and larger: PVC, AWWA Pipe: AWWA C900, Class 200, with bell end with gasket, and with spigot end.
1. Pipe shall conform to AWWA C900 and shall be plain end or gasket bell end. Pressure Class 200 (DR 14) with cast-iron-pipe-equivalent OD. Fittings shall be ductile-iron conforming to AWWA C110 and shall have cement-mortar lining conforming to AWWA C104/A21.4, standard thickness. Fittings with push-on joint ends shall conform to the same requirements as fittings with mechanical-joint ends, except that bell design shall be modified, as approved, for push-on joint suitable for use with PVC plastic pipe specified in this paragraph. Fittings shall have a rated water working pressure of 250 PSI.
 2. Joints for pipe shall be push-on joints as specified in ASTM D 3139. Joints between pipe and metal fittings, valves, and other accessories shall be push-on joints as specified in ASTM D 3139 or shall be compression-type joints/mechanical-joints as respectively specified in ASTM D 3139 and AWWA C111/A21.11. Each joint connection shall be provided with an elastomeric gasket suitable for the bell or coupling with which it is to be used. Gaskets for push-on joints for pipe shall conform to ASTM F 477. Gaskets for push-on joints and compression-type joints/mechanical-joints for joint connections between pipe and metal fittings, valves, and other accessories shall be as specified in AWWA C111/A21.11 respectively for push-on joints and mechanical-joints. Mechanically coupled joints using a sleeve-type mechanical coupling may be used as an optional jointing method in lieu of push-on joints on plain-end PVC plastic pipe, subject to the limitations specified for mechanically coupled joints using a sleeve-type mechanical coupling and to the use of internal stiffeners as specified for compression-type joints in ASTM D 3139.
 3. Sleeve-type mechanical couplings shall be designed to couple plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling shall consist of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. The middle ring and the follower rings shall be true circulate sections free from irregularities, flat spots, and surface defects; the design shall be such as to provide for confinement and compression of the gaskets. The middle ring shall be of cast-iron and the follower rings shall be of malleable iron. Cast iron shall

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conform to ASTM A 48 and shall be not less than Class 125. Malleable iron shall conform to ASTM A 47. Gaskets shall be designed for long life and resistance to set after installation and shall meet the applicable requirements specified for gaskets for mechanical joints in AWWA C111/A21/11. Bolts shall be track-head type; bolts and nuts shall be either of the following: bolts conforming to the tensile requirements of ASTM A 307, Grade A, with nut conforming to the tensile requirements of ASTM A 563, Grade A; or round-head square-neck type bolts conforming to ANSI B18.5 with hex units conforming to ANSI B18.2.2. Bolts shall be 5/8 inch in diameter; minimum number of bolts for each coupling shall be as follows (pipe size, number of bolts): 3-inch, 3; 4-inch, 4; 6-inch, 5; 10-inch, 7; 12-inch and 14-inch, 8; 16-inch, 9; 18-inch, 10; 20-inch, 12; 22-inch, 13; 24-inch, 14. Bolt holes in follower rings shall be of a shape to hold fast the necks of the bolts used. Mechanically coupled joints using a sleeve-type mechanical coupling shall not be used as an optional method of jointing except where pipeline is adequately anchored to resist of jointing except where pipeline is adequately anchored to resist tension pull across the joint.

4. Rubber gaskets for push-on joints shall meet requirements of ASTM F 477. Lubricants shall be suitable for lubricating joint components in potable water systems. They shall be non-toxic and shall not support the growth of bacteria and shall not contribute taste or odor to water systems flushed in accordance with AWWA Standard D601.

- C. Tracer wire shall be bare copper or aluminum wire not less than 0.10 inch in diameter and shall be provided in sufficient length to be continuous over each separate run of nonmetallic pipe below grade, in addition to location/identification tape.

2.3 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

- B. Tubular-Sleeve Pipe Couplings:

1. Manufacturers: Subject to compliance with requirements:

- a. Dresser, Inc.
- b. Hays Fluid Controls.
- c. Viking Johnson.
- d. Or equal.

2. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.

- a. Standard: AWWA C219.
- b. Center-Sleeve Material: Stainless steel.
- c. Gasket Material: Natural or synthetic rubber.
- d. Pressure Rating: 200 psig minimum.

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e. Metal Component Finish: Corrosion-resistant coating or material.

C. Retainer Glands:

1. Retainer glands shall be ductile iron mechanical joint set-screw type, installed in accordance with manufacturer's directions, with set screws tightened uniformly to 80 foot pounds torque. This type of anchorage may be used at any location instead of concrete anchorage subject to approval and shall be used where indicated and where concrete anchorage is not practicable.

D. Flexible Connectors:

1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
2. Ferrous-Metal Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.

E. Dielectric Fittings:

1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
2. Dielectric Unions:
 - a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Pressure Rating: 250 psig.
 - 3) End Connections: Solder-joint copper alloy and threaded ferrous.
3. Dielectric Flanges:
 - a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Factory-fabricated, bolted, companion-flange assembly.
 - 3) Pressure Rating: 300 psig.
 - 4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
4. Dielectric-Flange Insulating Kits:
 - a. Description:
 - 1) Nonconducting materials for field assembly of companion flanges.
 - 2) Pressure Rating: 150 psig.
 - 3) Gasket: Neoprene or phenolic.

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- 4) Bolt Sleeves: Phenolic or polyethylene.
- 5) Washers: Phenolic with steel backing washers.

2.4 VALVES

A. Manufacturers: Subject to compliance with requirements:

1. Clow Valve Co.
2. Kennedy Valve Division.
3. Mueller Co.
4. Or equal.

B. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

C. AWWA, Cast-Iron Gate Valves:

1. Non-rising-Stem, Resilient-Seated Gate Valves:

- a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.

- 1) Standard: AWWA C509.
- 2) Minimum Pressure Rating: 200 psig.
- 3) End Connections: Mechanical joint.
- 4) Interior Coating: Complying with AWWA C550.

D. UL/FMG, Cast-Iron Gate Valves:

1. UL/FMG, Non-Rising-Stem Gate Valves:

- a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.

- 1) Standards: UL 262 and FMG approved.
- 2) Minimum Pressure Rating: 175 psig.
- 3) End Connections: Flanged.

2. OS&Y, Rising-Stem Gate Valves:

- a. Description: Iron body and bonnet and bronze seating material.

- 1) Standards: UL 262 and FMG approved.
- 2) Minimum Pressure Rating: 175 psig.
- 3) End Connections: Flanged.

E. Bronze Gate Valves:

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1. Non-rising-Stem Gate Valves:
 - a. Description: Class 125, Type 1, bronze with solid wedge, threaded ends, and malleable-iron handwheel.
 - 1) Standard: MSS SP-80.

2.5 VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies:

1. Description: Sleeve and valve compatible with drilling machine.
 - a. Standard: MSS SP-60.
 - b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
 - c. Valve: AWWA, cast-iron, non-rising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5-1/4 inches in diameter.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
2. Install 24-inch diameter round concrete valve pad around valve box. 24-inch round valve pad shall be Sigma HRVP24 or equal.

C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

1. Post indicator valves, where required, shall be furnished with a padlock and angle wrench which can be locked at side of post when not in use. Lock indicator in open position. Padlock shall be pin tumbler mechanism, five or more pins, two-inch solid brass case, steel shackle, with chain and shackle, length as required. Chain shall be securely fastened to post indicator. See Section 211300 "Fire Suppression Systems."

2.6 FIRE HYDRANTS

- A. Hydrants shall conform to AWWA C502 design. Hydrants shall have 6-inch inlet, 5-1/4 inch valve opening, one 4-1/2 inch pumper connection, and two 2-1/2 inch hose connections. Inlet shall have mechanical-joint or push-on joint end except where

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flanged end is indicated; end shall conform to the applicable requirements as specified for the joint. Size and shape of operating nuts and threads on hose and pumper connections shall be as specified in AWWA C502. Provide "traffic type" hydrant with breakable features as defined in AWWA C503. The traffic type hydrant shall have special couplings joining upper and lower sections of hydrant barrel and upper and lower sections of hydrant stem. This type of hydrant shall be especially designed to have the special couplings break from a force not less than that, which would be imposed by a moving vehicle; hydrant shall operate properly under normal conditions.

2.7 ENCASEMENT FOR PIPING

- A. Standard: ASTM A 674 or AWWA C105/A21.5.
- B. Material: Linear low-density polyethylene film of 0.008-inch or high-density, cross-laminated polyethylene film of 0.004-inch minimum thickness.
- C. Form: Sheet or tube.
- D. Color: Black or natural.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Refer to Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Ductile iron pipe and fittings shall be utilized under roadways, drives, parking areas, and when burial depth is less than 30".
- D. Underground water-service piping NPS 3/4 to NPS 3:
 - 1. PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.
- E. Underground water-service piping NPS 4 to NPS 10:
 - 1. PVC, Schedule 40 pipe; PVC, Schedule 40 socket fittings; and solvent-cemented joints.

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2. NPS 4 through NPS 10: PVC, AWWA Class 200 pipe; PVC, AWWA Class 200 fabricated fittings; and gasketed joints.

F. Underground Fire-Service-Main Piping NPS 4 to NPS 12 shall be any of the following:

1. PVC, AWWA Class 200 pipe listed for fire-protection service; PVC Class 200 fabricated fittings; and gasketed joints.

3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, non-rising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2-1/2 and smaller installation.

B. Valves NPS 3 and larger:

1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, non-rising-stem, resilient-seated gate valves with valve box.
2. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FMG, cast-iron, non-rising-stem gate valves with indicator post.

3.4 PIPING INSTALLATION

A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.

B. Water lines shall not be laid in the same trench with other utilities.

C. Water pipe shall not be laid closer horizontally than 10 feet from a sewer except where the bottom of the water pipe shall be fully encased in concrete 4 inches thick or shall be made of ductile iron pipe with no joint located within 3 feet horizontally of the crossing.

D. Sewer pipes which cross over water lines shall for a distance of at least 10 feet each side of the crossing shall be fully encased in concrete 4 inches thick or shall be made of ductile iron pipe with no joint located within 3 feet horizontally of the crossing.

E. Pipe passing through walls or valve pits and structures shall be ductile iron and shall be provided with iron wall sleeves. Annular space between walls and sleeves shall be filled with rich cement mortar. Annular space between pipe and sleeves shall be filled with mastic.

F. Where connections are made between new work and existing mains, the connections shall be made by using specials and fittings to suit the actual conditions. Connections to be made under pressure or in the dewatered condition shall be installed as approved

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by the Architect and according to the recommendations of the manufacturer of pipe being tapped and/or connected.

- G. Pipe, fittings, valves, and accessories will be carefully inspected by the Architect before and after installation and those found defective will be rejected. Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories and maintain in a clean condition.
- H. Cut pipe accurately to measurements established at the site and work into place without springing or forcing. Replace by one of the proper dimensions any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted.
- I. Grade the pipeline in straight lines, taking care to avoid the formation of any dips or low points. Support pipe at its proper elevation and grade, taking care to secure firm and uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports where necessary for fastening work into place.
- J. Make proper provision for expansion and contraction of pipelines.
- K. Keep trenches free of water until joints have been properly made. Do not lay pipe when conditions of trench or weather are unsuitable.
- L. Foreign material shall be prevented from entering the pipe while it is being placed in the trench.
- M. As each length of pipe is placed in the trench, the joint shall be assembled, and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill materials.
- N. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the Architect. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation should the trench fill with water.
- O. Rubber gaskets that are not to be installed immediately shall be stored in a cool dark place.
- P. Comply with NFPA 24 for fire-service-main piping materials and installation.
 - 1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- Q. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
 - 1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.

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- R. Bury piping with depth of cover over top at least 30 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:
 - 1. Under Driveways: With at least 36 inches cover over top.
 - 2. Under Railroad Tracks: With at least 48 inches cover over top.
 - 3. In Loose Gravelly Soil and Rock: With at least 12 inches additional cover.
- S. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- T. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
 - 1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- U. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- V. See Section 221116 "Domestic Water Piping" for potable-water piping inside the building.

3.5 JOINT CONSTRUCTION

- A. Make pipe joints according to the following:
 - 1. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
 - 2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
 - 3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
 - 4. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 - a. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
 - b. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flange kits.
 - c. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.6 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

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- B. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- C. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
- D. Valves and valve boxes shall be set plumb. Valve boxes shall be centered on the valves.
- E. Earth fill shall be carefully tamped around each valve box to a distance of 4 feet on all sides of the box, or to the undisturbed trench face if less than 4 feet.

3.7 ANCHORAGE INSTALLATION

- A. Provide thrust blocks for plugs, caps, tees, and bends of 22-1/2 degrees or more, either vertically or horizontally, on water lines 2 inches in diameter or larger.
- B. Concrete shall be used to form the thrust block and shall meet Class 3000 PSI concrete as specified in Division 03 Concrete.
- C. Blocking shall be placed between solid ground and the fitting to be anchored. Unless otherwise indicated or directed the base and thrust bearing sides of thrust blocks shall be poured directly against undisturbed earth. The sides of thrust blocks not subject to thrust may be poured against forms.
- D. Blocking shall be placed so that the fitting joints will be accessible for repair.
- E. Steel rods and clamps shall be protected by galvanizing or by coating with bituminous paint.
- F. The total thrust support area required for various pipe sizes and fittings is tabulated as follows:

FITTING	BEARING AREA (FT ²)	
	2" - 4"	6" - 8"
90°	5.3	7.5
45°	3.1	4.5
22.5°	2.0	3.0
Valve or Tee	3.9	5.0

- G. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

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3.8 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Piping may be tested in sections between valves as the work progresses.
- C. Hydrostatic Tests: Test at not less than the pressures listed below for two hours:
 - 1. Domestic cold water service: 150 psig.
 - 2. Fire main service: 200 psig (per NFPA 24).
- D. Pressure Testing Procedure:
 - 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour.
 - 2. Maximum leakage shall not exceed that permitted by AWWA Specification C600 for ductile iron and UNI B-3 for PVC.
 - 3. Remake leaking joints with new materials and repeat test until leakage is within allowed limits. Repeat tests until all tests have been approved.
- E. Prepare reports of testing activities.

3.9 IDENTIFICATION

- A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."
- B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel.

3.10 CLEANING

- A. Before acceptance of potable water operation, each unit of completed water distribution line and water service shall be disinfected meeting AWWA C601. After pressure tests have been made, the unit to be disinfected shall be thoroughly flushed with water until all entrained dirt and mud have been removed before introducing the chlorinating material.
- B. The chlorinating material shall be either liquid chlorine, calcium hypochlorite, or sodium hypochlorite, as specified in this section and the chlorinating material shall provide a dosage of not less than 50 parts per million and shall be introduced into the water lines in an approved manner.

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FACILITY WATER DISTRIBUTION PIPING

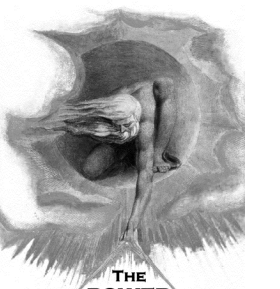
- C. The treated water shall be retained in the pipe long enough to destroy all non-spore-forming bacteria. Except where a shorter period is approved, the retention time shall be at least 24 hours and shall produce not less than 10 ppm of chlorine throughout the line at the end of the retention period.
- D. Valves on the lines being disinfected shall be opened and closed several times during the contact period, and then the line shall be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm.
- E. From several points in the system, the Contractor shall take samples of water in properly sterilized containers for bacterial examination. The disinfection shall be repeated until tests indicate the absence of pollution for a least two (2) full days. The piping will not be accepted until satisfactory bacteriological results have been obtained and verified by an independent testing laboratory. Transmit copy of test results to Architect for approval.
- F. Corporation stops shall match those of the customer service connections; provide these as required for testing and sterilizing, and after that use leave them in place with their outlets plugged. Customer service corporation stops may also be used for testing and sterilizing.
- G. Chlorinating materials for disinfection shall be either liquid chlorine conforming to AWWA Specification B301 or calcium or sodium hypochlorite conforming to AWWA Specification B300.
- H. Prepare reports of purging and disinfecting activities.

Section 22 11 13
FACILITY WATER DISTRIBUTION PIPING

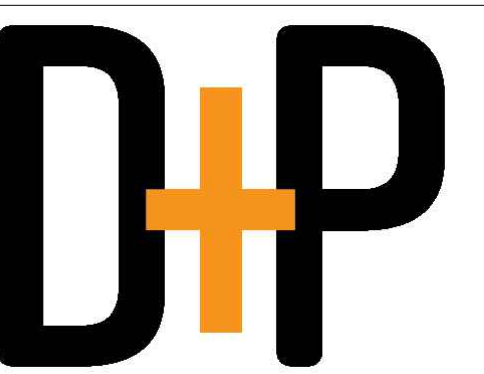
Facility Water Piping Test Log						
Date	System	Description of Piping Section Tested	Test Press. (psig)	Test Duration (hours)	Results Pass/Fail	Witness (Contractor) Initials

This form shall be completed and submitted with the project closeout documents. Contractor shall copy this form if more sheets are required. Piping pressure test log shall be kept at project site and shall be made available to the Architect upon request.

END OF SECTION 221113



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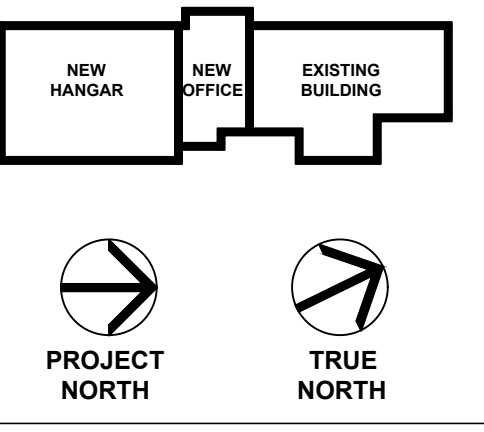
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ELECTRICAL RENOVATION SITE PLAN
Scale: 1" = 60'-0"

KEY PLAN



See

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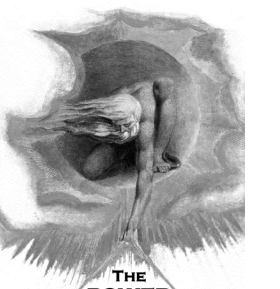
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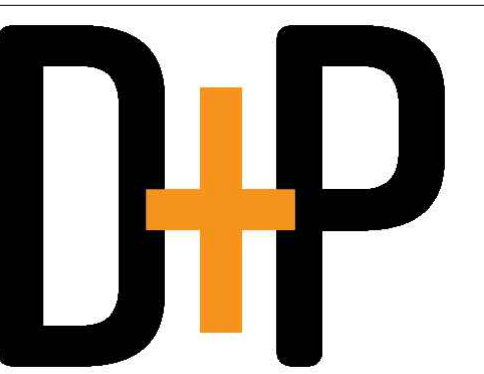
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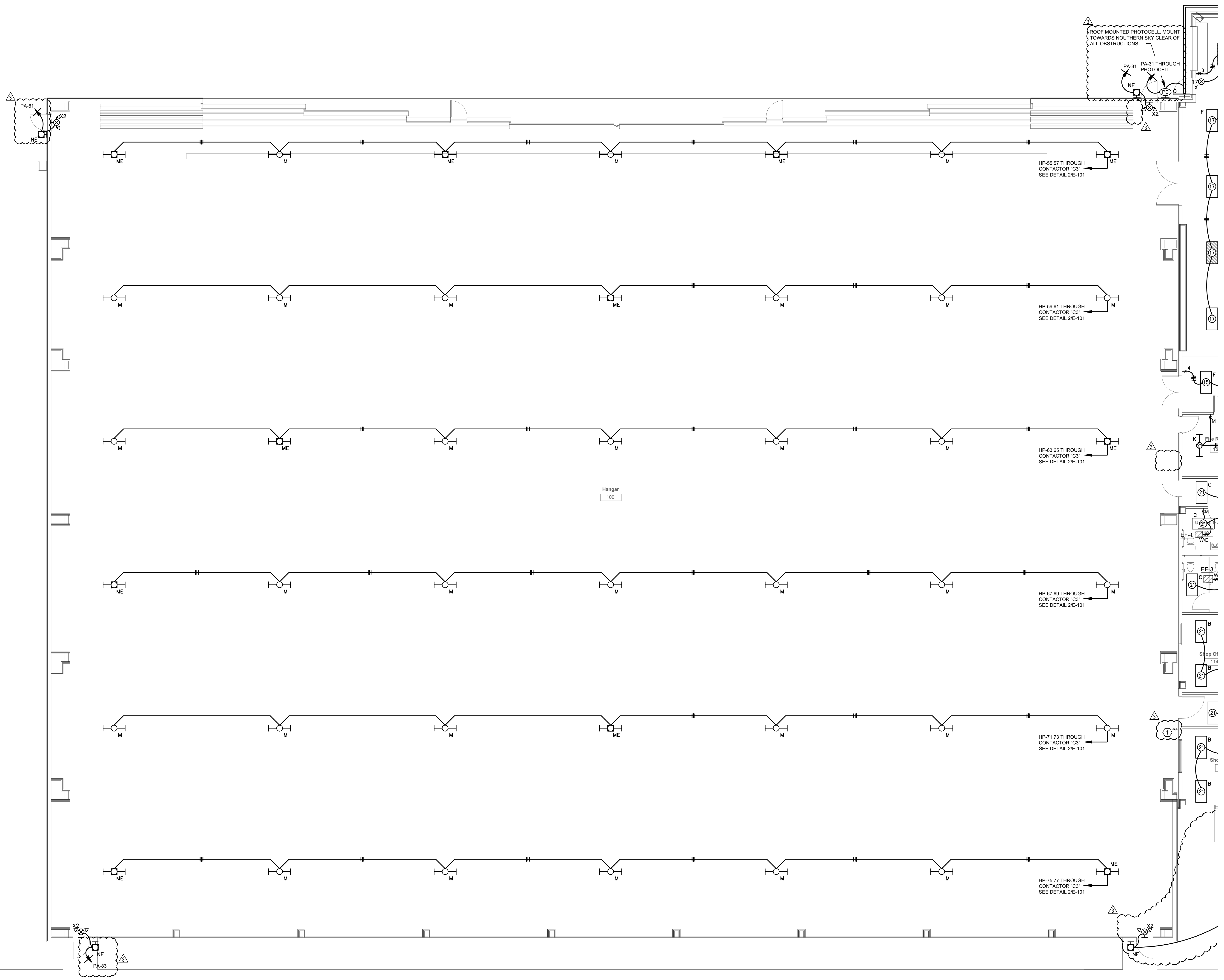
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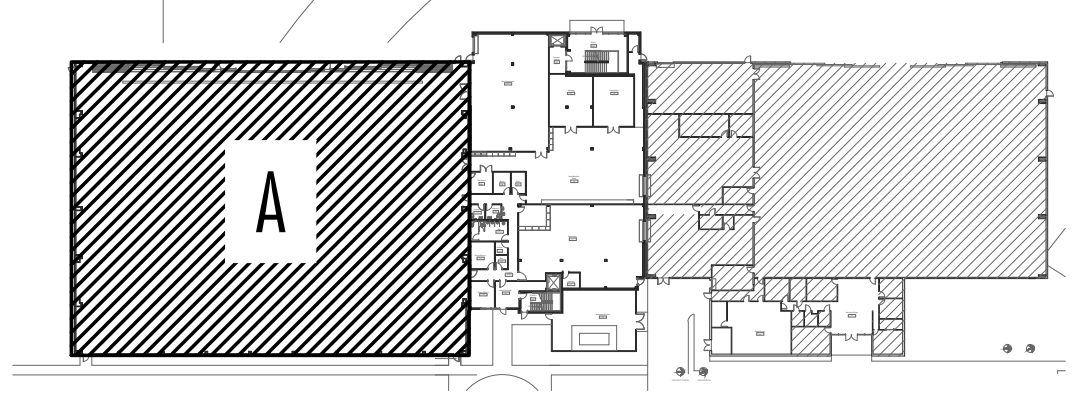
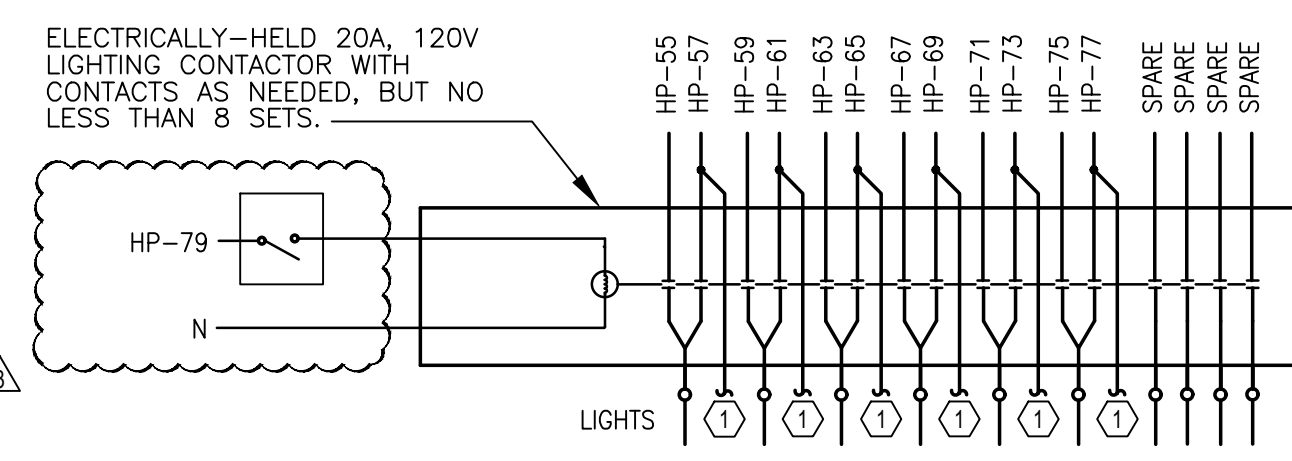
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LIGHTING CONTACTOR KEYED NOTES

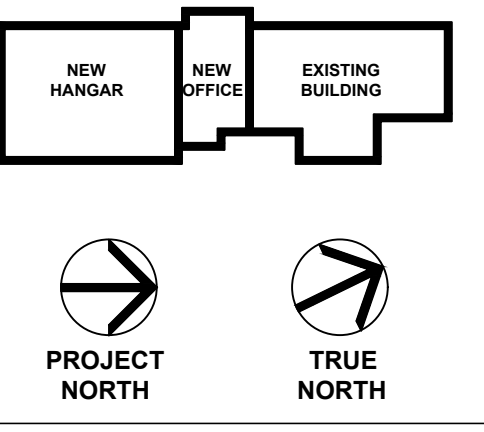
Mark	Description
①	PROVIDE UNSWITCHED HOT TO EMERGENCY BATTERY PACKS.



KEY PLAN - 1ST FLOOR

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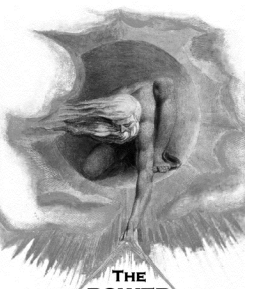
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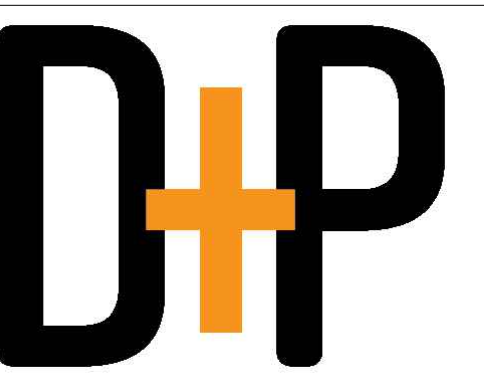
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E-101



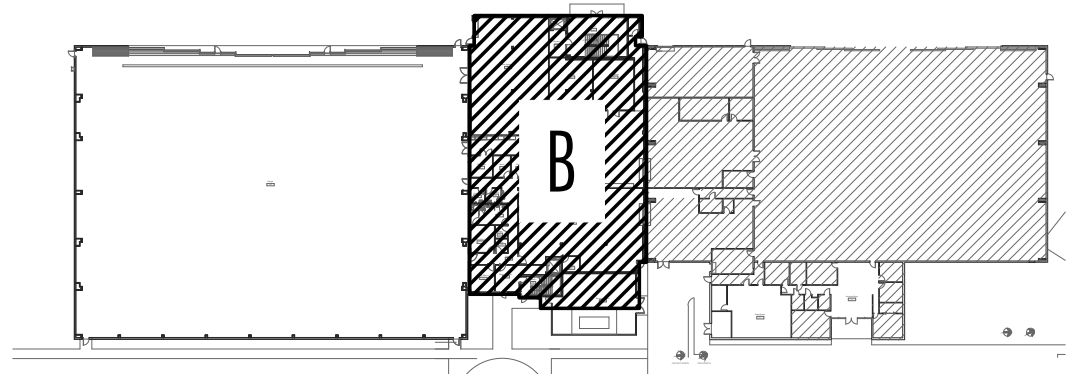
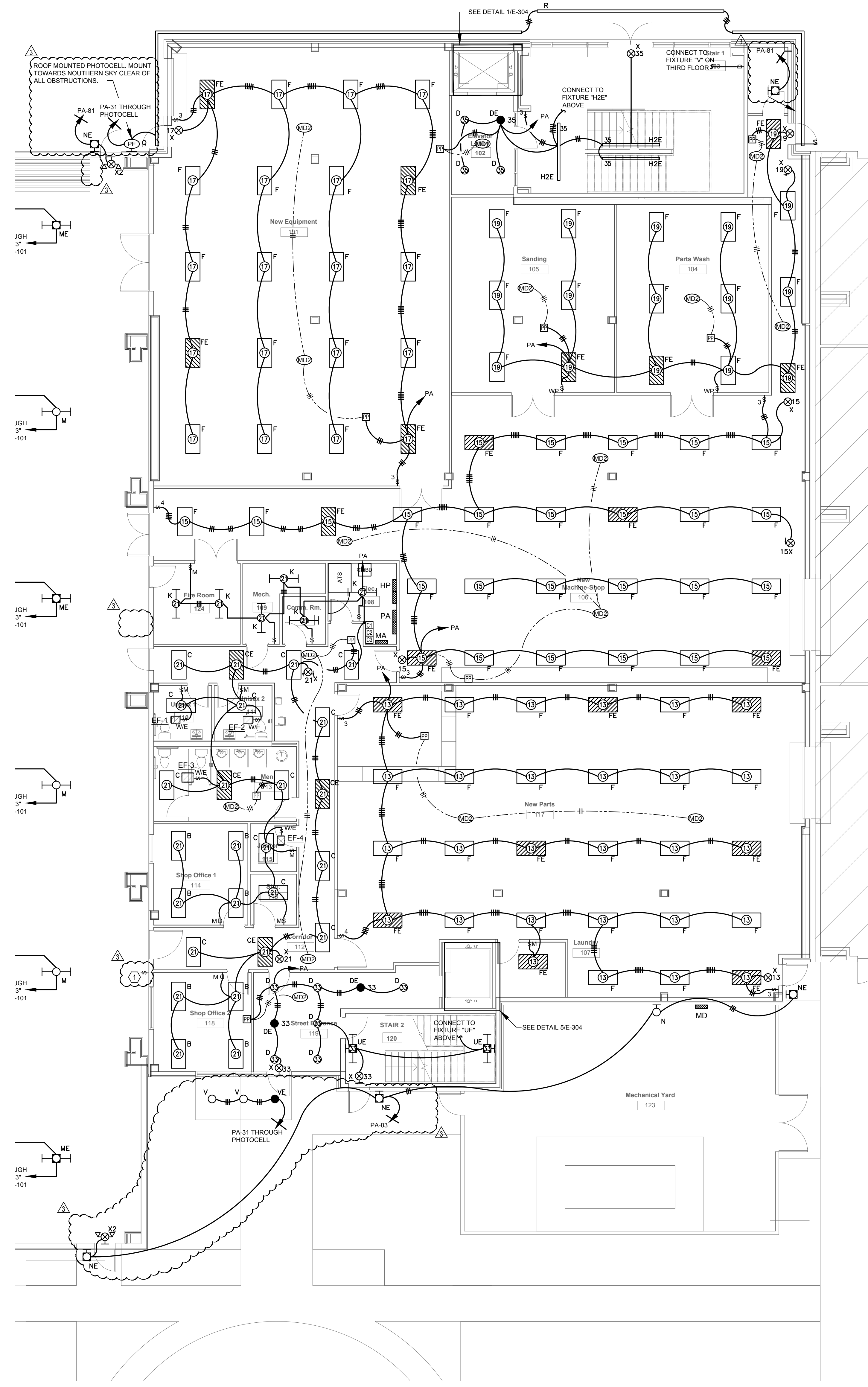
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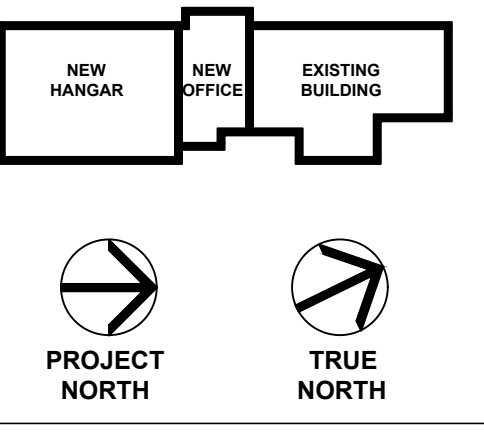
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KEY PLAN - 1ST FLOOR

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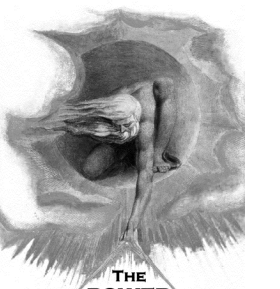
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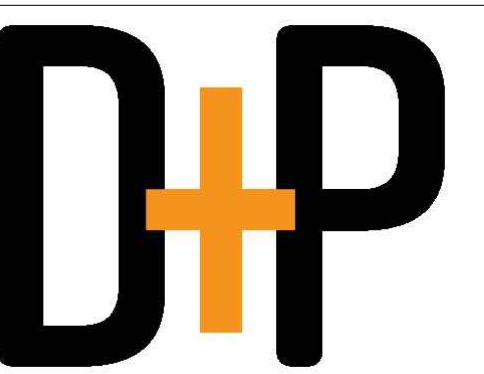
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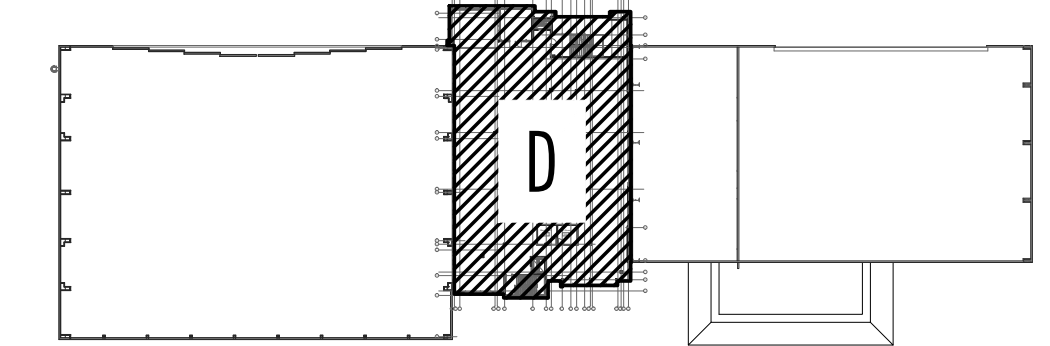
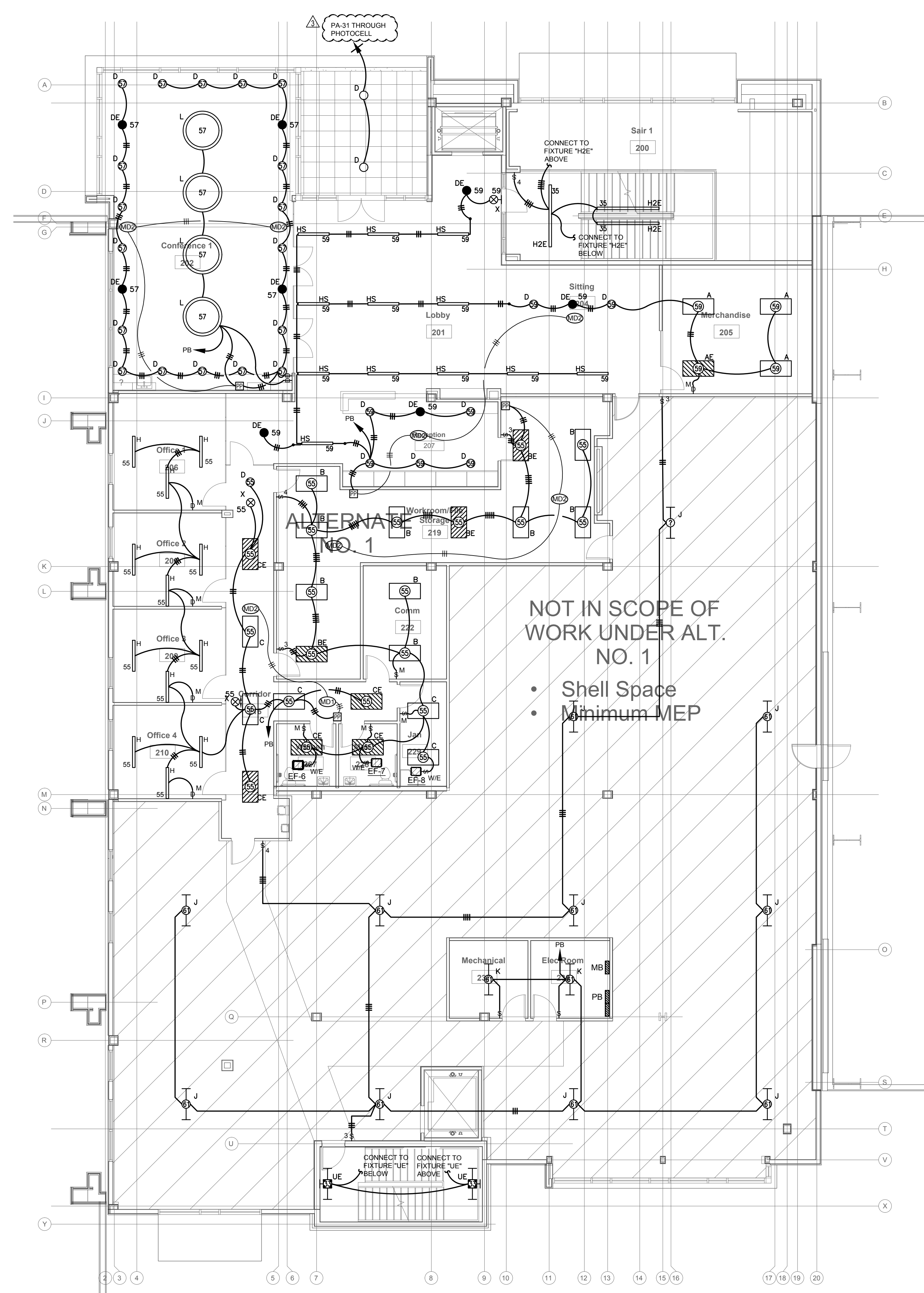
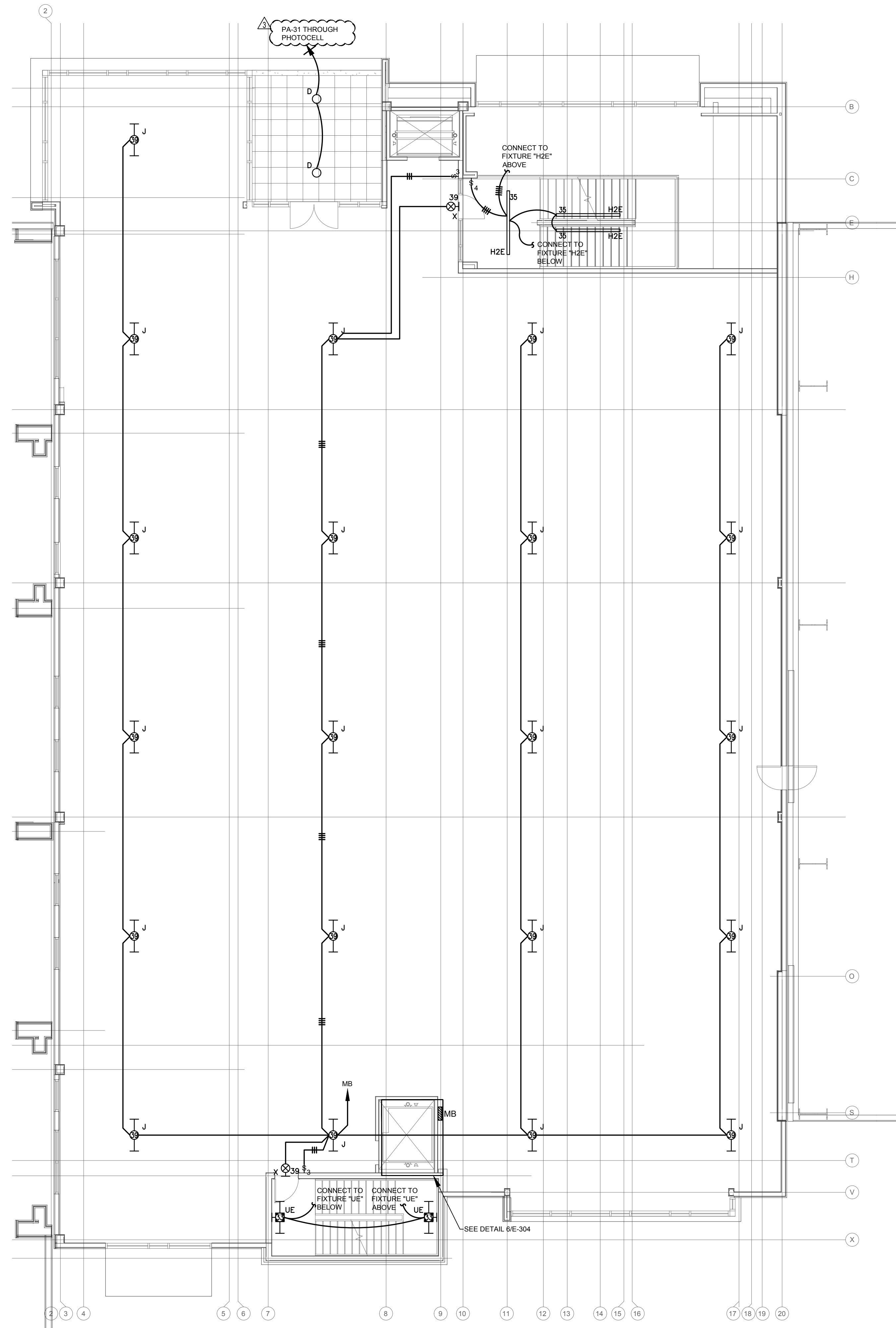
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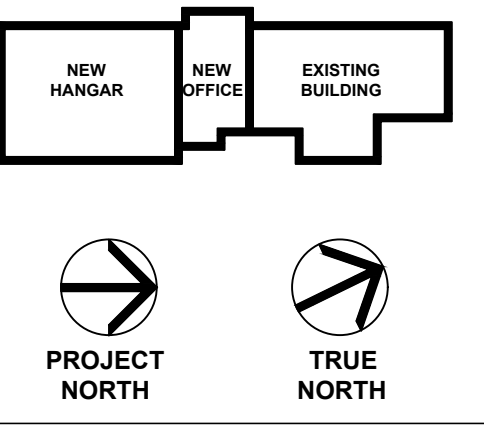
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KEY PLAN - 2ND FLOOR

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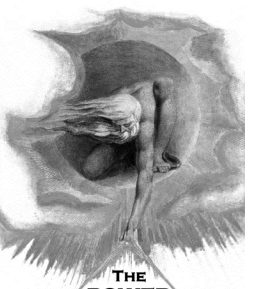
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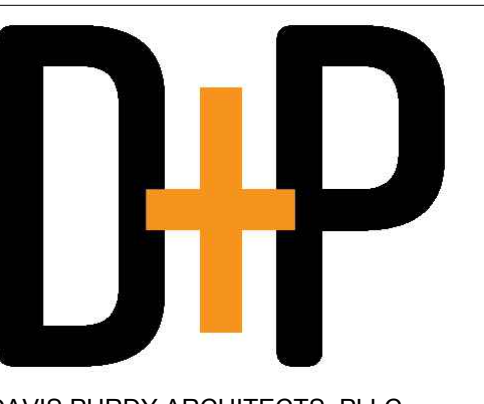
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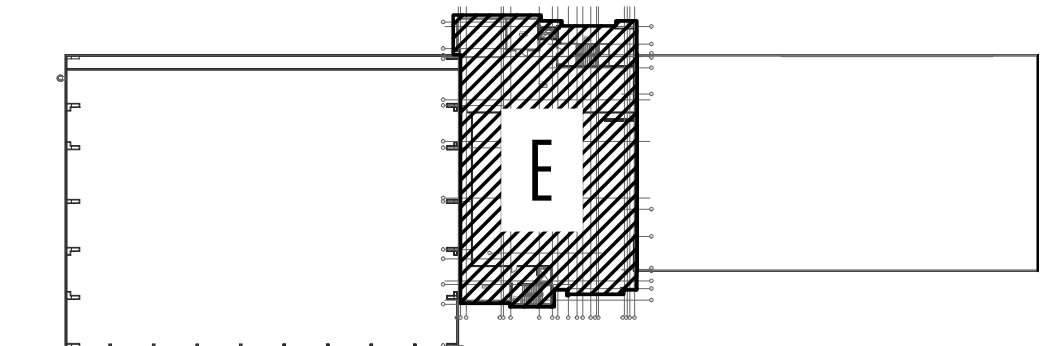
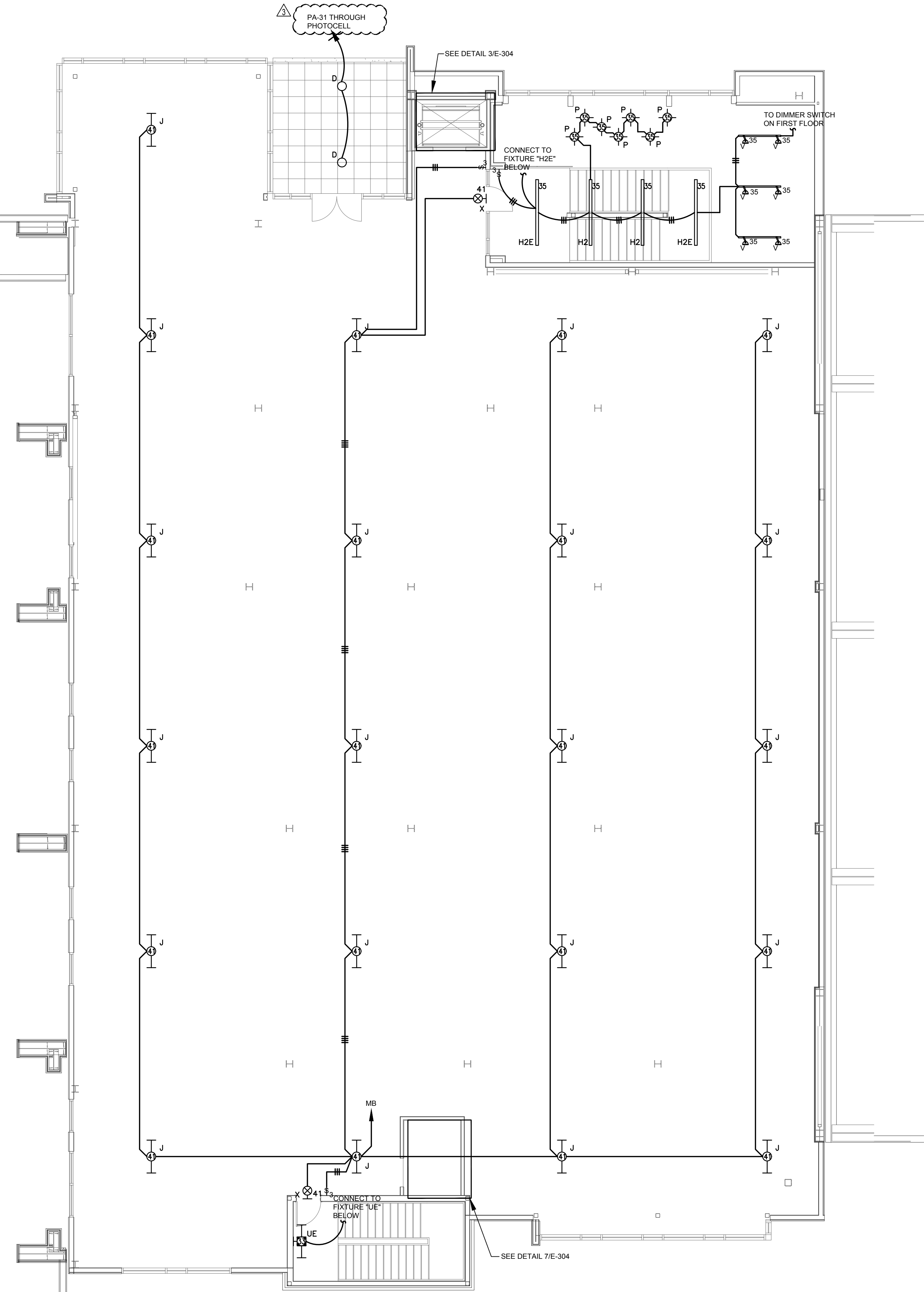
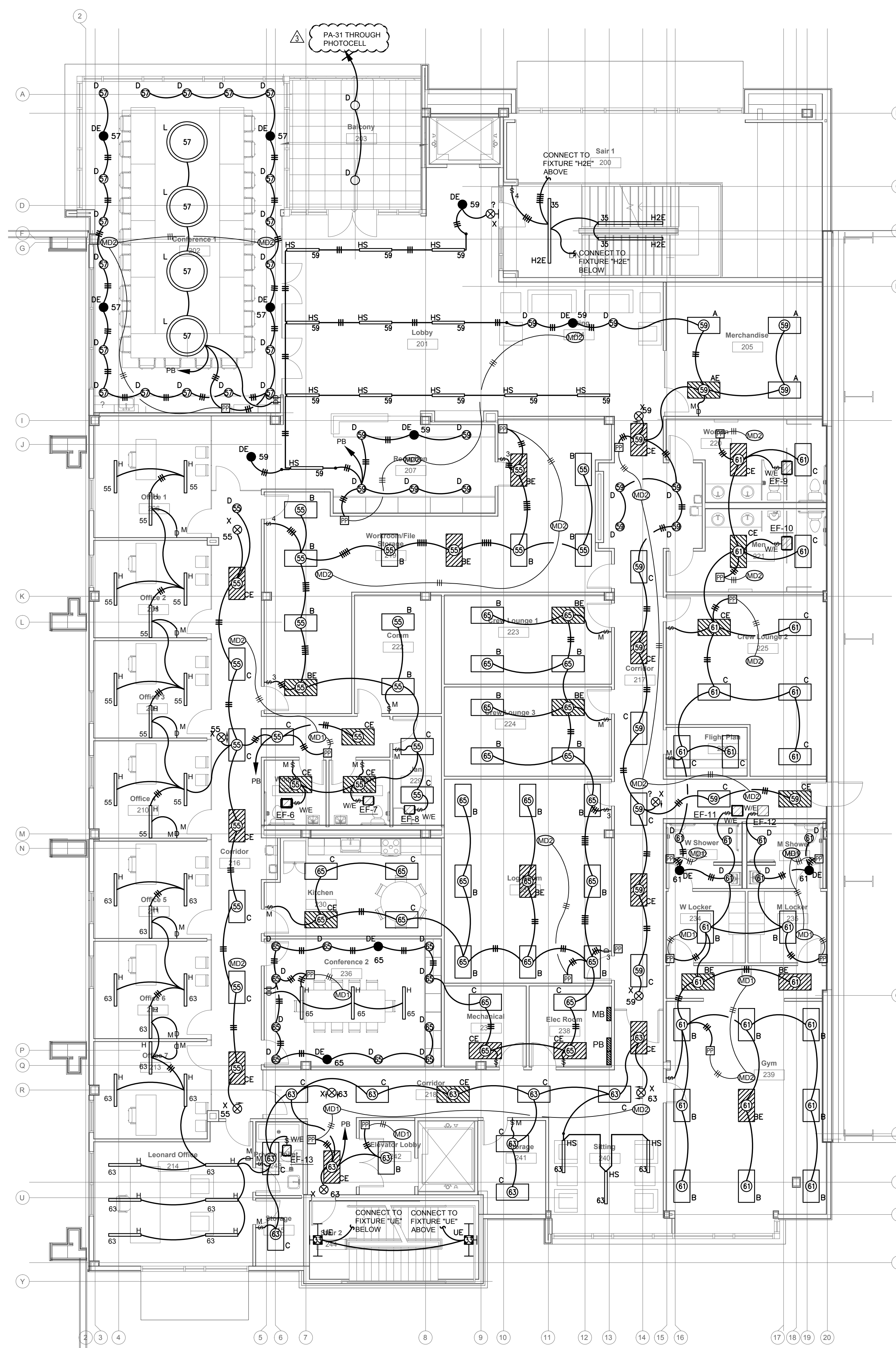
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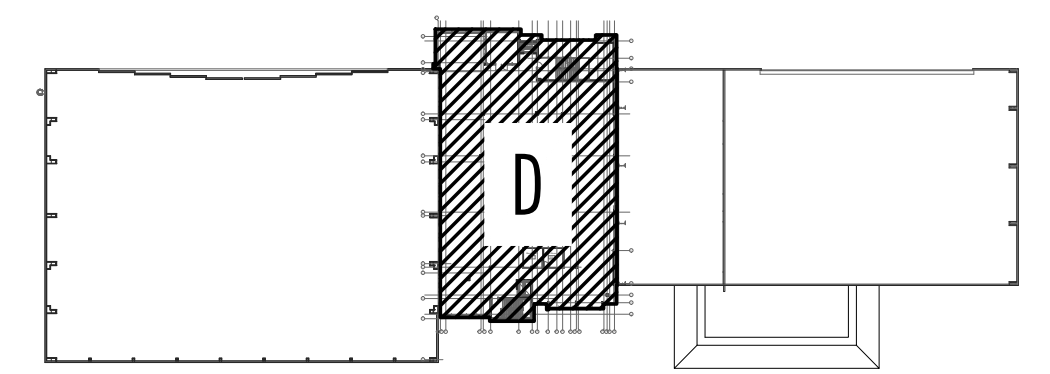
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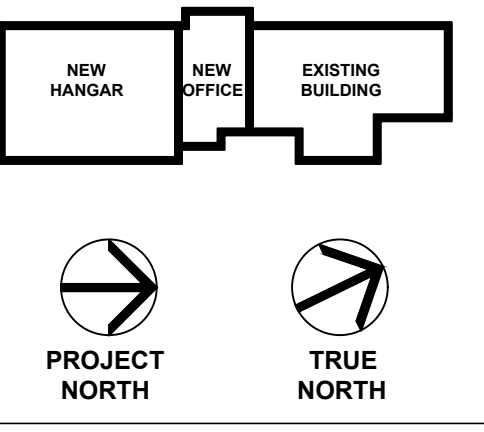
KEY PLAN - 3RD FLOOR



KEY PLAN - 2ND FLOOR

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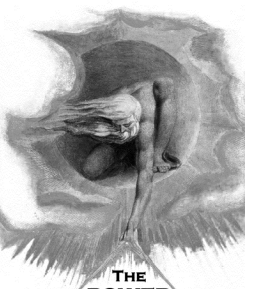
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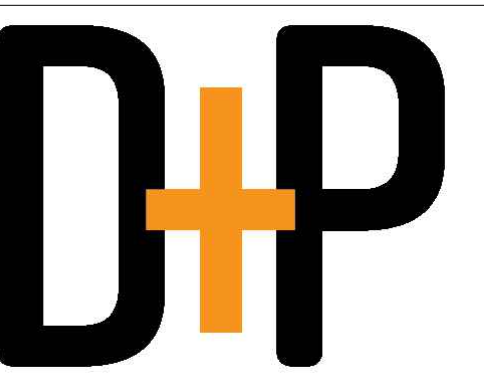
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Project No. 19-006 Date 2/14/20

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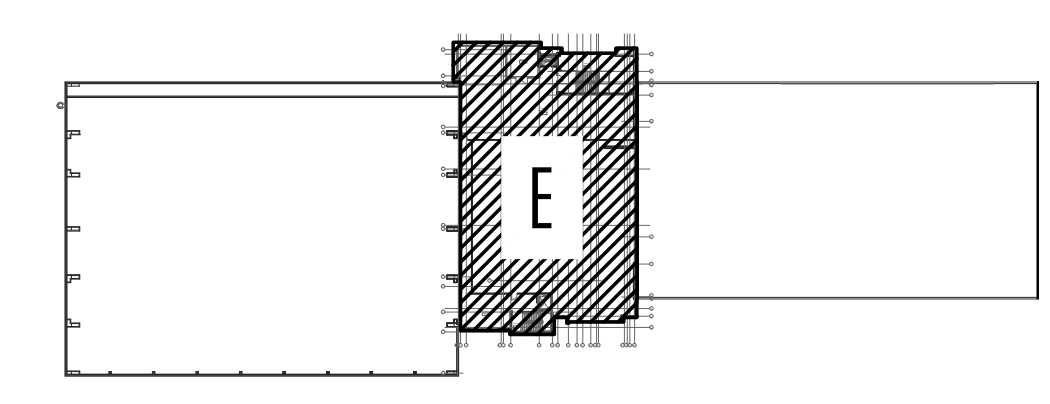
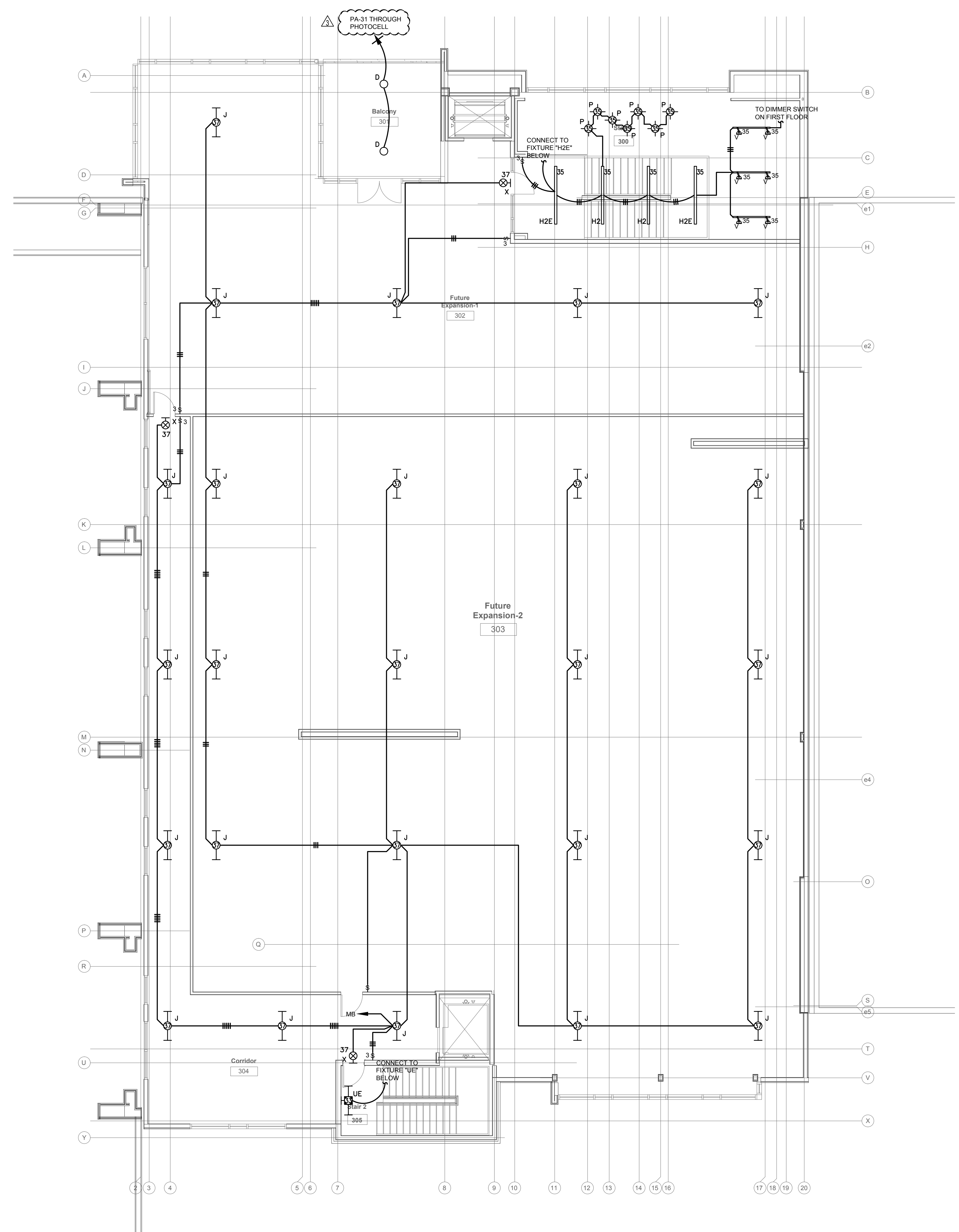
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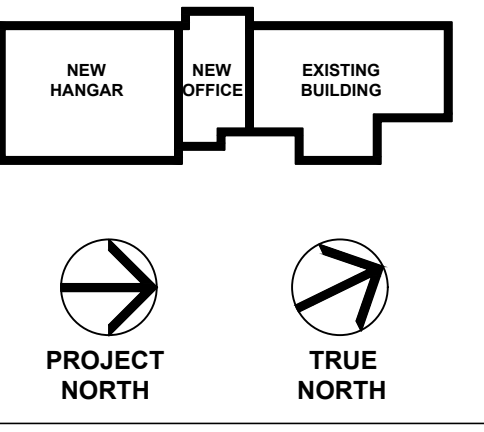
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KEY PLAN - 3RD FLOOR

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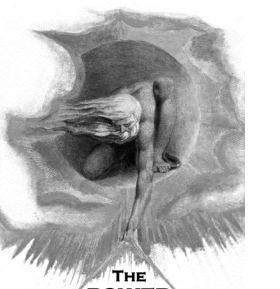
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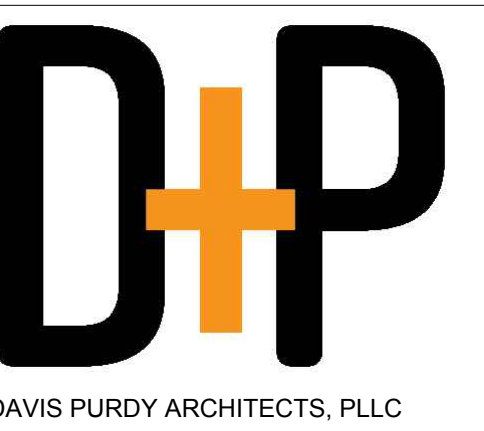
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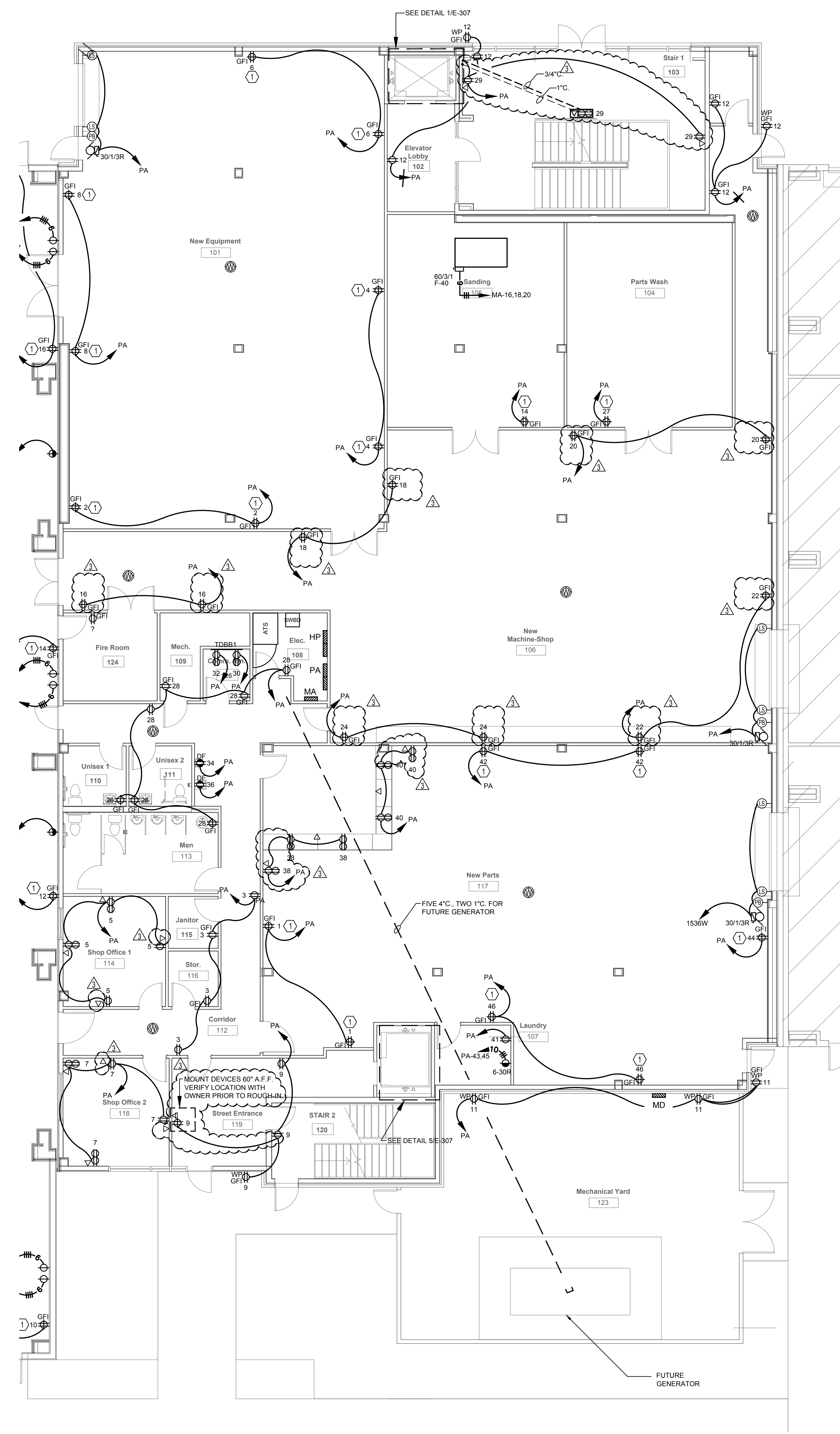
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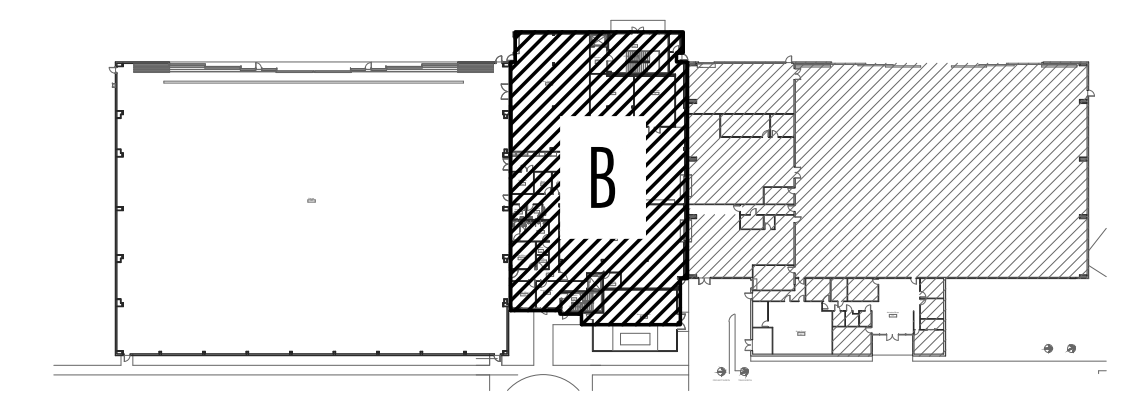
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1 PARTIAL POWER PLAN - FIRST FLOOR - PART B
E-202 Scale: 1/8" = 1'-0"

MASTER KEYED NOTES	
Mark	Description
①	MOUNT RECEPTACLE 36" AFF.
②	PROVISIONS FOR TELEVISION. VERIFY EXACT MOUNTING HEIGHT WITH ARCHITECT PRIOR TO ROUGH-IN.

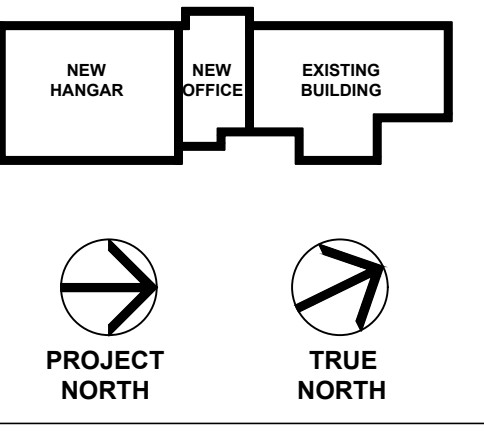
NOTE:
IF A KEYED NOTE IS NOT SHOWN ON A DRAWING, THEN THE KEYED NOTE SHALL BE IGNORED FOR THAT PARTICULAR DRAWING. THIS SHALL DIFFER FROM DRAWING TO DRAWING.



KEY PLAN - 1ST FLOOR

ADDENDUM #4 03-17-2020

KEY PLAN



Scale

No.	Description	Date
3	100% Construction Documents	2/14/20
2	100% Design Development	10/17/19
1	100% Schematic Design	8/7/19

MERIDIAN AIRPORT AUTHORITY
DEAN AIRCRAFT SERVICE

HANGAR ADDITIONS & ALTERATIONS

2913 Airport Blvd., South St.
Meridian, MS 39307

Sheet Title
PARTIAL POWER PLAN 1ST FLOOR PART B

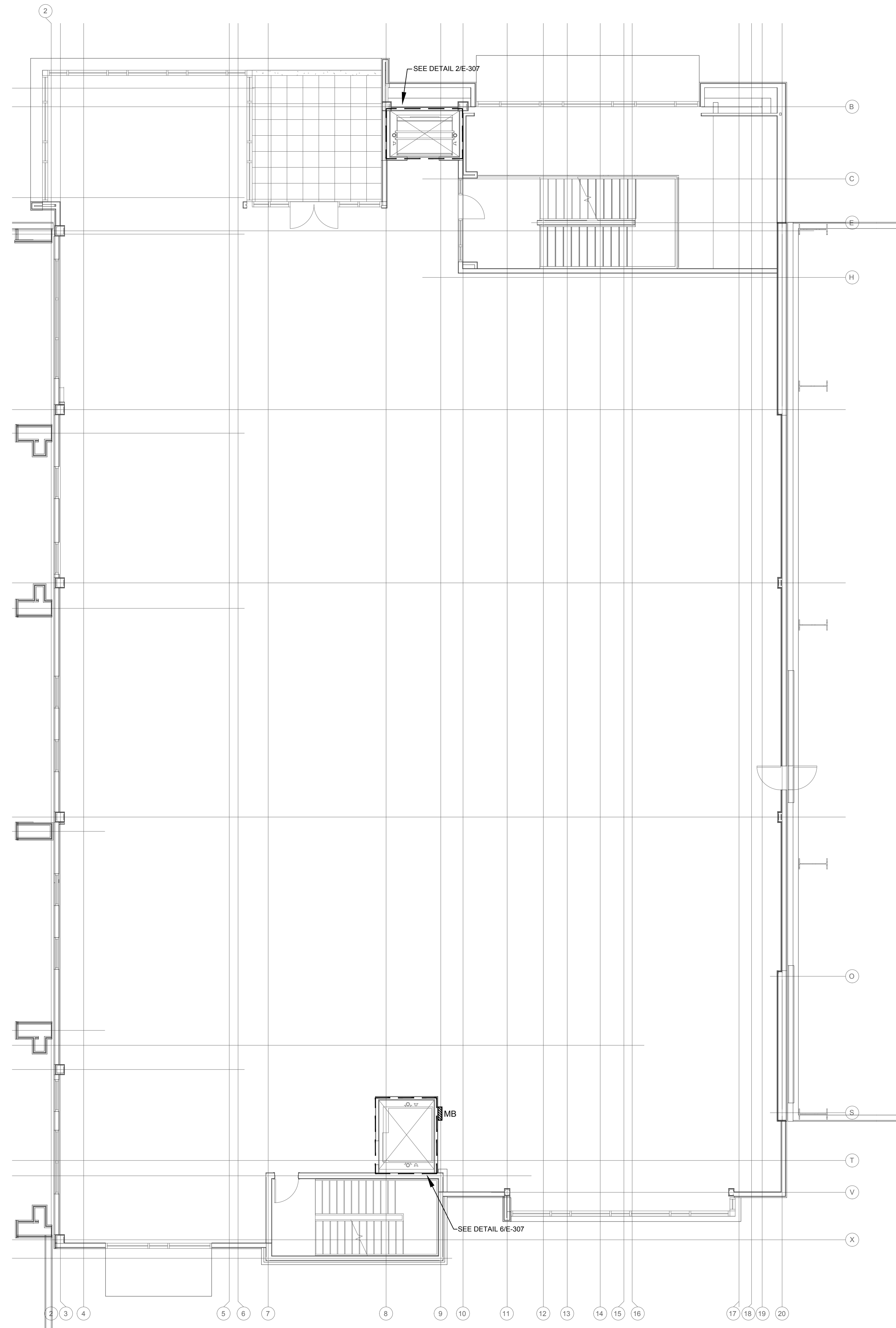
Project No. 19-006 Date 2/14/20

E-202

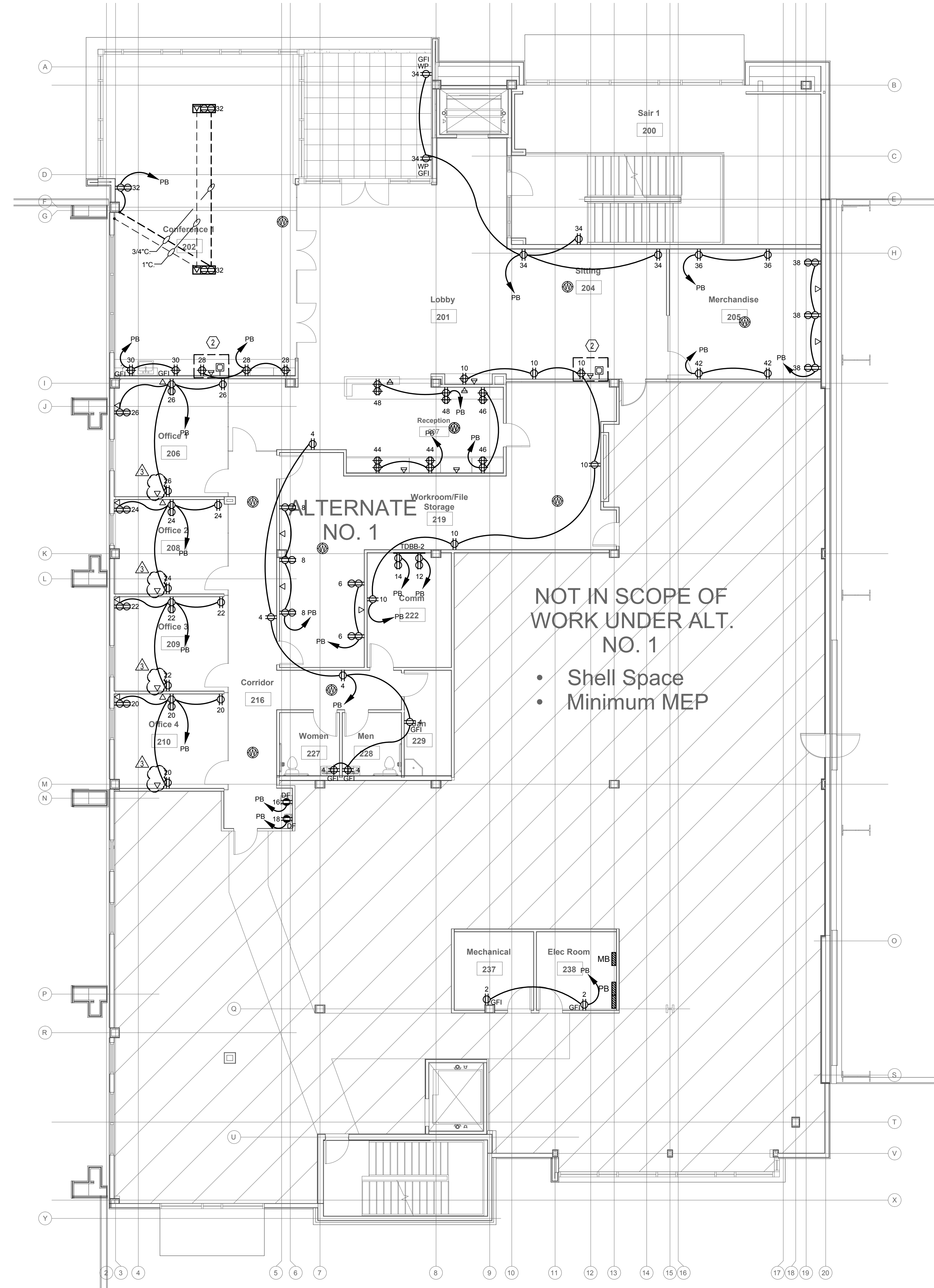
MASTER KEYED NOTES	
Mark	Description
①	MOUNT RECEPTACLE 36" A.F.F.
②	PROVISIONS FOR TELEVISION. VERIFY EXACT MOUNTING HEIGHT WITH ARCHITECT PRIOR TO ROUGH-IN.
NOTE: IF A KEYED NOTE IS NOT SHOWN ON A DRAWING, THEN THE KEYED NOTE SHALL BE IGNORED FOR THAT PARTICULAR DRAWING. THIS SHALL DIFFER FROM DRAWING TO DRAWING.	

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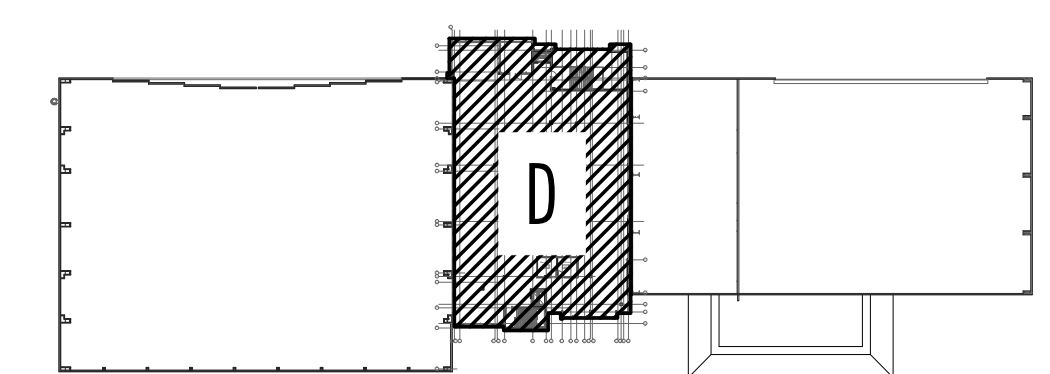
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1 PARTIAL POWER PLAN - SECOND FLOOR - PART D
E-204 Scale: 1/8" = 1'-0"

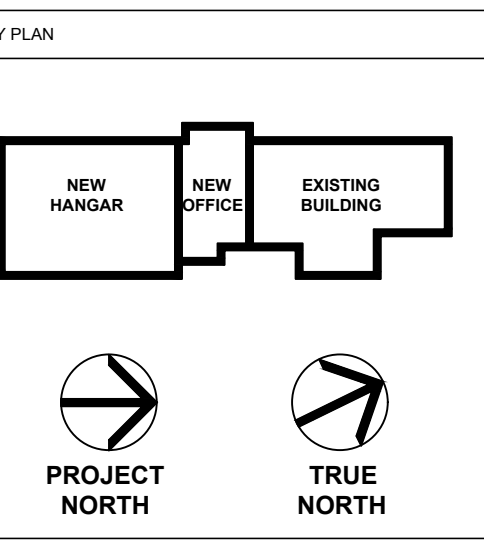


1 PARTIAL POWER PLAN - SECOND FLOOR - ALTERNATE #1 - PART D
E-204 Scale: 1/8" = 1'-0"



KEY PLAN - 2ND FLOOR

ADDENDUM #4 03-17-2020



No.	Description	Date
3	100% Construction Documents	2/14/20
2	100% Design Development	10/17/19
1	100% Schematic Design	8/7/19

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HANGAR ADDITIONS & ALTERATIONS
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Sheet Title
PARTIAL POWER PLAN 2ND FLOOR PART D

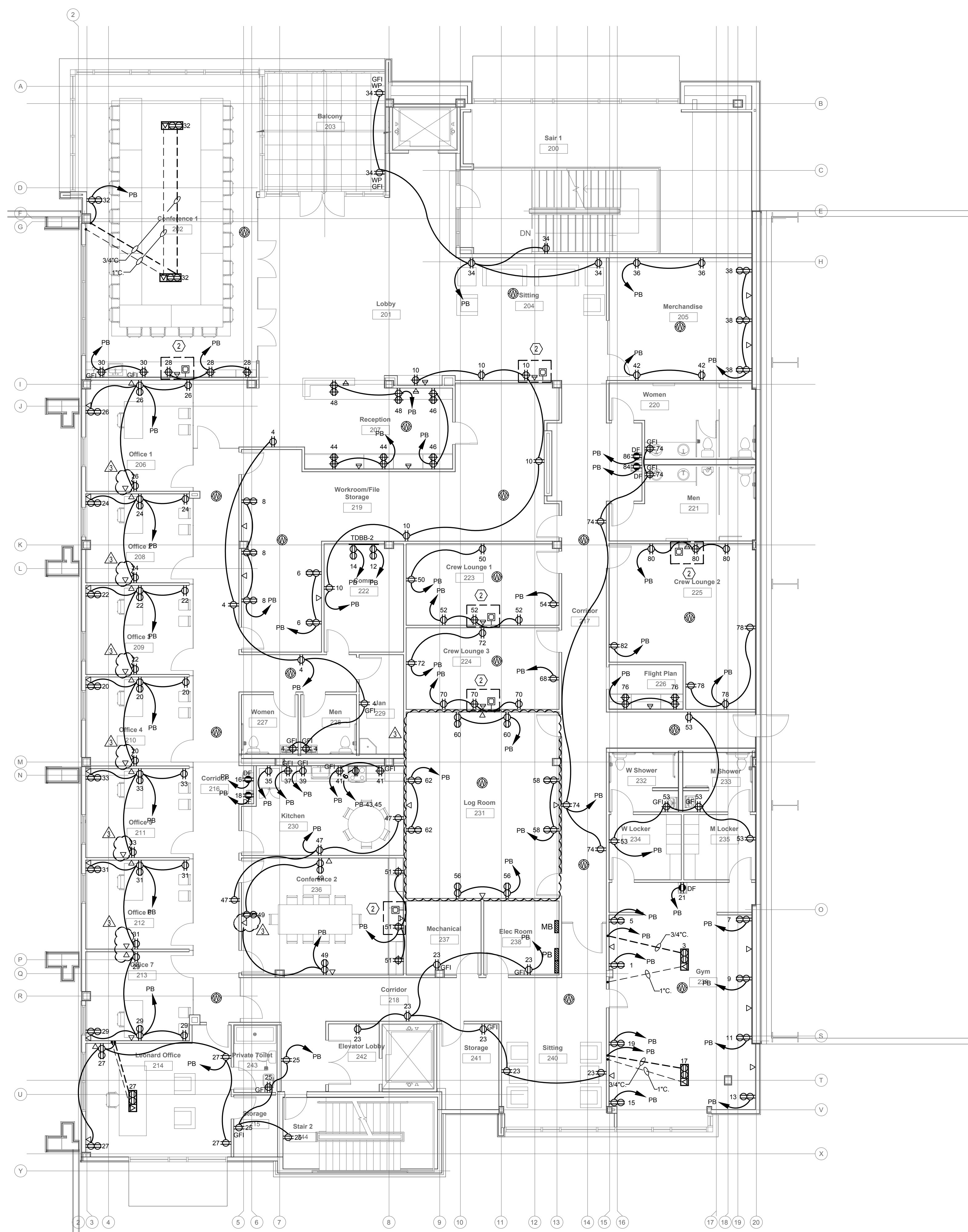
Project No. 19-006 Date 2/14/20

E-204

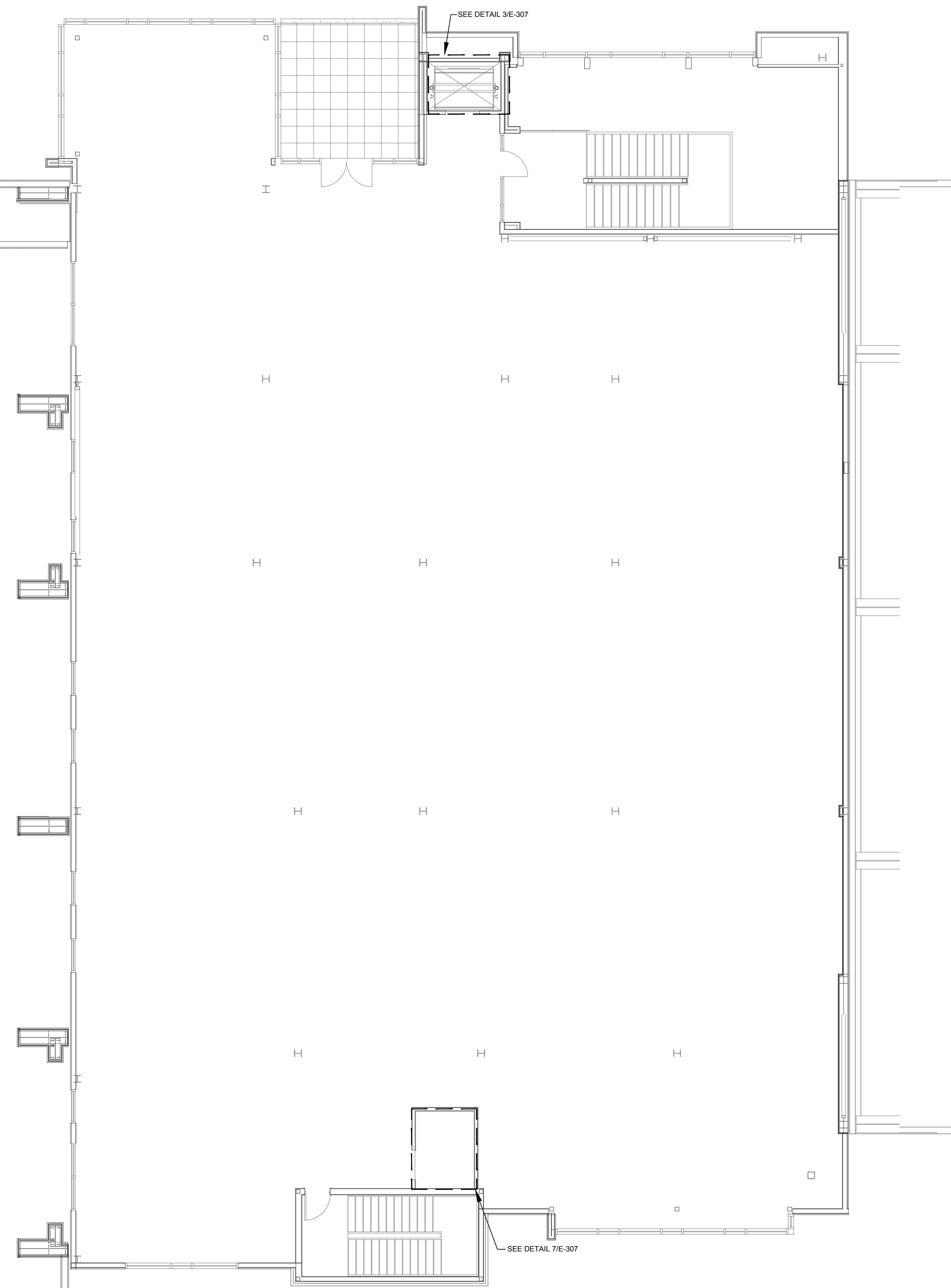
MASTER KEYED NOTES	
Mark	Description
①	MOUNT RECEPTACLE 36" A.F.F.
②	PROVISIONS FOR TELEVISION. VERIFY EXACT MOUNTING HEIGHT WITH ARCHITECT PRIOR TO ROUGH-IN.
NOTE: IF A KEYED NOTE IS NOT SHOWN ON A DRAWING, THEN THE KEYED NOTE SHALL BE IGNORED FOR THAT PARTICULAR DRAWING. THIS SHALL DIFFER FROM DRAWING TO DRAWING.	

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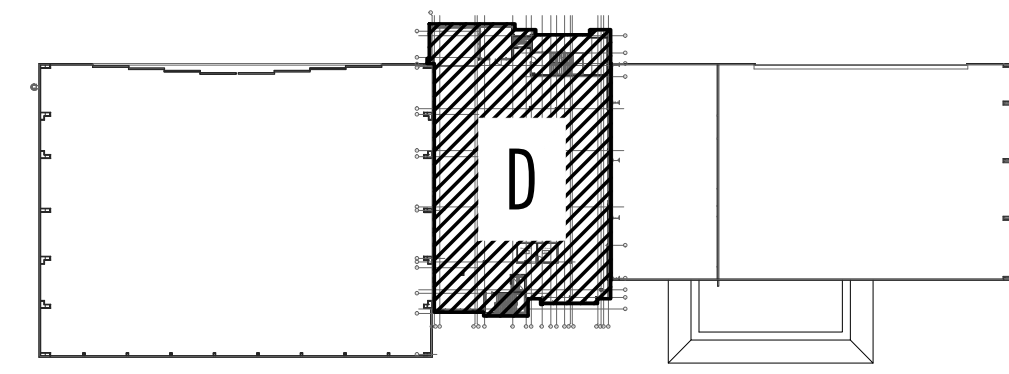
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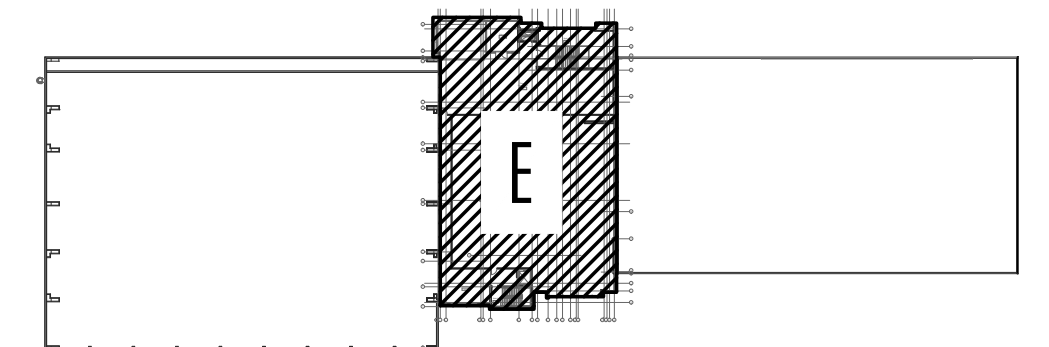
1 PARTIAL POWER PLAN - SECOND FLOOR - ALTERNATE #2 - PART D
 Scale: 1/8" = 1'-0"



1 PARTIAL POWER PLAN - THIRD FLOOR - BASE BID - PART D
 Scale: 1/8" = 1'-0"

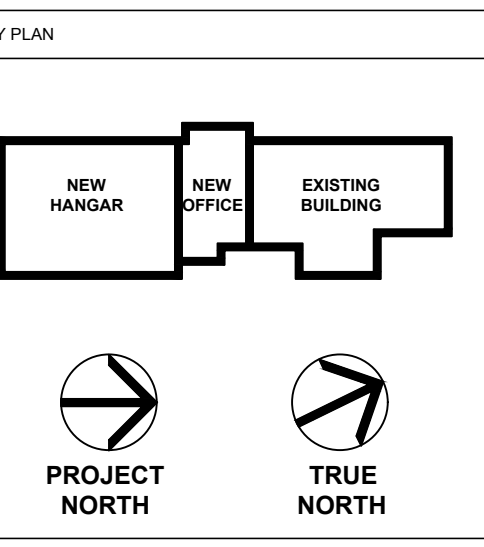


KEY PLAN - 2ND FLOOR



KEY PLAN - 3RD FLOOR

ADDENDUM #4 03-17-2020



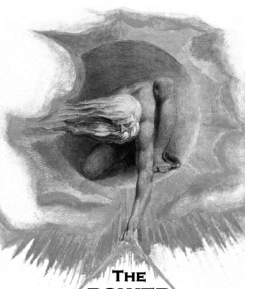
No.	Description	Date
3	100% Construction Documents	2/14/20
2	100% Design Development	10/17/19
1	100% Schematic Design	8/7/19

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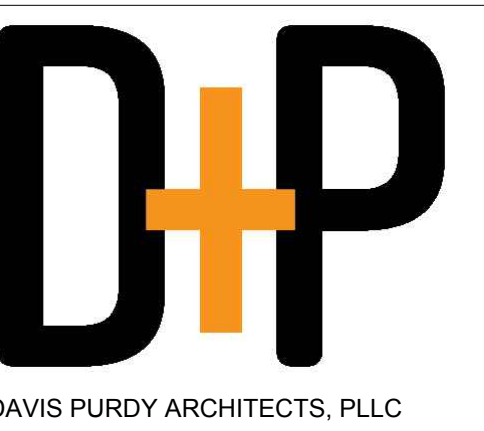
Sheet Title
PARTIAL POWER PLAN 2ND & 3RD FLOOR - PART D & E

Project No. 19-006 Date 2/14/20

E-205



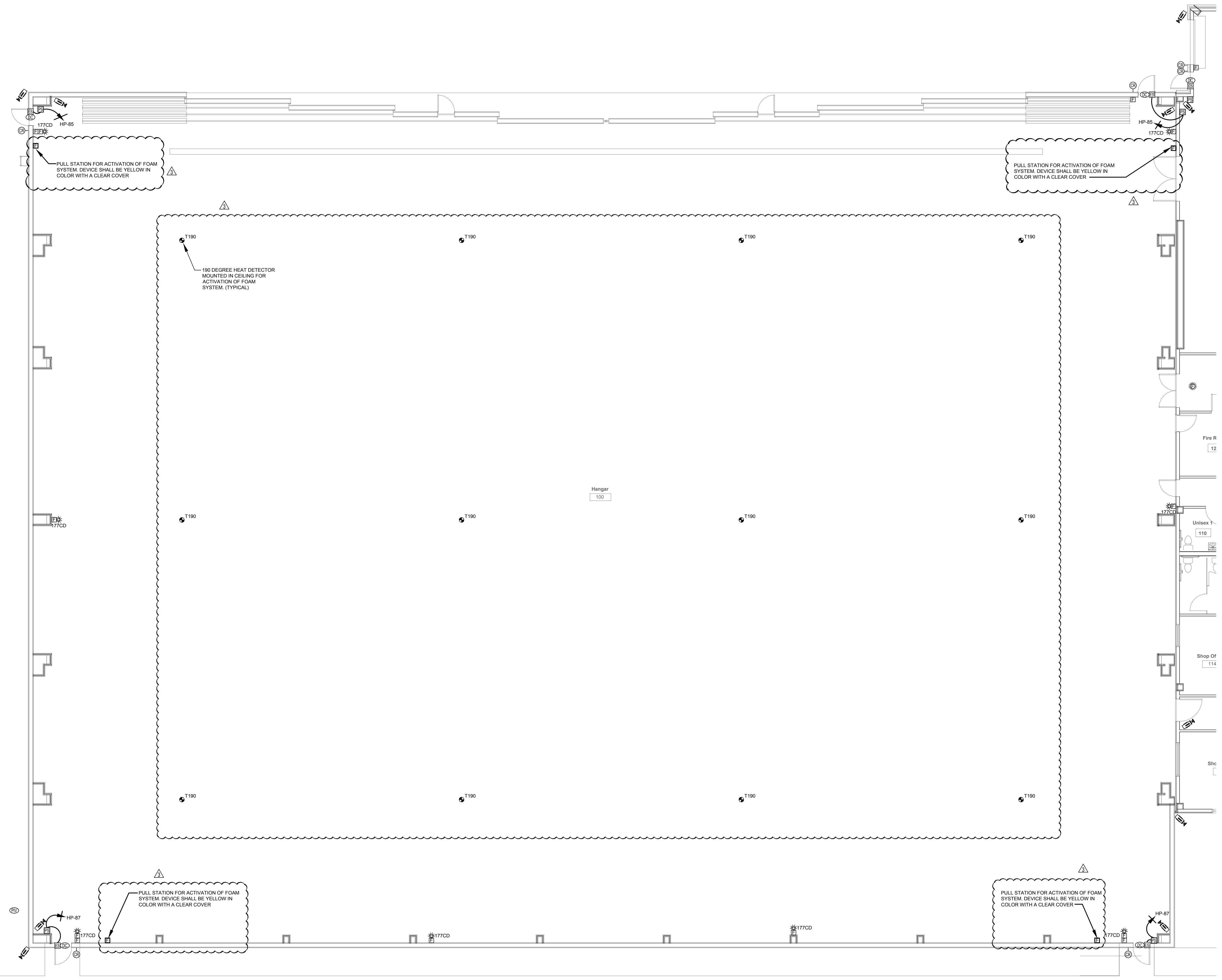
THE POWER SOURCE LLC
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 FAX (601) 605-4875
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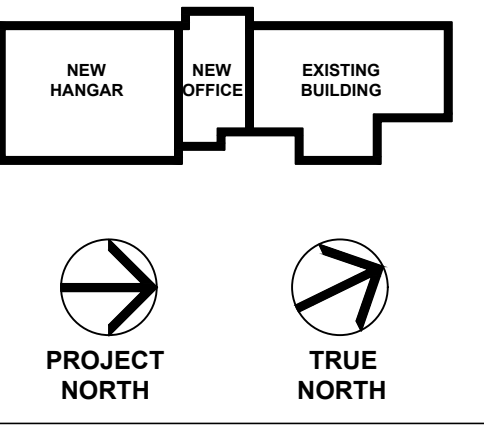
DAVIS PURDY ARCHITECTS, PLLC
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KEY PLAN



See

No.	Description	Date
3	100% Construction Documents	2/14/20
2	100% Design Development	10/17/19
1	100% Schematic Design	8/7/19

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 DEAN AIRCRAFT SERVICE
HANGAR ADDITIONS & ALTERATIONS
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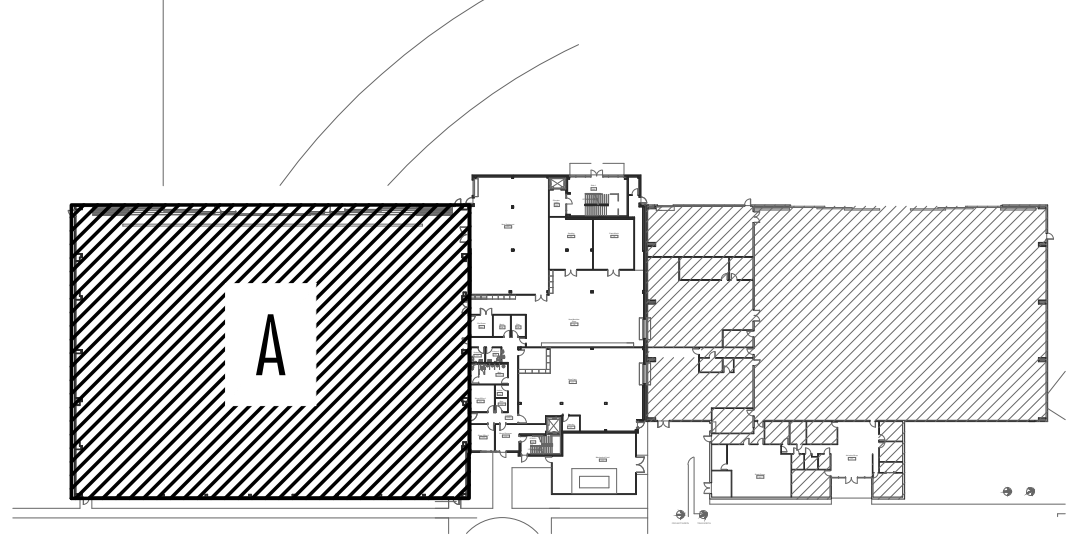
Sheet Title
PARTIAL AUXILIARY PLAN 1ST FLOOR PART A

Project No. 19-006 Date 2/14/20

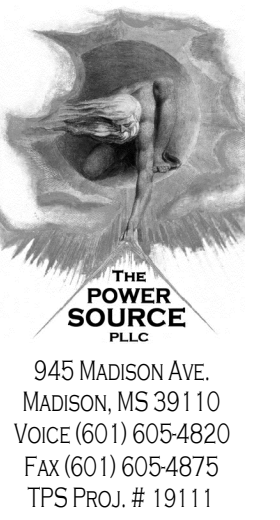
E-301

1 PARTIAL AUXILIARY PLAN - FIRST FLOOR - PART A
 E-301 Scale: 1/8" = 1'-0"

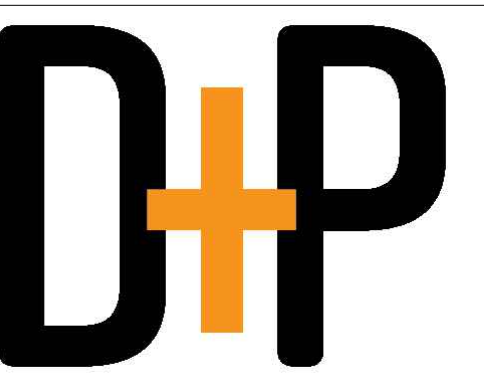
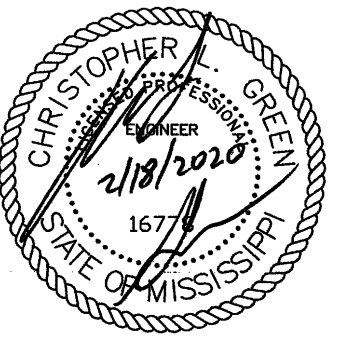
ADDENDUM #4 03-17-2020



KEY PLAN - 1ST FLOOR



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Table for PANEL SWBD, ELECTRICAL ROOM, 208Y/120V, 3Ø, 4W, 2000A. Includes columns for CIRCUIT NO., BREAKER, DESCRIPTION, PHASE LOAD (KVA), and PANELBOARD A/C RATING (A).

Table for PANEL MD, ELECTRICAL ROOM, 208Y/120V, 3Ø, 4W, 400A. Includes columns for CIRCUIT NO., BREAKER, DESCRIPTION, PHASE LOAD (KVA), and PANELBOARD A/C RATING (A).

Table for PANEL HP - SEC. 1, ELECTRICAL ROOM, 208Y/120V, 3Ø, 4W, 225A. Includes columns for CIRCUIT NO., BREAKER, DESCRIPTION, PHASE LOAD (KVA), and PANELBOARD A/C RATING (A).

Table for PANEL PA - SEC. 1, ELECTRICAL ROOM, 208Y/120V, 3Ø, 4W, 225A. Includes columns for CIRCUIT NO., BREAKER, DESCRIPTION, PHASE LOAD (KVA), and PANELBOARD A/C RATING (A).

Table for PANEL HP - SEC. 2, ELECTRICAL ROOM, 208Y/120V, 3Ø, 4W, 225A. Includes columns for CIRCUIT NO., BREAKER, DESCRIPTION, PHASE LOAD (KVA), and PANELBOARD A/C RATING (A).

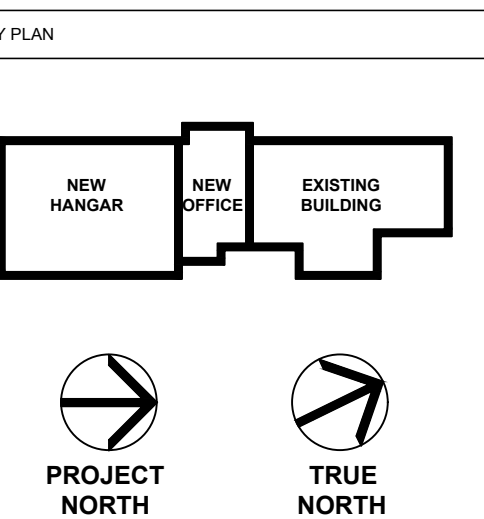
Table for PANEL PA - SEC. 2, ELECTRICAL ROOM, 208Y/120V, 3Ø, 4W, 225A. Includes columns for CIRCUIT NO., BREAKER, DESCRIPTION, PHASE LOAD (KVA), and PANELBOARD A/C RATING (A).

Table for PANEL MA, ELECTRICAL ROOM, 208Y/120V, 3Ø, 4W, 225A. Includes columns for CIRCUIT NO., BREAKER, DESCRIPTION, PHASE LOAD (KVA), and PANELBOARD A/C RATING (A).

Table for PANEL PB - SEC. 1, ELECTRICAL ROOM, 208Y/120V, 3Ø, 4W, 225A. Includes columns for CIRCUIT NO., BREAKER, DESCRIPTION, PHASE LOAD (KVA), and PANELBOARD A/C RATING (A).

Table for PANEL MB, ELECTRICAL ROOM, 208Y/120V, 3Ø, 4W, 400A. Includes columns for CIRCUIT NO., BREAKER, DESCRIPTION, PHASE LOAD (KVA), and PANELBOARD A/C RATING (A).

Table for PANEL PB - SEC. 2, ELECTRICAL ROOM, 208Y/120V, 3Ø, 4W, 225A. Includes columns for CIRCUIT NO., BREAKER, DESCRIPTION, PHASE LOAD (KVA), and PANELBOARD A/C RATING (A).



Sheet No.

Table with columns: No., Description, Date. Contains revision history for 100% Construction Documents, 100% Design Development, and 100% Schematic Design.

MERIDIAN AIRPORT AUTHORITY

DEAN AIRCRAFT SERVICE

HANGAR ADDITIONS & ALTERATIONS

2913 Airport Blvd., South St. Meridian, MS 39307

Sheet Title

Project No. 19-006 Date 2/14/20

ALTERNATE #1 PANEL SCHEDULES

PANEL		LOCATION:	ELECTRICAL ROOM	LUG LOCATION:	BOTTOM FEED	PANELBOARD AIC RATING (A):		CIRCUIT	
NO.	AMPS	VOLT. BUS:	208Y120V, 3Ø, 4W	MAIN BUS MOUNTING:	MAIN LUGS ONLY SURFACE	A	B	C	NO.
1	20	1							2
3	20	1							4
5	20	1							6
7	50	3	AHLJ-5	4.1	1.6	4.1	0.0	4.1	8
9	20	1							10
11	20	1							12
13	20	1	SPARE	0.0	2.8				14
15	20	1	SPARE						16
17	20	1	SPARE						18
19	20	1	SPARE	0.0	0.0				20
21	20	1	SPARE						22
23	20	1	SPARE						24
25	20	2	IU-2.01 THRU IU-2.08	1.0	0.0				26
27	20	1	SPARE						28
29	20	2	IU-2.09 - IU-2.11	1.0	0.0				30
31	20	1	SPARE	1.0	0.0				32
33	20	1	SPARE						34
35	20	1	SPARE	0.0	0.0				36
37	30	1	EVH-2	2.0	0.0				38
39	20	1	SPARE						40
41	20	1	SPARE						42
43	20	1	SPARE	0.0	0.0				44
45	20	1	SPARE						46
47	20	1	SPARE						48
49	20	1	SPARE	0.0	0.0				50
51	20	1	SPARE						52
53	20	1	SPARE						54
TOTAL				17.0	9.7			11.9	

PANEL		LOCATION:	ELECTRICAL ROOM	LUG LOCATION:	BOTTOM FEED	PANELBOARD AIC RATING (A):		CIRCUIT	
NO.	AMPS	VOLT. BUS:	208Y120V, 3Ø, 4W	MAIN BUS MOUNTING:	MAIN LUGS ONLY W/FEED THRU LUGS SURFACE	A	B	C	NO.
1	20	1							2
3	20	1	SPARE	0.0	0.4				4
5	20	1	SPARE						6
7	20	1	SPARE	0.0	1.1				8
9	20	1	SPARE						10
11	20	1	SPARE						12
13	20	1	SPARE	0.0	0.5				14
15	20	1	SPARE						16
17	20	1	SPARE						18
19	20	1	SPARE	0.0	1.1				20
21	20	1	SPARE						22
23	20	1	SPARE						24
25	20	1	SPARE	0.0	1.1				26
27	20	1	SPARE						28
29	20	1	SPARE						30
31	20	1	SPARE	0.0	1.1				32
33	20	1	SPARE						34
35	20	1	SPARE						36
37	20	1	SPARE	0.0	1.1				38
39	20	1	SPARE						40
41	20	1	SPARE						42
43	20	1	SPARE	0.0	0.7				44
45	20	1	SPARE						46
47	20	1	SPARE						48
49	20	1	SPARE	0.0	0.0				50
51	20	1	SPARE						52
53	20	1	SPARE						54
TOTAL				7.0	5.9			4.6	

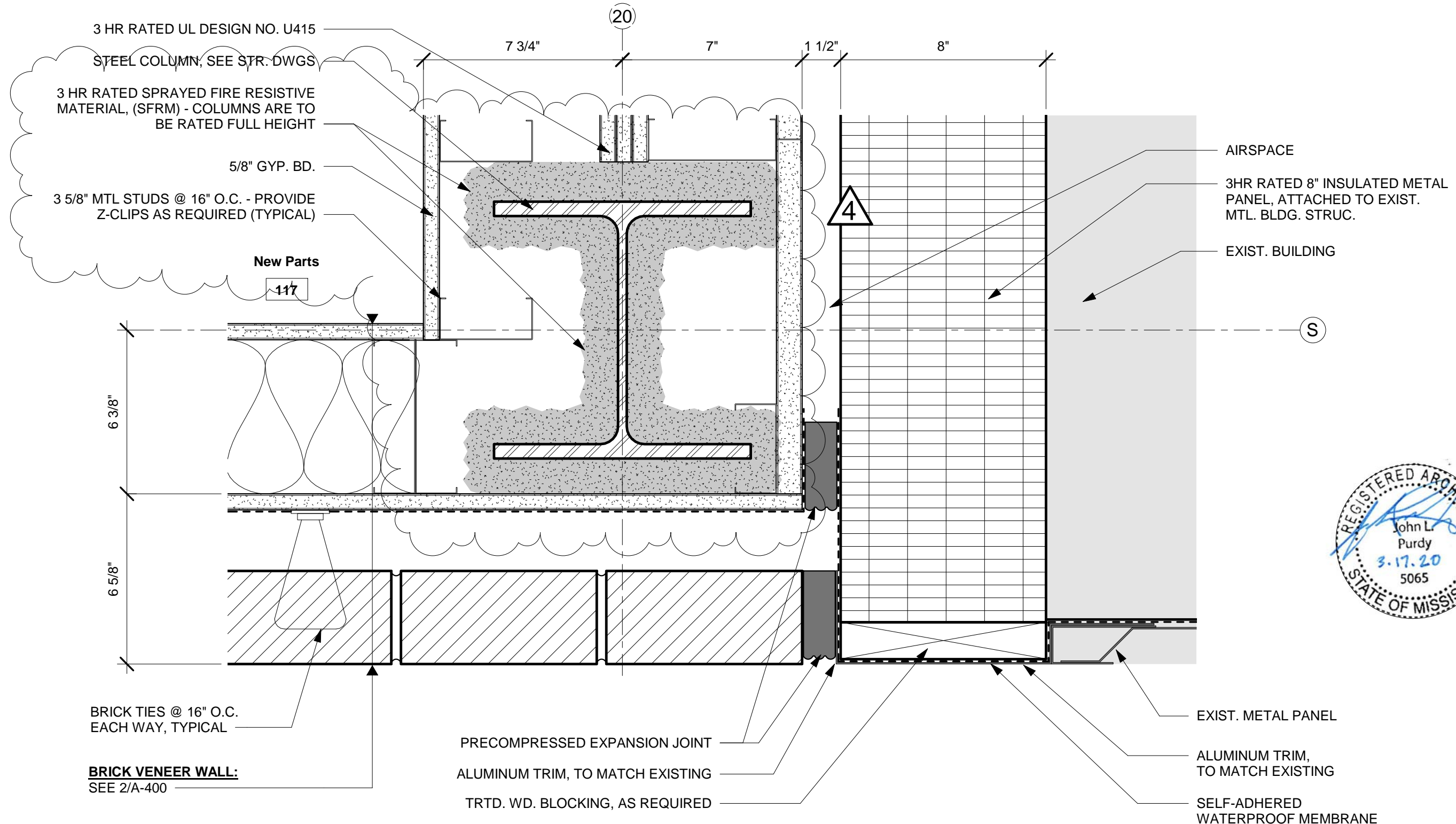
PANEL		LOCATION:	ELECTRICAL ROOM	LUG LOCATION:	TOP FEED	PANELBOARD AIC RATING (A):		CIRCUIT	
NO.	AMPS	VOLT. BUS:	208Y120V, 3Ø, 4W	MAIN BUS MOUNTING:	MAIN LUGS ONLY SURFACE	A	B	C	NO.
55	20	1	LTS - CORR 216, WOMEN 227, MEN 228, OFFICE 1-4	1.2	0.0				56
57	20	1	LTS - CONF 1 202						58
59	20	1	LTS - LOBBY 201, SITTING 204, MERCH 205						60
61	20	1	LTS - SHELL SPACE	0.7	0.0				62
63	20	1	SPARE						64
65	20	1	SPARE						66
67	20	1	ACCESS CONTROLS	0.1	0.0				68
69	20	1	SPARE						70
71	20	1	SPARE						72
73	20	1	SPARE	0.0	0.0				74
75	20	1	SPARE						76
77	20	1	SPARE						78
79	20	1	SPARE	0.0	0.0				80
81	20	1	SPARE						82
83	20	1	SPARE						84
85	20	1	SPARE	0.0	0.0				86
87	20	1	SPARE						88
89	20	1	SPARE						90
91	20	1	SPARE	0.0	0.0				92
93	20	1	SPARE						94
95	20	1	SPARE						96
97	20	1	SPARE	0.0	0.0				98
99	20	1	SPARE						100
101	20	1	SPARE						102
103	20	1	SPARE	0.0	0.0				104
105	20	1	SPARE						106
107	20	1	SPARE						108
TOTAL				2.0	0.8			0.9	

ALTERNATE #2 PANEL SCHEDULES

PANEL		LOCATION:	ELECTRICAL ROOM	LUG LOCATION:	BOTTOM FEED	PANELBOARD AIC RATING (A):		CIRCUIT	
NO.	AMPS	VOLT. BUS:	208Y120V, 3Ø, 4W	MAIN BUS MOUNTING:	MAIN LUGS ONLY SURFACE	A	B	C	NO.
1	20	1							2
3	20	1							4
5	20	1							6
7	20	1							8
9	20	1							10
11	20	1							12
13	20	2							14
15	20	1							16
17	20	2							18
19	20	1							20
21	20	2							22
23	20	2	IU-2.01 THRU IU-2.08	1.0	0.0				24
25	20	2							26
27	20	1							28
29	20	2	IU-2.09 THRU IU-2.11	1.0	0.0				30
31	20	2							32
33	20	2							34
35	20	1							36
37	70	3	OAU-1	6.0	0.0				38
39	20	1							40
41	20	1							42
43	20	1	SPARE	0.0	0.0				44
45	20	1	SPARE						46
47	20	1	SPARE						48
49	20	1	SPARE	0.0	0.0				50
51	20	1	SPARE						52
53	20	1	SPARE						54
TOTAL				10.5	8.0			8.0	

PANEL		LOCATION:	ELECTRICAL ROOM	LUG LOCATION:	BOTTOM FEED	PANELBOARD AIC RATING (A):		CIRCUIT	
NO.	AMPS	VOLT. BUS:	208Y120V, 3Ø, 4W	MAIN BUS MOUNTING:	MAIN LUGS ONLY W/FEED THRU LUGS SURFACE	A	B	C	NO.
1	20	1							2
3	20	1	REC - GYM	0.4	0.4				4
5	20	1	REC - GYM						6
7	20	1	REC - GYM	0.4	1.1				8
9	20	1	REC - GYM						10
11	20	1	REC - GYM						12
13	20	1	REC - GYM	0.4	0.5				14
15	20	1	REC - GYM						16
17	20	1	REC - GYM						18
19	20	1	REC - GYM	0.4	1.1				20
21	20	1	REC - DRINKING FOUNTAIN						22
23	20	1	REC - OFFICE 2	0.5	1.1				24
25	20	1	REC - OFFICE 1	0.7	1.1				26
27	20	1	REC - LEONARD OFFICE						28
29	20	1	REC - OFFICE 2						30
31	20	1	REC - OFFICE 6	1.1	1.1				32
33	20	1	REC - OFFICE 5						34
35	20	1	REC - KITCHEN						36
37	20	1	REC - KITCHEN	0.2	1.1				38
39	20	1	REC - KITCHEN						40
41	20	1	REC - KITCHEN						42
43	50	2	REC - KITCHEN STOVE	2.5	0.7				44
45	20	1	REC - RECEPTION						46
47	20	1	REC - KITCHEN CORRIDOR						48
49	20	1	REC - CONFERENCE 2	1.1	0.4				50
51	20	1	REC - CONFERENCE 1						52
53	20	1	REC - W LOCKER, M LOCKER, CORR	14.3	14.4			11.0	54
TOTAL				14.3	14.4			11.0	

PANEL		LOCATION:	ELECTRICAL ROOM	LUG LOCATION:	TOP FEED	PANELBOARD AIC RATING (A):		CIRCUIT	
NO.	AMPS	VOLT. BUS:	208Y120V, 3Ø, 4W	MAIN BUS MOUNTING:	MAIN LUGS ONLY SURFACE	A	B	C	NO.
55	20	1	LTS - CORR 216, WOMEN 227, MEN 228, OFFICE 1-4	1.2	0.7				56
57	20	1	LTS - CONF 1 202						58
59	20	1	LTS - LOBBY 201, SITTING 204, MERCH 205						60
61	20	1	LTS - SHELL SPACE	0.7	0.7				62
63	20	1	LTS - ELEVATOR 240, OFFICE 21						



1 PLAN DETAIL @ EAST WALL EXP. JOINT
3" = 1'-0"

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Drawing No.
AD4-410

Addendum No. 4
03/17/20
Date Revised
Date 1

HANGAR ADDITIONS & ALTERNATIONS

MERIDIAN AIRPORT AUTHORITY DEAN AIRCRAFT SERVICE

2913 Airport Blvd, South St. Meridian, MS 39307



BRICK TIES @ 16" O.C.
EACH WAY, TYPICAL

BRICK VENEER WALL:
SEE 2/A-400

PRECOMPRESSED
EXPANSION JOINT

ALIGN

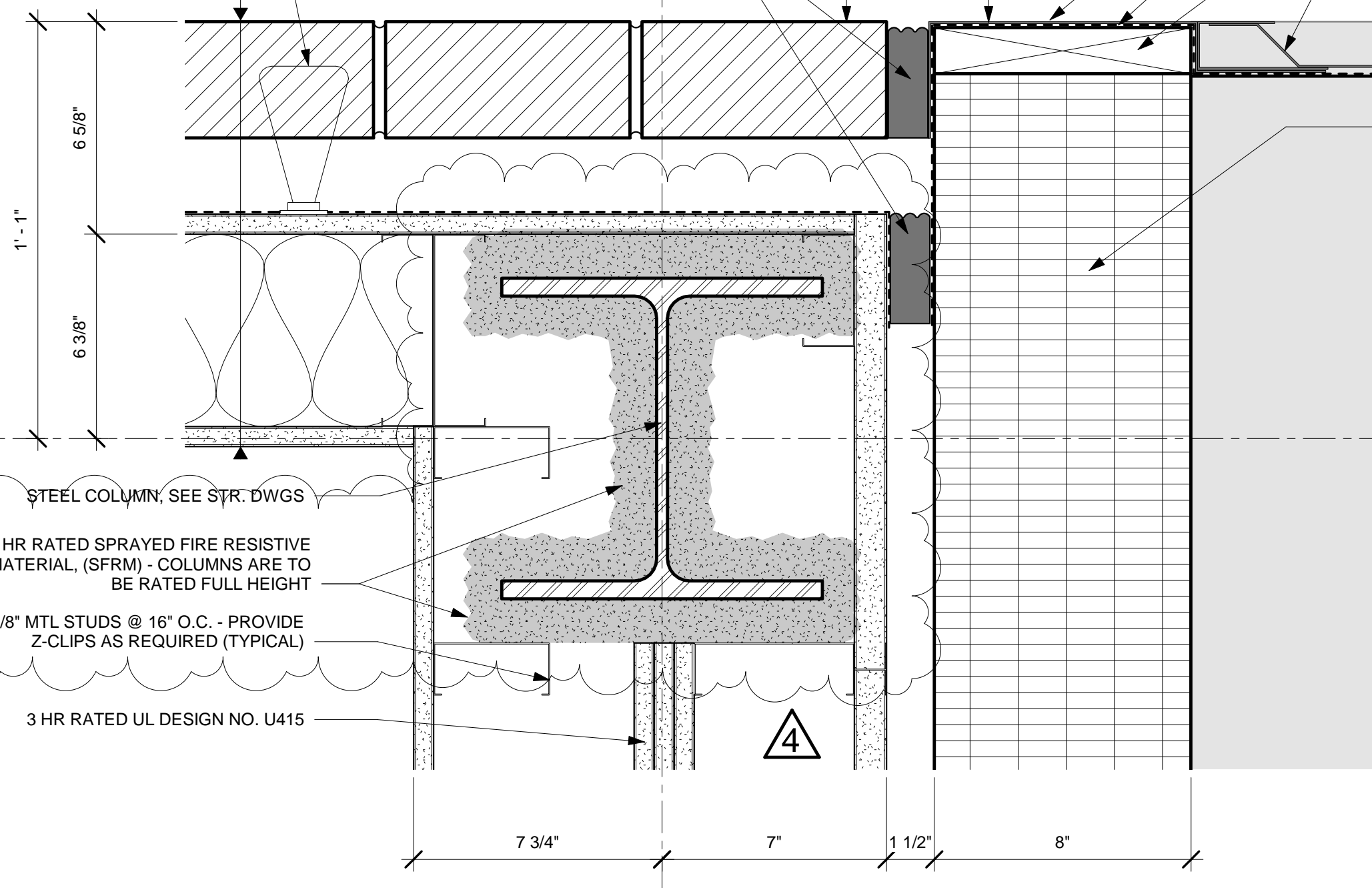
ALUMINUM TRIM, TO MATCH EXISTING

SELF-ADHERED
WATERPROOF MEMBRANE

TRTD. WD. BLOCKING, AS REQUIRED

EXIST. METAL PANEL

3HR RATED 8" INSULATED METAL
PANEL, ATTACHED TO EXIST.
MTL. BLDG. STRUC.



STEEL COLUMN, SEE STR. DWGS

3 HR RATED SPRAYED FIRE RESISTIVE
MATERIAL, (SFRM) - COLUMNS ARE TO
BE RATED FULL HEIGHT

3 5/8" MTL STUDS @ 16" O.C. - PROVIDE
Z-CLIPS AS REQUIRED (TYPICAL)

3 HR RATED UL DESIGN NO. U415

1 PLAN DETAIL @ WEST WALL EXP. JOINT
3" = 1'-0"

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Drawing No.
AD4-413

Addendum No. 4
03/17/20
Date Revised
Date 1

HANGAR ADDITIONS & ALTERNATIONS

MERIDIAN AIRPORT AUTHORITY DEAN AIRCRAFT SERVICE
2913 Airport Blvd, South St. Meridian, MS 39307





DAVIS PURDY ARCHITECTS, PLLC
 2011 23rd Avenue
 Meridian, Mississippi 39001
 P: 601.262.1600
 F: 601.262.1601
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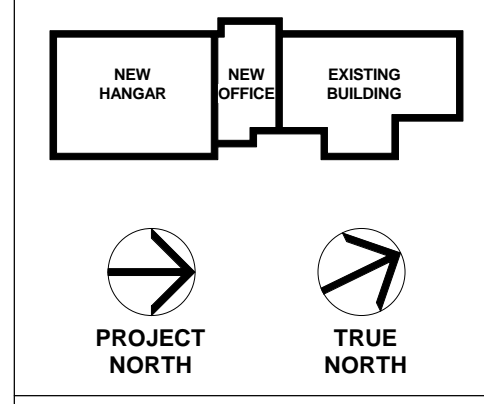
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GENERAL NOTES

- ALTERNATE NO. 2 IS THE MOST COMPREHENSIVE VERSION OF THE DESIGN AND IS THEREFORE REPRESENTED.
- ALL PRIMARY STRUCTURE SHALL HAVE A 2 HR. FIRE-RESISTANCE RATING. COORDINATE METHOD OF RATING WITH DRAWINGS AND SPECIFICATIONS.
- ALL 2 HR. RATED GYPSUM BOARD COLUMN WRAPS FOR THE PRIMARY STRUCTURE ARE UL DESIGN NO. X517 OR X524 UNLESS OTHERWISE INDICATED. COORDINATE EXACT COLUMN WRAP CONFIGURATIONS WITH DRAWINGS.
- REFER TO SHEET A-810 & A-811 FOR UL DESIGNATIONS FOR TESTED RATED ASSEMBLIES.
- ANY CONDITIONS WHERE ELEMENTS SUCH AS, BUT NOT LIMITED TO, STRUCTURAL STEEL INTERSECT OR PENETRATE RATED PARTITIONS MUST MAINTAIN MINIMUM RATING AS PRESCRIBED BY SUCH PARTITION. REFER TO UL DESIGNATION SHEET A-810 F OR APPROPRIATE METHOD OF MAINTAINING REQUIRED RATING OF INTERSECTING OR PENETRATING ELEMENT.
- NOT ALL STRUCTURAL ELEMENTS ARE SHOWN IN PLAN. CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ALL STRUCTURAL ELEMENTS MAINTAIN REQUIRED RATING.
- ALL DOORS IN RATED PARTITIONS AND/OR WALLS SHALL BE RATED ACCORDINGLY. REFER TO DOOR SCHEDULE.
- ALL FIRE EXTINGUISHERS ARE TO BE MOUNTED ON EXPOSED WALL BRACKETS, EXCEPT AT LEVEL 02 ALT. NO. 1 & NO. 2. REFER TO SPECIFICATIONS.
- LEVEL 02 ALT. NO. 1 & NO. 2 FIRE EXTINGUISHERS ARE CABINETS SET WITHIN PARTITION. REFER TO SPECIFICATIONS.
- ANY BRACING ASSOCIATED WITH COLUMNS SHALL BE FIRE RATED WITH SAME METHOD OF RATED COLUMN.
- ALL SFRM IS TO BE STANDARD DENSITY SFRM.
- ALL FIRE RATING ABOVE CEILING SHALL BE SFRM UNLESS OTHERWISE INDICATED.
- STEEL RECEIVING INTUMESCENT PAINT SHALL BE PRIMED WITH PRIMER APPROVED BY INTUMESCENT PAINT MANUFACTURER.

KEY PLAN



No.	Description	Date

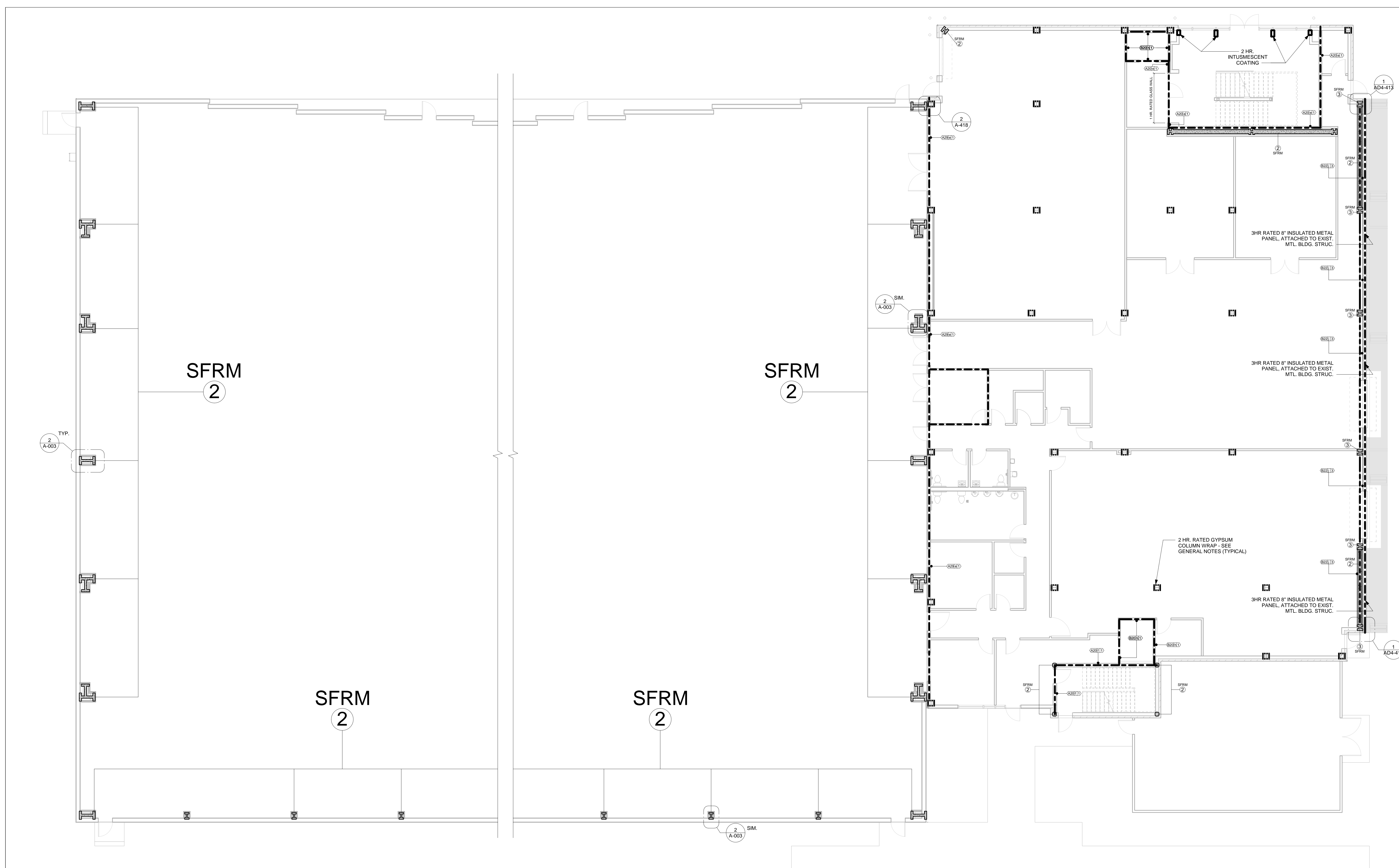
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LEVEL 01 - FIRE RATING PLAN

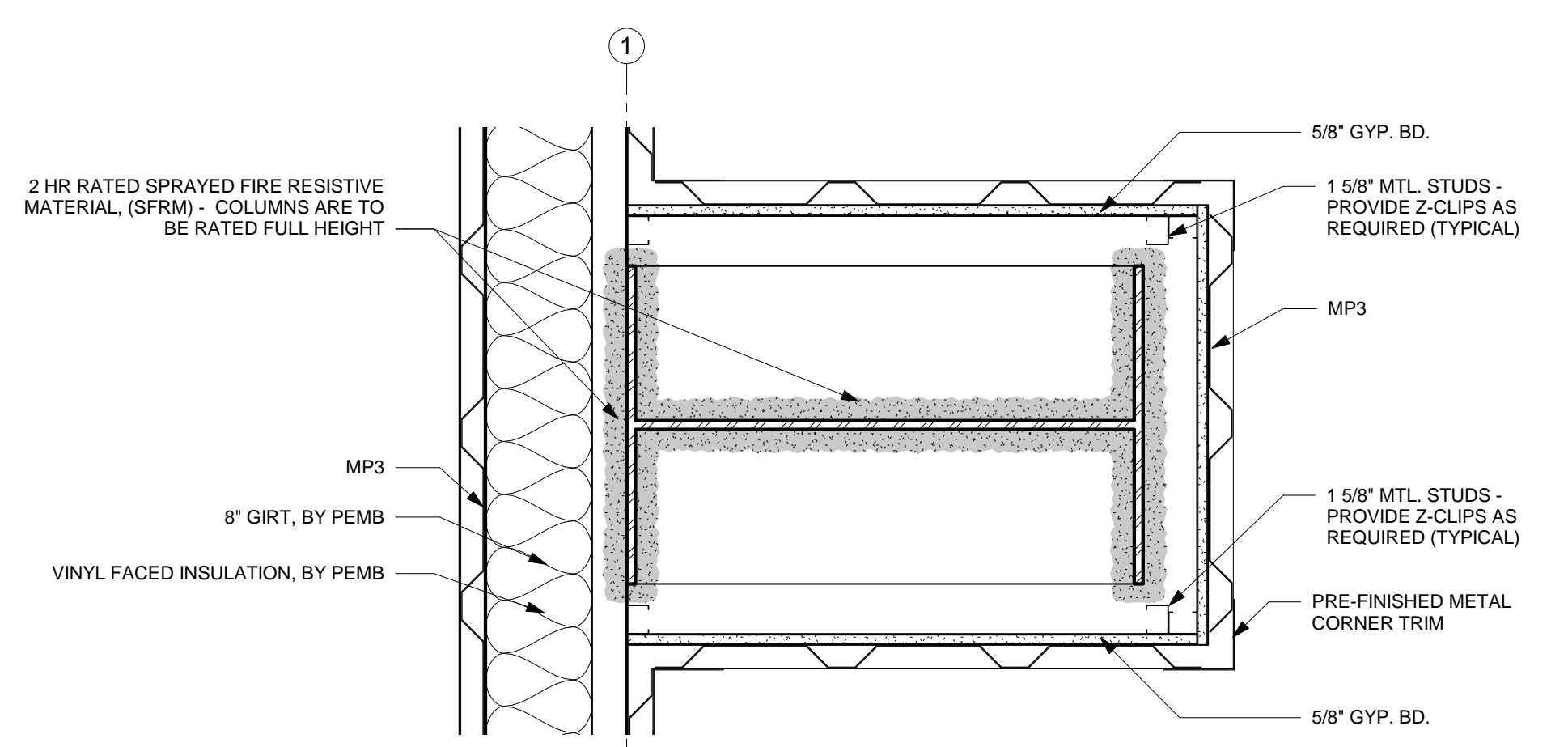
Project No. 19-006 Date 2/04/20

A-003



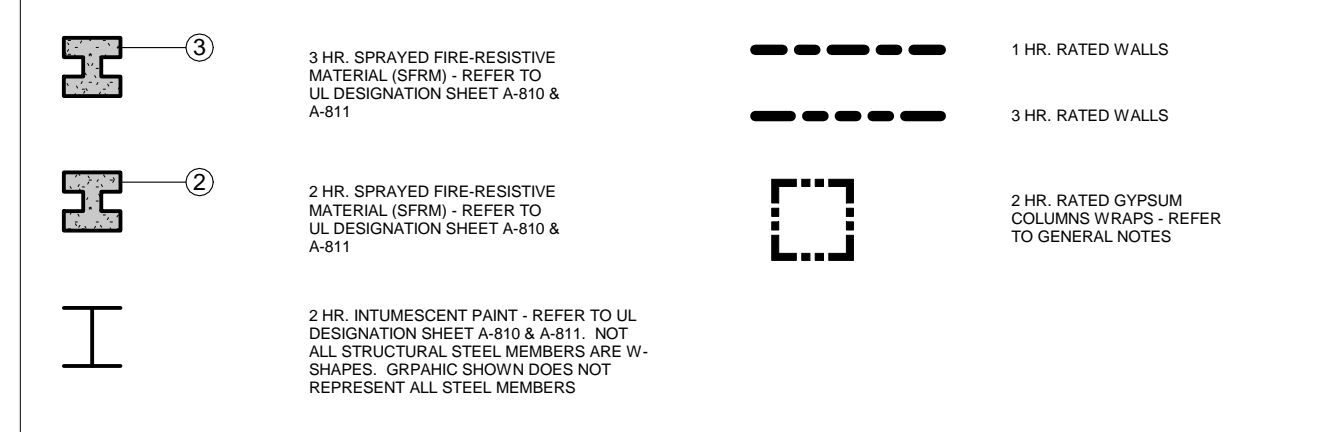
1 LEVEL 01 FIRE RATING PLAN
 1/8" = 1'-0"

THIS IS A NEW SHEET AND SHOULD BE ADDED TO THE CONSTRUCTION DOCUMENTS



3 PLAN DETAIL @ TYP. HANGAR COLUMN
 1 1/2" = 1'-0"

FIRE RATING LEGEND





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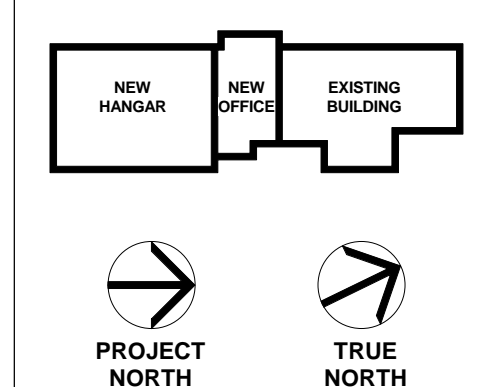
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KEY PLAN



See



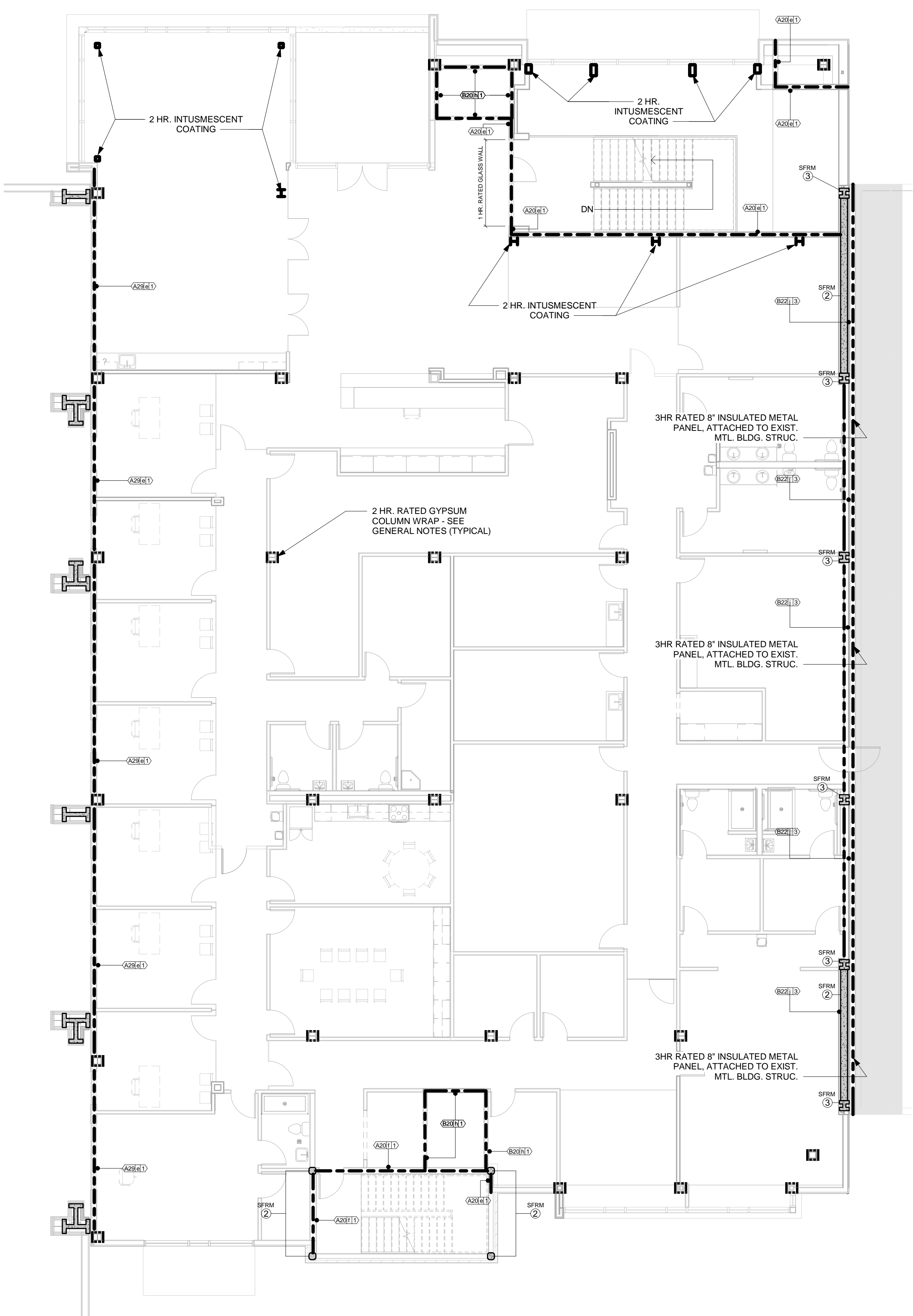
No.	Description	Date

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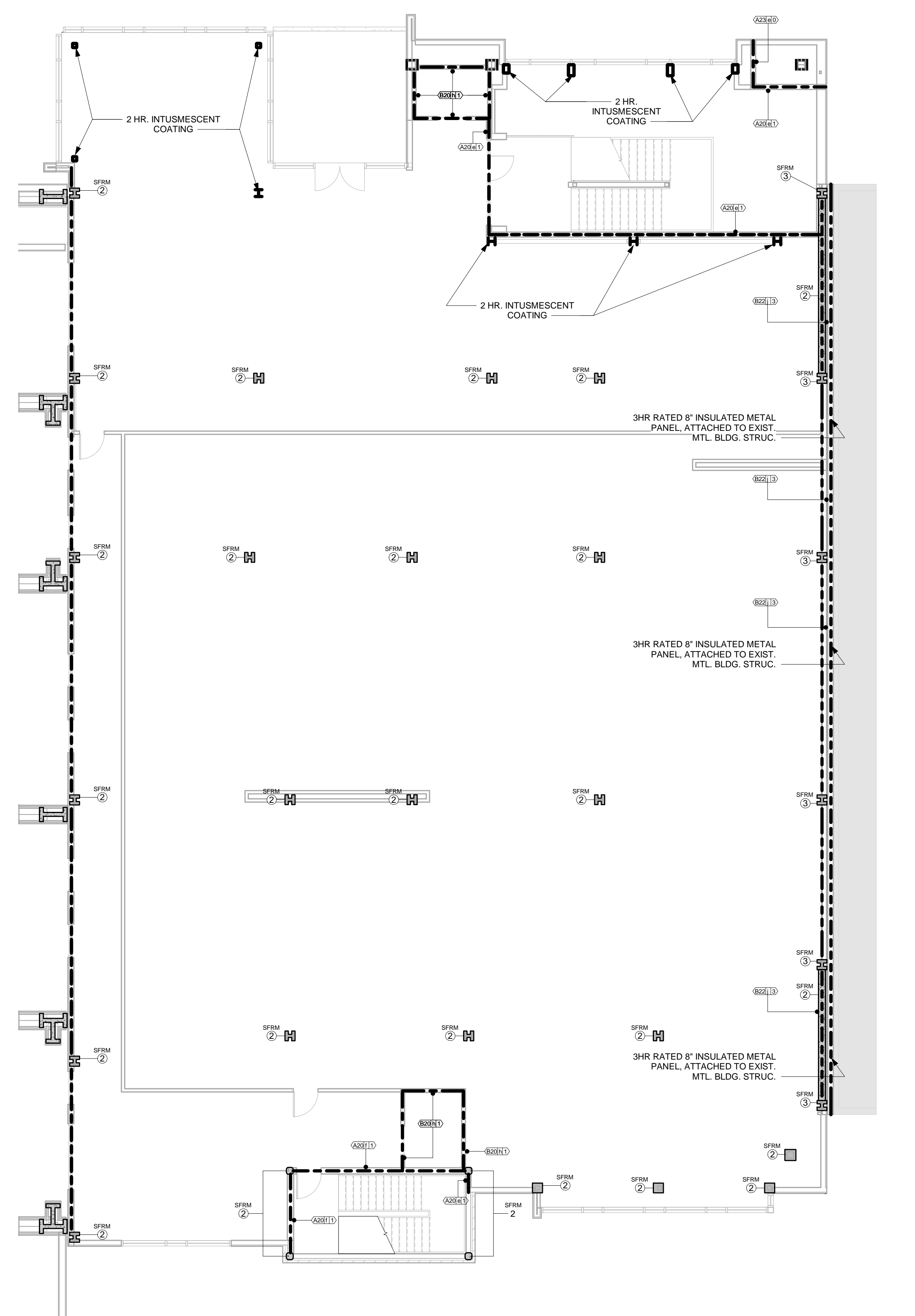
LEVEL 02 & 03 - FIRE RATING PLAN

Project No. 19-006 Date 2/04/20

A-004



① LEVEL 02 FIRE RATING PLAN ALT. NO. 2
 1/8" = 1'-0"



② LEVEL 03 FIRE RATING PLAN ALT. NO. 3
 1/8" = 1'-0"

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FIRE RATING LEGEND

