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NOTICE TO ALL CONTRACTORS AND SUB-CONTRACTORS

October 29, 2025

USD 419 Canton-Galva Schools Track & Vo-Ag Building – JGR Proj #25-3521

ADDENDUM NO. 1

YOU ARE INSTRUCTED TO READ AND TO NOTE THE FOLLOWING DESCRIBED CHANGES, CORRECTIONS, CLARIFICATIONS, OMISSIONS, DELETIONS, ADDITIONS, APPROVALS, AND STATEMENTS PERTINENT TO THE CONTRACT AND CONSTRUCTION DOCUMENTS. THIS ADDENDUM IS A PART OF THE CONTRACT AND CONSTRUCTION DOCUMENTS AND SHALL GOVERN IN THE PERFORMANCE OF THE WORK.

ARCHITECTURAL – Specifications

1. Section 02205 Soil Materials – Paragraph 2.1.A. Delete this sentence. There is no future south addition.
2. Section 06410 Custom Casework – The following substitutions shall be acceptable:
 - 2.3.A – Blum Metabox drawer boxes
 - 2.8.A – Blum 110-degree self-closing Hinges
 - 2.8.D – 5mm Spoon Shelf Pins, or equivalent product in lieu of recessed standards.
3. Section 06410 Custom Casework – Include the following manufacturers approved for bidding purposes:
 - Higgins Group
 - SBK Supply and Millwork
 - Custom Wood Products
4. Section 06410 Custom Casework – Paragraph 2.3.A – Clarification – Cabinet and drawer interior, non-exposed surfaces may be Melamine finish (white).
5. Section 09262 Custom Casework – Paragraph 1.01.E – Drywall finish shall be level 4 unless noted otherwise.
6. Section 10522 Fire Extinguisher Cabinets – Clarification – There shall be 2 fire extinguishers/cabinets required.
7. Section 321817 Synthetic Track Surfacing System – Include Hellas, EpiqTracks as an approved manufacturer for bidding purposes. All products must meet specifications.

ARCHITECTURAL – Drawings

1. Sheet A1.1 – Site Plan – At Shot Put throwing areas, for bidding purposes, contractor shall include (4) 24" dia. X 48" and (2) 12" dia. X 30" deep concrete pier footings for installation of netting system. Netting system provided by owner. There shall be one set per base bid and one set per alternate 5b.
2. Sheet A1.1 – Site Plan – At Discus throwing areas, for bidding purposes, contractor shall include (6) 24" dia. X 48" and (6) 12" dia. X 30" deep concrete pier footings for installation of netting system. Netting system provided by owner. There shall be one set per base bid and one set per alternate 5a.
3. Sheet A1.1 and Civil Sheet C-3 – Clarification – All existing field areas affected by new track, field events, and building shall be seeded with Fescue Blend grass seed suitable to blend with existing, Provide top soil at upper 4" of fill areas at seeded areas. Contractor may use Fescue sod at any disturbed areas.
4. Sheet A2.1 – General Note 8. Delete this note. There are no clerestory windows.
5. Sheet A2.1 – Floor Plan – Storage Room 103 cabinet/shelving at the NW corner is to be provided by owner, not a built-in item.
6. Sheet A5.1 – Reflected Ceiling Plan – Clarification – Per the Base Bid, ceiling height at Storage Room 107 and 106 shall be 12' A.F.F.
7. Sheet A5.1 – Reflected Ceiling Plan and Sheet A7.1 Interior Finish Schedule, Hallway 105 shall receive a G.B. Ceiling.
8. Sheet A6.1 – Details C, J, K, and L – All countertops are to be stainless steel in lieu of solid surface.
9. Sheet A6.2 – Reference attached revised sheet for ladder and railing detail.

STRUCTURAL – Drawings

1. Sheet S2.1 – Foundation Plan – Coordinate the doorway stoop locations with the Architectural Floor Plan on Sheet A2.1. There are two doorway stoops at the South wall location.
2. Sheet S2.1 and S2.2 – Foundation Plan and Framing Plan – At the NW corner mezzanine and associated stair – Foundations and framing shown are based on Alternate 2. Per the base bid, foundations at grade beams at this area shall be consistent with Details 1/S3.1 (North wall) and 2/S3.1 (west wall). All structural steel framing is eliminated. All interior wall framing is non-load bearing and bears on the slab.

CIVIL – Drawings

1. Sheet C-5 – Utility Plan – At the North track section. Eliminate the north drain inlet between the track and the high jump area and provide a slot drain system equivalent to Sports Edge XT-4 slot drain system. Provide all components, pipe, basins, etc., as required for complete and free-draining installation. Reference the attached revised sheet C-5.

MECHANICAL – Specifications

1. Section 230713 Duct Insulation – This section was missing page 4. The full section is attached.

MECHANICAL – Drawings

1. Sheet M1.1 - Main Level HVAC Plan
 - A. Added notes by symbol legend.
 - B. Added note to twin systems 'F-3' and 'F-4'.
2. Sheet M1.2 - Mezzanine HVAC Plan
 - A. Added notes by symbol legend.
3. Sheet P1.2 - Main Level Dom Water and Gas Plan
 - A. Added notes by symbol legend.
 - B. Added two wall hydrants.
4. Sheet P1.3 - Mezzanine Plumbing Plan
 - A. Added notes by symbol legend.
 - B. Added piping for two additional wall hydrants.

ELECTRICAL – Specifications

1. Section 284600 Fire Detection and Alarm – This section has been added to the specification, see attached..

ELECTRICAL – Drawings

1. E0.1 - Electrical Title Sheet
 - A. Added fire alarm symbols to Electrical Symbols Legend.
 - B. Added fire alarm general notes.
2. E1.1 - Lighting Plans
 - A. Removed exit sign and exterior emergency light from South wall of Ag Science Classroom 102.
 - B. Adjusted undercabinet lighting in Ag Science Classroom 102.
 - C. Removed exit sign and exterior emergency light from South wall of Industrial Classroom 108.
 - D. Adjusted undercabinet lighting in Industrial Classroom 108.
 - E. Added exit sign and exterior emergency lights to Southeast egress door out of Vo-Ag 101.
3. E1.2 - Power Plans
 - A. Added fire alarm system equipment and devices throughout building.
 - B. Added plan note for Furnaces 'F-3' and 'F-4' to circuit to same phase in panelboard.
 - C. Added note to extend power for relocated scoreboard.
 - D. Added conduit below grade from Storage 103 to exterior for future greenhouse.
4. E6.1 - Electrical Schedules and Details
 - A. Modified Panel Schedule 'P1'.

Receipt of this Addendum shall be noted on the Bid Form.

END OF ADDENDUM NO. 1

Attachments

Section 230713

Section 284600

Sheet C-5, A6.2, M1.1, M1.2, P1.2, P1.3, E0.1, E1.1, E1.2, E6.1

SECTION 230713 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes insulating the following duct services:
 - 1. Indoor, concealed supply, return, and outdoor air.
 - 2. Indoor, exposed supply, return, and outdoor air.
- B. Related Requirements:
 - 1. Section 230719 "HVAC Piping Insulation."
 - 2. Section 233113 "Metal Ducts" for duct liners.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - 2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
 - 3. Detail application of field-applied jackets.
 - 4. Detail application at linkages of control devices.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers are to be marked with the manufacturer's name, appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.4 COORDINATION

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 230529 "Hangers and Supports for HVAC Piping and Equipment."
- B. Coordinate clearance requirements with duct Installer for duct insulation application. Before preparing ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

1.5 SCHEDULING

- A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.
 - 1. All Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2.2 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule" article for where insulating materials are to be applied.
- B. Products do not contain asbestos, lead, mercury, or mercury compounds.
- C. Glass-Fiber Blanket: Glass fibers bonded with a thermosetting resin; suitable for maximum use temperature up to 450 deg F in accordance with ASTM C411. Comply with ASTM C553, Type II, and ASTM C1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed; SAINT-GOBAIN
 - b. Johns Manville; a Berkshire Hathaway company
 - c. Knauf Insulation
 - d. Manson Insulation Inc.
 - e. Owens Corning

2.3 ADHESIVES

- A. Materials are compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
- B. Glass-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products
 - b. Eagle Bridges - Marathon Industries
 - c. Foster Brand; H. B. Fuller
 - d. Mon-Eco Industries, Inc.
- C. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products
 - b. Eagle Bridges - Marathon Industries
 - c. Foster Brand; H. B. Fuller
 - d. Mon-Eco Industries, Inc.

2.4 MASTICS AND COATINGS

- A. Materials are compatible with insulation materials, jackets, and substrates.
- B. Vapor-Retarder Mastic, Water Based, Interior Use: Suitable for indoor use on below ambient services.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Aeroflex USA
 - b. Childers Brand; H. B. Fuller Construction Products
 - c. Foster Brand; H. B. Fuller
 - d. Knauf Insulation
 - 2. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
 - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 4. Color: White.
- C. Vapor-Retarder Mastic, Solvent Based, Exterior Use: Suitable for outdoor use on below ambient services.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Aeroflex USA
 - b. Childers Brand; H. B. Fuller Construction Products
 - c. Eagle Bridges - Marathon Industries
 - d. Foster Brand; H. B. Fuller
 - 2. Water-Vapor Permeance: Comply with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions.
 - 3. Service Temperature Range: Minus 50 to plus 220 deg F.
 - 4. Color: White.
- D. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products
 - b. Eagle Bridges - Marathon Industries
 - c. Foster Brand; H. B. Fuller
 - d. Knauf Insulation
 - e. Mon-Eco Industries, Inc.
 - 2. Water-Vapor Permeance: ASTM E96/E96M, greater than 1.0 perm at manufacturer's recommended dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 4. Color: White.

2.5 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products
 - b. Eagle Bridges - Marathon Industries
 - c. Foster Brand; H. B. Fuller
 - d. Mon-Eco Industries, Inc.
 - 2. Materials are compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: Aluminum.
- B. ASJ Flashing Sealants:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Childers Brand; H. B. Fuller Construction Products
 - b. Foster Brand; H. B. Fuller
 - 2. Materials are compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: White.

2.6 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
- 1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C1136, Type I.
 - 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C1136, Type I.
 - 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C1136, Type II.

2.7 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Industrial Adhesives and Tapes Division
 - b. Aeroflex USA
 - c. Avery Dennison Corporation, Specialty Tapes Division
 - d. Ideal Tape Co., Inc., an American Biltrite Company
 - e. Knauf Insulation
 - 2. Width: 3 inches.
 - 3. Thickness: 11.5 mils.
 - 4. Adhesion: 90 ounces force/inch in width.
 - 5. Elongation: 2 percent.
 - 6. Tensile Strength: 40 lbf/inch in width.
 - 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C1136.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Industrial Adhesives and Tapes Division
 - b. Avery Dennison Corporation, Specialty Tapes Division
 - c. Ideal Tape Co., Inc., an American Biltrite Company
 - d. Knauf Insulation
 - 2. Width: 3 inches.
 - 3. Thickness: 6.5 mils.
 - 4. Adhesion: 90 ounces force/inch in width.
 - 5. Elongation: 2 percent.
 - 6. Tensile Strength: 40 lbf/inch in width.
 - 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.8 SECUREMENTS

- A. Bands:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company
 - b. RPR Products, Inc.
 - 2. Stainless Steel: ASTM A240/A240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing seal or closed seal.
 - 3. Aluminum: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing seal or closed seal.
 - 4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.
- C. Wire: 0.080-inch nickel-copper alloy.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.
 - 1. Verify that systems to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of ducts and fittings.
- B. Install insulation materials, vapor barriers or retarders, jackets, and thicknesses required for each item of duct system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, compress, or otherwise damage insulation or jacket.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Keep insulation materials dry during application and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with Contract Documents, unless otherwise approved by the engineer-of-record.
- G. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- H. Install insulation with least number of joints practical.
- I. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - 1. Install insulation continuously through hangers and around anchor attachments.
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
- J. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- K. Install insulation with factory-applied jackets as follows:
 - 1. Draw jacket tight and smooth, but not to the extent of creating wrinkles or areas of compression in the insulation.
 - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
 - 3. Overlap jacket longitudinal seams at least 1-1/2 inches. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 - 4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
 - 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- L. Cut insulation in a manner to avoid compressing insulation.
- M. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

- N. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
- C. Insulation Installation at Floor Penetrations:
 - 1. Duct: For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least 2 inches.
 - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.5 INSTALLATION OF GLASS-FIBER INSULATION

- A. Comply with manufacturer's written installation instructions.
 - 1. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to two times the insulation thickness, but not less than 3 inches.
 - 2. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
 - 3. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 - 4. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch-wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.6 FIELD-APPLIED JACKET INSTALLATION

- A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
 - 1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.
 - 2. Embed glass cloth between two 0.062-inch- thick coats of lagging adhesive.
 - 3. Completely encapsulate insulation with coating, leaving no exposed insulation.
- B. Where FSK jackets are indicated, install as follows:
 - 1. Draw jacket material smooth and tight.
 - 2. Install lap or joint strips with same material as jacket.
 - 3. Secure jacket to insulation with manufacturer's recommended adhesive.

4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch- wide joint strips at end joints.
5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

3.7 DUCT INSULATION SCHEDULE, GENERAL

- A. Definitions:
1. Supply air ducts shall be ducts conveying air that has been heated or cooled for space conditioning purposes. Discharge ducts from dedicated outside air units shall be considered supply air ducts.
 2. Outdoor air ducts shall be ducts conveying untreated outside air.
 3. Return air ducts shall be ducts conveying room temperature air from conditioned spaces to the return side of air handling equipment, to be recirculated.
 4. Exhaust ducts shall be ducts conveying room temperature air from conditioned spaces to be discharged to the exterior.
- B. Plenums and Ducts Requiring Insulation:
1. Indoor, concealed supply and outdoor air.
 2. Indoor, exposed supply and outdoor air.
 3. Indoor, return located within 10' of air handling equipment.
 4. Indoor, concealed return located in unconditioned space.
 5. Indoor, exposed return located in unconditioned space.
- C. Items Not Insulated:
1. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
 2. Factory-insulated flexible ducts.
 3. Factory-insulated plenums and casings.
 4. Flexible connectors.
 5. Vibration-control devices.
 6. Factory-insulated access panels and doors.

3.8 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, round and flat-oval, supply-air duct insulation is the following:
1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. 1.5 lb/cu. ft. nominal density.
- B. Concealed, round and flat-oval, outdoor-air duct insulation is one of the following:
1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- C. Concealed, rectangular, supply-air duct insulation is the following:
1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- D. Concealed, rectangular, return-air duct insulation in unconditioned space is the following:
1. Glass-Fiber Blanket: 3 inches thick and 0.75 lb/cu. ft. nominal density.
- E. Concealed, rectangular, outdoor-air duct insulation is the following:
1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- F. Concealed, supply-air plenum insulation is the following:
1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- G. Concealed, outdoor-air plenum insulation is the following:
1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- H. Exposed, round and flat-oval, supply-air duct insulation is the following:
1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- I. Exposed, round and flat-oval, outdoor-air duct insulation is the following:
1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- J. Exposed, rectangular, supply-air duct insulation is the following:

1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- K. Exposed, rectangular, outdoor-air duct insulation is the following:
 1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- L. Exposed, supply-air plenum insulation is the following:
 1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- M. Exposed, outdoor-air plenum insulation is the following:
 1. Glass-Fiber Blanket: 1-1/2 inches thick and 0.75 lb/cu. ft. nominal density.
- N. Supply and return ductwork within 10' of air handling equipment shall be lined per Section 233113 "Metal Ducts".

END OF SECTION 230713

SECTION 284600 - FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-alarm system control units.
2. Fire-alarm remote annunciators.
3. Fire-alarm auxiliary power supplies.
4. Fire-alarm audio amplifiers.
5. Fire-alarm terminal cabinets.
6. Manual fire-alarm boxes.
7. Heat-sensing fire detectors.
8. Smoke-sensing fire detectors.
9. Carbon monoxide detectors.
10. Audible notification appliances.
11. Visual notification appliances.
12. Combination audible/visual notification appliances.
13. Fire-alarm supervised control module interfaces for fire safety functions.
14. Fire-alarm supervisory signal-initiating devices.
15. Fire-alarm digital alarm communicator transmitters.
16. Fire-alarm record documentation cabinets.
17. Fire-alarm cables.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" specifies additional requirements applicable to coordinating, scheduling, and sequencing of the Work specified in this Section.
2. Section 078413 "Penetration Firestopping" specifies materials and methods for sealing penetrations of rated walls and partitions referenced by this Section.
3. Section 260529 "Hangers and Supports for Electrical Systems" specifies hangers, supports, and concrete bases referenced by this Section.
4. Section 260533.13 "Conduits for Electrical Systems" specifies raceway types installed by this Section.
5. Section 260553 "Identification for Electrical Systems" specifies electrical equipment labels and warning signs installed by this Section.

1.2 REFERENCES

A. Abbreviations and Acronyms for Electrical Terms and Units of Measure:

1. AWG: American wire gauge; see ASTM B258.
2. BAS: Building automation system.
3. BMS: Building management system.
4. cd: Candela, the SI fundamental unit of luminous intensity.
5. DACR: Digital alarm communicator receiver.
6. DACT: Digital alarm communicator transmitter.
7. dB(A-weighted) or dB(A): Decibel acoustical sound pressure level with A-weighting applied in accordance with IEC 61672-1.
8. EMP: Electrical maintenance program (operation and maintenance); electromagnetic pulse (transient analysis).
9. EPS: Emergency power supply.
10. EPSS: Emergency power supply system.
11. ERCES: Emergency responder communications enhancement system.
12. ESS: Energy storage system.
13. FACU: Fire-alarm control unit.
14. FAS: Fire-alarm system.
15. IDC: Initiating device circuit.

16. IP: Internet Protocol.
17. IR: Infrared.
18. LAN: Local area network.
19. LCD: Liquid-crystal display.
20. LED: Light-emitting diode.
21. Li-ion: Lithium-ion.
22. NAC: Notification appliance circuit.
23. N.C.: Normally closed.
24. Ni-Cd: Nickel-cadmium.
25. Ni-MH: Nickel-metal hydride.
26. N.O.: Normally open.
27. PC: Personal computer.
28. PLFA: Power-limited fire alarm.
29. PoE: Power over Ethernet.
30. POTS: Plain old telephone service. See "public switched telephone network" definition.
31. PSTN: Public switched telephone network.
32. RAT: Radio alarm transmitter.
33. SLC: Signaling-line circuit.
34. TR: Tamper resistant.
35. UL: (standards) UL Standards & Engagement Inc.; (product categories) UL Solutions, Inc.
36. UL CCN: UL Category Control Number.
37. UPS: Uninterruptible power supply.
38. VoIP: Voice over Internet Protocol.
39. VPN: Virtual private network.
40. VRLA: Valve regulated lead acid; also called "sealed lead acid (SLA)" or "valve regulated sealed lead acid."
41. WAN: Wide area network.
42. WR: Weather resistant.

B. Abbreviations and Acronyms for Electrical Raceway Types:

1. EMT: Electrical metallic tubing.
2. ERMCS-G: Galvanized-steel electrical rigid metal conduit.
3. FMC: Flexible metal conduit.
4. IMC: Steel electrical intermediate metal conduit.
5. LFMC: Liquidtight flexible metal conduit.
6. PVC: Rigid PVC conduit.
7. PVC-40: Schedule 40 rigid PVC conduit.
8. PVC-80: Schedule 80 rigid PVC conduit.
9. RGS: See ERMCS-G.
10. RMC: See ERMCS raceway types above.

C. Abbreviations and Acronyms for Electrical Single-Conductor and Multiple-Conductor Cable Types:

1. FPL: Power-limited fire-alarm cable.
2. FPLP: Power-limited fire-alarm plenum cable.
3. FPLR: Power-limited fire-alarm riser cable.

D. Definitions:

1. Cable: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "cable" is (1) a conductor with insulation, or a stranded conductor with or without insulation (single-conductor cable); or (2) a combination of conductors insulated from one another (multiple-conductor cable).
2. Conductor: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "conductor" is (1) a wire or combination of wires not insulated from one another, suitable for carrying an electric current; (2) (National Electrical Safety Code) a material, usually in the form of wire, cable, or bar, suitable for carrying an electric current; or (3) (general) a substance or body that allows a current of electricity to pass continuously along it.

3. Conduit: A structure containing one or more duct raceways.
4. Duct Raceway: A single enclosed raceway for conductors or cable.
5. Emergency Systems: Those systems legally required and classed as emergency by municipal, state, federal, or other codes, or by any governmental agency having jurisdiction that are designed to ensure continuity of lighting, electrical power, or both, to designated areas and equipment in the event of failure of the normal supply for safety to human life.
6. Public Switched Telephone Network (PSTN): Analog telephone technology that uses twisted pair cables from a telephone-provider central office for the transmission medium. "PSTN" refers to the telephone network; "POTS" refers to the individual subscriber line.
7. Voice over Internet Protocol (VoIP): Digital telephone packet technology that uses the internet for its transmission medium.
8. Wire: In accordance with NIST NBS Circular 37 and IEEE standards, in the United States for the purpose of interstate commerce, the definition of "wire" is a slender rod or filament of drawn metal. A group of small wires used as a single wire is properly called a "stranded wire." A wire or stranded wire covered with insulation is properly called an "insulated wire" or a "single-conductor cable." Nevertheless, when the context indicates that the wire is insulated, the term "wire" will be understood to include the insulation.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. In addition to information identified in Section 013300 "Submittal Procedures," submit the following:
 1. Product Listing: Include copy of unexpired approval letter, on letterhead of qualified electrical testing agency, certifying product's compliance with specified listing criteria.
 - a. If listed manufacturer differs from selling manufacturer, indicate relationship between entities on submittal. Clearly indicate which entity warrants product performance and fitness for purpose.
 - b. Listing criteria identified in approval letter must match specified listing criteria. UL label indicating approval of equipment's enclosure is not considered approval of equipment for intended application.
 - c. Product identification in approval letter must match product branding and model numbers in submittal. Approval letters for discontinued or superseded products are not acceptable for submitted product.
 2. Include manufacturer's sample extended warranty language.
- B. Shop Drawings: Prepare and submit the following:
 1. Cover sheet indicating protected premises name and location and Owner information, name of installer, device legend and symbols and date of issue and any revision dates.
 2. Floor Plans:
 - a. Floor or level identification.
 - b. Point of compass (indication of north).
 - c. Graphic scale.
 - d. All walls and doors.
 - e. All partitions extending to within 15 percent of the ceiling height.
 - f. Room and area descriptions.
 - g. Acoustically distinguishable spaces.
 - h. Minimum required illumination levels.
 - i. System devices/component locations.
 - j. Locations of the system's primary power disconnecting means.
 - k. Locations of monitor/control interfaces to other systems.
 - l. System riser locations.
 - m. Type and number of system components/devices on each circuit, on each floor or level.
 - n. Type and quantity of conductors for each circuit.
 - o. Identification of any ceiling over 10 ft in height where automatic fire detection is being proposed.
 - p. Details of ceiling geometries, including beams and solid joists, where automatic fire detection is being proposed.

- q. Acoustic properties of spaces, where known.
- r. Pathway class designations, including the location of any end-of-line supervisory or power devices that are required by the pathway class.
- s. Pathway survivability level designations.
- 3. Wiring Diagrams:
 - a. System riser diagrams coordinated with the floor plans and indicating the following information:
 - 1) General arrangement of the system in building cross-section.
 - 2) Number of risers.
 - 3) Type and number of circuits in each riser.
 - 4) Type and number of system components/devices on each circuit, on each floor or level.
 - 5) Number of conductors for each circuit.
 - 6) Pathway class designation, including the location of any end-of-line supervisory or power devices that are required by the pathway class.
 - 7) Pathway survivability level designations.
 - b. Control unit diagrams for all control equipment, power supplies, battery chargers, and annunciators indicating the following information:
 - 1) Identification of control equipment depicted.
 - 2) Location(s) of control equipment.
 - 3) All field wiring terminals and terminal identifications.
 - 4) All circuits connected to field wiring terminals and circuit identifications.
 - 5) All indicators and manual controls.
 - 6) Field connections to supervising station signaling equipment and emergency safety control interfaces.
 - c. Typical fire-alarm component schematic wiring diagrams for all initiating devices, notification appliances, and annunciators.
- 4. Fire-Alarm Input/Output Sequence: Include a narrative description or input/output matrix of operation to describe the fire-alarm system sequence of operation.
- 5. Details:
 - a. Component installation details.
- 6. Calculations:
 - a. Battery calculations.
 - b. Voltage-drop calculations.
 - c. Speaker circuit calculations.
 - d. Spare capacity circuit calculations.

C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

- A. Warranty documentation.
- B. Maintenance service agreement.
- C. Software and firmware service agreement.

1.5 REGULATORY AGENCY APPROVALS

- A. Submittals for fire detection and alarm system requiring approval by authorities having jurisdiction must be signed by qualified NICET FAS engineering technician or life-safety professional engineer responsible for their preparation. Obtain approval by authorities having jurisdiction prior to submitting for action by Architect.

1.6 QUALIFICATIONS

- A. Fire-Alarm Systems (FAS) Technician Trainee: Having at least six months of experience and possessing active NICET FAS Level I certification. Able to perform limited tasks under direct supervision.

- B. Fire-Alarm Systems (FAS) Associate Engineering Technician: Having at least two years of experience and possessing active NICET FAS Level II certification. Able to review drawings, specifications, codes, and standards; to conduct basic installation activities; and to perform basic troubleshooting.
- C. Fire-Alarm Systems (FAS) Engineering Technician: Having at least five years of experience and possessing active NICET FAS Level III certification. Able to perform system layout activities, supervise Level I and Level II technicians, provide submittal packages, and interact with authorities having jurisdiction.
- D. Fire-Alarm Systems (FAS) Senior Engineering Technician: Having at least 10 years of experience and possessing active NICET FAS Level IV certification. Able to manage multiple projects at once, interpret codes and standards, conduct training, and serve as liaison between authorities having jurisdiction, owners, engineers, and contractors.
- E. Inspection and Testing of Fire-Alarm Systems (I&TFAS) Technician I: Possessing active NICET I&TFAS Level I certification. Able to perform periodic inspections and tests of basic fire-alarm systems and prepare related records and reports.
- F. Inspection and Testing of Fire-Alarm Systems (I&TFAS) Technician II: Possessing active NICET I&TFAS Level II certification. Able to plan, perform, and coordinate periodic inspections and tests of complex fire-alarm systems (including one or more of suppression interfaces, networked control units, smoke control interfaces, air sampling systems, multi-zone voice evacuation systems, or high-rise applications) and prepare related records and reports.
- G. Life-Safety Professional Engineer: Professional engineer possessing active qualifications specified in Section 014000 "Quality Requirements," with expertise in life-safety systems.
- H. Fire-Alarm Cable Installer: Entity possessing active qualifications specified in Section 014000 "Quality Requirements" with training and manufacturer certification to install, splice, and terminate fire-alarm cabling.
 - 1. On-site fire-alarm cable installation supervisor must possess active NICET FAS Engineering Technician certification.
- I. Fire-Alarm Testing Agency: Entity possessing active credentials from qualified electrical testing laboratory recognized by authorities having jurisdiction.
 - 1. On-site fire-alarm testing supervisor must possess active NICET I&TFAS Technician II certification.

1.7 WARRANTY FOR FIRE DETECTION AND ALARM SYSTEMS

- A. Special Installer Extended Warranty: Installer warrants that installed fire detection and alarm system performs in accordance with specified requirements and agrees to repair or replace system components or products that fail to perform as specified within extended-warranty period. Warranty must convey to Owner upon acceptance of the Work.
 - 1. Extended-Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.
- B. Special Manufacturer Extended Warranty: Manufacturer warrants that fire detection and alarm system components perform in accordance with specified requirements and agrees to repair or replace system components or products that fail to perform as specified within extended-warranty period. Warranty must convey to Owner upon acceptance of the Work.
 - 1. Initial Extended-Warranty Period: Three years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Products or components listed and labeled in accordance with NFPA 70 or NFPA 72, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
- B. System Description: Noncoded, UL-certified addressable system with multiplexed signal transmission and voice -and-strobe notification for evacuation.
- C. System Inputs:
 - 1. Fire-alarm signal initiation must be by one or more of the following devices:
 - a. Manual fire-alarm boxes.
 - b. Heat detectors.
 - c. Smoke detectors.
 - d. Carbon monoxide detectors.
 - 2. Supervisory signal initiation must be by one or more of the following devices and actions:
 - a. Zones or individual devices have been disabled.
 - b. FACU has lost communication with network.
 - 3. System trouble signal initiation must be by one or more of the following devices and actions:
 - a. Open circuits, shorts, and grounds in designated circuits.
 - b. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 - c. Loss of communication with addressable sensor, input module, relay, control module, remote annunciator, or ethernet module.
 - d. Loss of primary power at FACU.
 - e. Ground or single break in internal circuits of FACU.
 - f. Abnormal AC voltage at FACU.
 - g. Break in standby battery circuitry.
 - h. Failure of battery charging.
 - i. Abnormal position of switch at FACU or remote annunciator.
 - j. Voice signal amplifier failure.
 - 4. Carbon monoxide alarm signal initiation must be by the following devices :
 - a. Carbon monoxide detectors.
- D. System Outputs:
 - 1. Fire-alarm signal must initiate the following actions:
 - a. Continuously operate alarm notification appliances, including voice evacuation notices.
 - b. Identify alarm and specific initiating device at FACU and remote annunciators.
 - c. Transmit alarm signal to remote alarm receiving station.
 - d. Activate voice/alarm communication system.
 - e. Record events in system memory.
 - 2. System supervisory signal must initiate the following actions:
 - a. Initiate supervisory notification appliances.
 - b. Identify specific device initiating event at FACU and remote annunciators.
 - c. After time delay of 200 seconds, transmit trouble or supervisory signal to remote alarm receiving station.
 - 3. Carbon monoxide alarm signal must initiate the following actions:
 - a. Initiate carbon monoxide notification appliances and sound temporal-4 signal.
 - b. Identify specific device initiating event at FACU and remote annunciators.
 - c. Transmit carbon monoxide alarm signal to remote alarm receiving station.

2.2 FIRE-ALARM SYSTEM CONTROL UNITS

- A. Description: A component of the fire-alarm system, provided with primary and secondary power sources, which receives signals from initiating devices or other fire-alarm control units, and processes these signals to determine part or all of the required fire-alarm system output functions.

- B. UL UOJZ - Addressable Fire-Alarm System Control Units:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire-Lite Alarms; Honeywell International, Inc.
 - b. Gamewell-FCI; Honeywell International, Inc.
 - c. Notifier; Honeywell International, Inc.
 - d. Siemens Industry, Inc.; Fire Safety Division
 2. Source Limitations: Obtain products from single manufacturer.
 3. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Electrical Control Units for Fire-Protective Signaling Systems: UL CCN UOJZ, including UL 864 and NFPA 72.
 4. Standard Features:
 - a. Product Reference Standards: Ch. 23 of NFPA 72.
 - b. Voice /alarm communications.
 - c. Indication of which communication zones have been silenced.
 - d. Provide selective silencing of alarm notification appliances by building communication zone.
 - e. Real-time clock for time annotation of events on the event recorder.
 - f. Communication between the FACU and remote circuit interface panels, annunciators, and displays.
 - g. The FACU must be listed for connection to a central station signaling system service.
 - h. Provide non-volatile memory for system database, logic, operating system, and event history.
 - i. The system must not require manual input to initialize in the event of a complete power-down condition.
 - j. Alphanumeric display and system controls.
 - k. Minimum of two Class B signaling-line circuits with expansion capability to add circuits.
 - l. Minimum of two Class B notification appliance circuits with expansion capability to add circuits.
 - m. Synchronization of notification appliance circuits.

2.3 FIRE-ALARM REMOTE ANNUNCIATORS

- A. Description: A unit containing one or more indicator lamps, alphanumeric displays, or other equivalent means in which each indication provides status information about a fire-alarm system device, circuit, condition, or location.
- B. UL UOXX - Fire-Alarm System Remote Annunciators:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Same manufacturer as FACU
 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Control Unit Accessories for Fire-Protective Signaling Systems: UL CCN UOXX, including UL 864 and NFPA 72.
 3. Standard Features:
 - a. Product Reference Standards: Ch. 23 of NFPA 72.
 - b. Compatibility with fire-alarm control unit for alphanumeric display and LED indicating lights.
 - c. Provide controls to acknowledge, silence, reset and test functions for alarm, supervisory, and trouble signals.

2.4 FIRE-ALARM AUXILIARY POWER SUPPLIES

- A. Description: An auxiliary source of low-voltage electrical operating power for fire-alarm system equipment, including the circuits and terminations connecting it to the equipment being powered.

Auxiliary power supplies are often referred to as remote power supplies, booster power supplies, or notification appliance power supplies.

- B. UL UOXX - Fire-Alarm Auxiliary Power Supplies :
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Control Unit Accessories for Fire-Protective Signaling Systems: UL CCN UOXX, including UL 864 and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Chs. 10 and 23 of NFPA 72.
 - b. Minimum of two 24 V(dc) auxiliary power circuits.
 - 4. Other Available Features Required by Project:
 - a. Synchronization of notification appliance circuits.
 - b. Addressable-type notification appliance power supply, which connects directly to a signaling-line circuit.

2.5 FIRE-ALARM AUDIO AMPLIFIERS

- A. Description: A component of in-building fire emergency voice/alarm communications systems that takes a low-level audio input and amplifies the power output to distribute to fire-alarm loudspeakers. Amplifiers can be an integral component of the fire-alarm control unit or can be remotely located in a separate cabinet within the building.
- B. UL UEAY2 - Fire-Alarm Audio Amplifiers:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Amplifiers for Fire-Protective Signaling Systems: UL CCN UEAY2, including UL 1711, UL 1480, UL 1480A, UL 864, and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Chs. 18, 23, and 24 of NFPA 72.
 - b. Supervised high-fidelity audio for emergency voice evacuation fire-alarm systems.
 - c. Frequency Response: 275 Hz - 6.5 kHz.
 - d. Speaker Outputs: 70 V power limited.
 - e. Minimum of four Class B speaker output circuits.
 - 4. Other Available Features Required by Project:
 - a. Eight digitally pre-recorded voice messages.
 - b. Push-to-Talk (PTT) microphone.

2.6 FIRE-ALARM TERMINAL CABINETS

- A. Description: A cabinet with hinged, lockable cover clearly labeled and intended for termination of fire-alarm conductors at junction points. Screw-type terminal blocks are provided within the terminal cabinet for conductor splices.
- B. UL UOXX - Fire-Alarm Terminal Cabinet:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. System Control Unit Accessories: UL CCN UOXX, including UL 864 and NFPA 72.
 - 3. Standard Features:
 - a. Labeled "FIRE ALARM TERMINAL CABINET."
 - b. Interior field identification labels.
 - c. Sized accordingly to contain required number of termination points.

- d. Accessible by authorized personnel only.

2.7 MANUAL FIRE-ALARM BOXES

- A. Description: A manually operated device used to initiate a fire-alarm signal. Manual fire-alarm boxes come in both conventional or addressable models and may require a single-action (pull down) or double-action (push in and pull down) to initiate a fire-alarm signal. These initiating devices are sometimes referred to as manual fire-alarm stations, pull stations, or call points.
- B. UL UNIU - Double-Action Manual Fire-Alarm Boxes:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Non-Coded Fire-Alarm Boxes: UL CCN UNIU, including UL 38 and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Chs. 10 and 17 of NFPA 72.
 - b. Colored red with raised letters providing operating instructions.
 - c. Station Reset: Key operated switch.
 - d. Material: Polycarbonate.
- C. Accessories:
 - 1. Factory-fabricated clear plastic enclosure.

2.8 HEAT-SENSING FIRE DETECTORS

- A. Description: A fire detector that detects either abnormally high temperatures or rate-of-temperature rise, or both.
- B. UL UQGS - Fixed-Temperature Heat Detectors:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Heat-Detecting-Type Automatic Fire Detectors: UL CCN UQGS, including UL 521 and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Ch. 17 of NFPA 72.
 - b. Actuated by temperature that exceeds fixed temperature of 135 deg F regardless of rate of temperature rise.
 - c. Addressable-type initiating device.
 - d. Detector must have functional humidity range of 10 to 90 percent.
- C. UL UQGS - Rate-Compensated Heat Detectors:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Heat-Detecting-Type Automatic Fire Detectors: UL CCN UQGS, including UL 521 and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Ch. 17 of NFPA 72.
 - b. Outer metal construction and inner metal components, which eliminate nuisance alarms due to thermal lag.
 - c. Actuated by temperature that exceeds fixed temperature of 135 deg F regardless of rate of temperature rise.

2.9 SMOKE-SENSING FIRE DETECTORS

- A. Description: A device that detects visible or invisible particles of combustion and initiates an action. Types of smoke-sensing fire detectors include spot-type detectors, air-sampling detectors, projected beam-type detectors, duct detectors, multi-criteria detectors, and video image smoke detectors.
- B. UL UROX - Spot-Type Smoke Detectors:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Detectors Designed for Smoke Particles: UL CCN UROX, including UL 268 and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Ch. 17 of NFPA 72.
 - b. Field programmable.
 - c. Resettable from the control unit.
 - d. Removable from the base assembly without the use of tools and without disturbing the wiring connections.
 - e. Sensing Type: Photoelectric.

2.10 CARBON MONOXIDE DETECTORS

- A. Description: A device that detects the presence of a specific carbon monoxide concentration.
- B. UL FTAM - Carbon Monoxide Detectors:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Detectors and Sensors Designed to Detect Gases and Vapors: UL CCN FTAM, including UL 2075 and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Ch. 17 of NFPA 72.
 - b. Detector sends trouble alarm when nearing end of life or experiencing power supply problems or internal faults.
 - c. Detector sounder base emits Temporal-4 signal.
 - d. Testable by introducing test carbon monoxide into sensing cell.

2.11 AUDIBLE NOTIFICATION APPLIANCES

- A. Description: A fire-alarm system component such as a horn or loudspeaker that provides audible output to alert occupants by the sense of hearing.
- B. UL UUMW - Loudspeakers:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Speakers and Amplifiers Used in Fire-Alarm and/or Emergency Communication Systems: UL CCN UUMW, including UL 1480 and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Ch. 18 of NFPA 72.
 - b. Flush and ceiling-tile mounting with use of ceiling tile brackets.
 - c. Field-selectable voltage and power tap settings.
 - d. Operating Temperature Range: 32 deg F to 120 deg F.
 - e. Compatible with wires up to 12 AWG.
- C. Accessories:

1. Audible appliance protective guard.

2.12 VISUAL NOTIFICATION APPLIANCES

- A. Description: A fire-alarm system component that provides a visible output to alert occupants by the sense of sight, including visual strobes.
- B. UL UVAV - Strobe:
 1. Source Limitations: Obtain products from single manufacturer.
 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Visual-Signal Appliances for Fire-Protective Signaling Applications: UL CCN UVAV, including UL 1638 and NFPA 72.
 3. Standard Features:
 - a. Product Reference Standards: Ch. 18 of NFPA 72.
 - b. Operating Temperature Range: 32 deg F to 120 deg F.
 - c. Compatible with wires up to 12 AWG.
 - d. Rated Light Output: 15, 30, 75, or 110 candela.
 - e. Field-selectable candela settings.
 - f. Clear or nominal white polycarbonate lens mounted on faceplate.
 4. Other Available Features Required by Project:
 - a. For units with guards to prevent physical damage, light output ratings must be determined with guards in place.
 - b. Weather resistant to provide protection against water, humidity, and corrosion.
- C. Accessories:
 1. Visual appliance protective guard.

2.13 COMBINATION AUDIBLE/VISUAL NOTIFICATION APPLIANCES

- A. Description: A fire-alarm system component such as a horn/strobe or loudspeaker/strobe that provides both an audible and a visible output to alert occupants by the sense of hearing and sight.
- B. UL UUMW and UVAV - Combination Loudspeaker/Strobe Appliances:
 1. Source Limitations: Obtain products from single manufacturer.
 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Electrically Operated Signal-Sounding Appliances or Visual-Signal Appliances for Fire-Protective Signaling Applications: UL CCN UUMW and UVAV, including UL 1480, UL 1638, and NFPA 72.
 3. Standard Features:
 - a. Product Reference Standards: Ch. 18 of NFPA 72.
 - b. Operating Temperature Range: 32 deg F to 120 deg F.
 - c. Compatible with wires up to 12 AWG.
 - d. Rated Light Output: 15, 30, 75, or 110 candela.
 - e. Clear or nominal white polycarbonate lens mounted on faceplate.
 - f. Strobe flash rate of 1 Hz over its entire operating range.
 - g. Field-selectable candela settings.
 - h. Field-selectable voltage and power settings.
 - i. Universal mounting plate for ceiling units.
 4. Other Available Features Required by Project:
 - a. For units with guards to prevent physical damage, light output ratings must be determined with guards in place.
 5. Accessories:
 - a. Combination audible/visual appliance protective guard.
 - b. Weather resistant to provide protection against water, humidity, and corrosion.

2.14 FIRE-ALARM SUPERVISED CONTROL MODULE INTERFACES FOR FIRE SAFETY FUNCTIONS

- A. Description: An addressable fire-alarm control module that interfaces to another building system for the purpose of initiating an action for that system based upon activation of a supervisory or alarm condition on the fire-alarm system. The interface between the control module and the other building system or equipment is supervised.
- B. UL UOXX - Fire-Alarm Supervised Control Module:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Control Unit Accessories - Addressable Control Modules: UL CCN UOXX, including UL 864 and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Ch. 17 of NFPA 72.
 - b. Field programmable.
 - c. Resettable from the control unit.
 - d. Supervises Class A and Class B initiating device circuits.

2.15 FIRE-ALARM SUPERVISORY SIGNAL-INITIATING DEVICES

- A. Description: An initiating device such as a valve supervisory switch, water-level indicator, low-air-pressure switch, or low-temperature switch in which the change of state signals to the fire-alarm control unit an off-normal condition and its restoration to normal of a fire-protection or life-safety system; or a need for action in connection with guard tours, fire-suppression systems or equipment, or maintenance features of related systems.
- B. UL USQT - Control Valve Supervisory Signal-Initiating Devices:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Extinguishing System Attachments: UL CCN USQT, including UL 346 and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Ch. 17 of NFPA 72.
 - b. Initiation of two separate and distinct signals; one indicating movement of the valve from its normal position, and the other indicating restoration of the valve to its normal position.
 - c. Off-normal signal must be initiated during the first two revolutions of the handwheel, or during one-fifth of the travel distance of the valve from its normal position.
 - d. Off-normal signal must not be restored at any valve position except normal.

2.16 FIRE-ALARM DIGITAL ALARM COMMUNICATOR TRANSMITTERS

- A. Description: A fire-alarm system component at the protected premises to which the fire-alarm control unit connects and transmit signals indicating a status change of initiating devices or groups of devices. The DACT seizes the connected cellular signal, dials a preselected number to connect to a DACR, and transmits signals indicating a status change of the initiating devices.
- B. UL UOXX - Fire-Alarm Digital Alarm Communicator Transmitter:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. Control Unit Accessories for Fire-Protective Signaling Systems: UL CCN UOXX, including UL 864 and NFPA 72.
 - 3. Standard Features:
 - a. Product Reference Standards: Ch. 26 of NFPA 72.

- b. Compatible with remote alarm receiving station receiver.
- c. Receive alarm, supervisory, or trouble signals from FACU and automatically transmit to remote alarm receiving station via cellular network.
- d. Indicate trouble signal at FACU upon loss of communication with the remote alarm receiving station.
- e. Indicate local trouble signal upon loss of communication with the FACU.
- f. Secondary Power: Integral rechargeable battery and automatic charger.
- g. Digital data transmission of the following signals:
 - 1) Address of alarm-initiating device.
 - 2) Address of supervisory signal.
 - 3) Address of trouble-initiating device.
 - 4) Loss of AC supply.
 - 5) Loss of power.
 - 6) Low battery.
 - 7) Abnormal test signal.
 - 8) Communication bus failure.
- h. Self-test automatically performed every 24 hours with report transmitted to remote alarm receiving station.

2.17 FIRE-ALARM RECORD DOCUMENTATION CABINETS

- A. Description: A cabinet clearly labeled and intended for the storage of fire-alarm record documents, including as-built drawings; programming documentation; and inspection, testing, and maintenance documentation.
- B. UL UOXX - Fire-Alarm-System Record-Documents Storage Cabinet:
 - 1. Source Limitations: Obtain products from single manufacturer.
 - 2. Listing Criteria: Investigated, labeled, and marked by qualified electrical testing laboratory in accordance with guide information and standards specified for the following UL product categories:
 - a. System Control Unit Accessories: UL CCN UOXX, including UL 864 and NFPA 72.
 - 3. Standard Features:
 - a. Labeled "SYSTEM RECORD DOCUMENTS."
 - b. Sized accordingly to contain all necessary documentation.
 - c. Accessible by authorized personnel only.

2.18 FIRE-ALARM CABLES

- A. UL HNIR - Power-Limited Fire-Alarm Cable (FPL):
 - 1. Listing Criteria:
 - a. Power-Limited Fire-Alarm Cable: UL CCN HNIR; including UL 1424 and Article 760 of NFPA 70.
 - b. Vertical-Tray Flame Test: UL 1685.
 - c. Limited Smoke "ST1" Marking: UL 1685 or UL 2556.
 - 2. Standard Features:
 - a. Solid copper conductors with 300 V rated, 75 deg C, color-coded insulation.
 - b. Minimum Conductor Size: 18 AWG.
- B. UL HNIR - Power-Limited Fire-Alarm Plenum Cable (FPLP):
 - 1. Listing Criteria:
 - a. Power-Limited Fire-Alarm Cable: UL CCN HNIR; including UL 1424 and Article 760 of NFPA 70.
 - b. Vertical-Tray Flame Test: UL 1685.
 - c. Limited Smoke "ST1" Marking: UL 1685 or UL 2556.
 - d. Plenum Rating: NFPA 262.
 - 2. Standard Features:
 - a. Solid copper conductors with 300 V rated, 75 deg C, color-coded insulation.
 - b. Minimum Conductor Size: 18 AWG.

- C. UL HNIR - Power-Limited Fire-Alarm Riser Cable (FPLR):
 - 1. Listing Criteria:
 - a. Power-Limited Fire-Alarm Cable: UL CCN HNIR; including UL 1424 and Article 760 of NFPA 70.
 - b. Vertical-Tray Flame Test: UL 1685.
 - c. Limited Smoke "ST1" Marking: UL 1685 or UL 2556.
 - d. Riser Rating: UL 1666.
 - 2. Standard Features:
 - a. Solid copper conductors with 300 V rated, 75 deg C, color-coded insulation.
 - b. Minimum Conductor Size: 18 AWG.

2.19 MAINTENANCE MATERIAL ITEMS

- A. Spare Parts: Furnish to Owner spare parts, for repairing fire detection and alarm system components, that are packaged with protective covering for storage on-site and identified with labels describing contents. Include the following:
 - 1. Smoke Detectors: 2.
 - 2. Heat Detectors: 2.
 - 3. Manual Fire-Alarm Boxes: 2.
 - 4. Audible Notification Appliances: 2.
 - 5. Visual Notification Appliances: 2.
 - 6. Combination Audible/Visual Notification Appliances: 2.
- B. Special Tools: Furnish to Owner proprietary equipment, keys, and software required to operate, maintain, repair, adjust, or implement future changes to fire detection and alarm system, that are packaged with protective covering for storage on-site and identified with labels describing contents. Include the following:
 - 1. Keys for control equipment cabinets.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine field conditions with Installer present for compliance with requirements for fire detection and alarm systems and other conditions affecting performance of the Work.
- B. Examine all materials, products, and equipment received for defects or damage.
- C. Reject all materials, products, and equipment that show signs of defects or damage.
- D. Examine roughing-in for fire detection and alarm system piping to verify actual locations of piping connections before equipment installation.
- E. Examine walls, floors, ceilings, and roofs for suitable conditions where fire detection and alarm system components will be installed.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SELECTION OF CABLING FOR FIRE ALARM

- A. Field Circuits:
 - 1. SLC: 12 to 18 AWG unshielded twisted pair FPLR FPLP.
 - 2. NAC: 12 to 18 AWG unshielded FPLR FPLP.
 - 3. Audio Circuits: 12 to 18 AWG unshielded FPLR FPLP.
 - 4. Auxiliary Power Circuits: 12 to 18 AWG unshielded FPLR FPLP.

3.3 SELECTION OF RACEWAYS FOR FIRE ALARM

- A. Identification: At a minimum, all junction box covers for fire-alarm raceways must be identified using the color red.

- B. Outdoor Pathways:
 - 1. Exposed and Subject to Severe Physical Damage: ERM C.
 - 2. Exposed and Subject to Physical Damage: ERM C. Locations include the following:
 - a. Locations less than 2.5 m (8 ft) above finished grade.
 - 3. Exposed and Not Subject to Physical Damage: ERM C.
- C. Indoor Pathways:
 - 1. Exposed and Subject to Severe Physical Damage: ERM C. Locations include the following:
 - a. Mechanical rooms.
 - 2. Exposed and Subject to Physical Damage: ERM C EMT. Locations include the following:
 - a. Locations less than 2.5 m (8 ft) above finished floor.
 - b. Stub-ups to above suspended ceilings.
 - 3. Exposed and Not Subject to Physical Damage: ERM C EMT.
 - 4. Concealed above Suspended Ceilings: ERM C EMT Hooks.
 - 5. Concealed in Ceilings and Interior Walls and Partitions: ERM C EMT.
 - 6. Damp or Wet Locations: ERM C.
 - 7. In Vertical Runs: ERM C EMT.

3.4 INSTALLATION OF FIRE DETECTION AND ALARM SYSTEMS

- A. Comply with manufacturer's published instructions.
- B. Reference Standards for Installation: Unless more stringent installation requirements are specified in the Contract Documents or manufacturer's published instructions, comply with the following:
 - 1. Electrical Construction: ICC IBC, ICC IF C, NFPA 1, NFPA 70, and NECA NEIS 1.
 - 2. Commissioning of Electrical Systems: NECA NEIS 90.
 - 3. Commissioning of Active and Passive Fire Protection Features: NFPA 3 and NFPA 4.
 - 4. Fire-Alarm and Premises Security Work: NFPA 72, NFPA 731, NFPA 1225, and NECA NEIS 305.
 - 5. Work in ITE Rooms: NFPA 75.
 - 6. Work in Health Care Facilities: NFPA 99 and Article 517 of NFPA 70.
 - 7. Life-Safety and Means-of-Egress Work: NFPA 101.
 - 8. Emergency and Standby Power Work: NFPA 110, NFPA 111, and NECA NEIS 416.
 - 9. Work in Confined Spaces: NFPA 350.
 - 10. Work in Basements and Other Developed Subterranean Spaces: NFPA 520.
 - 11. Work in Museums, Libraries, Places of Worship, and Historic Structures: NFPA 909 and NFPA 914.
 - 12. Fire-Alarm Circuits and Pathways: Ch. 12 of NFPA 72 and Article 760 of NFPA 70.
 - 13. Fire-Alarm Initiating Devices: Ch. 17 of NFPA 72.
 - 14. Fire-Alarm Notification Appliances: Ch. 18 of NFPA 72.
 - 15. Fire-Alarm Control Equipment: Ch. 23 of NFPA 72.
 - 16. Fire-Alarm Transmitting Equipment: Ch. 23 and Ch. 26 of NFPA 72.
 - 17. Consult Architect for resolution of conflicting requirements.
- C. Interfaces with Other Work:
 - 1. Identification: Provide labels for all initiating devices, control equipment cabinets, and associated electrical equipment.
 - a. Identify field-installed conductors, interconnecting wiring, and components.
 - b. Label initiating devices with unique identification.
 - c. Identify source of AC power inside each control equipment cabinet.
 - d. Identify circuit disconnecting means at AC power source with red engraved label. Provide approved locking device for circuit disconnecting means.
 - e. Label enclosures with engraved metal or laminated-plastic nameplate.
 - f. Identify junction box covers using the color red.

3.5 FIELD QUALITY CONTROL OF FIRE DETECTION AND ALARM SYSTEMS

- A. Administrant for Fire-Alarm Tests and Inspections:

1. Engage factory-authorized service representative to administer and perform tests and inspections on components, assemblies, and equipment installations, including connections.
- B. Field tests and inspections must be witnessed by authorities having jurisdiction.
- C. Tests and Inspections:
 1. Perform manufacturer's recommended tests and inspections.
 2. Perform system acceptance testing in accordance with Ch. 14 and Appendix D of NFPA 72.
 3. Contractor is responsible for completing pre-acceptance testing to verify proper operation of the fire detection and alarm systems. Correct system deficiencies prior to scheduling a final acceptance test.
- D. Nonconforming Work:
 1. Initiating devices, notification appliances, control equipment, and system accessories will be considered defective if they do not pass tests and inspections.
 2. Remove and replace defective units and retest.
- E. Field Quality-Control Reports: Collect, assemble, and submit test and inspection reports.
- F. Manufacturer Services: Engage factory-authorized service representative to supervise field tests and inspections.
 1. Manufacturer's Field Reports for Field Quality-Control Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at Project site.

3.6 SYSTEM STARTUP

- A. Perform startup service.
 1. Complete installation and startup checks in accordance with manufacturer's published instructions.
 2. Provide power to the FACU and configure internal settings.
 3. Test all field wiring prior to connecting field devices and prior to connecting to the FACU. Ensure field wiring is free from ground faults and short circuits.
 4. Connect field devices to field wiring.
 5. Connect field wiring inside FACU cabinet.
 6. Ensure system is normal and free from ground faults, open circuits, or short circuits.
 7. Allow system burn-in for [30][60] days.
 8. Correct any issues that occur during the system burn-in period.
- B. Manufacturer Services: Engage factory-authorized service representative to support system startup.
 1. Manufacturer's Field Reports for System Startup Support: Prepare and submit report after each visit by factory-authorized service representative, documenting activities performed at Project site.

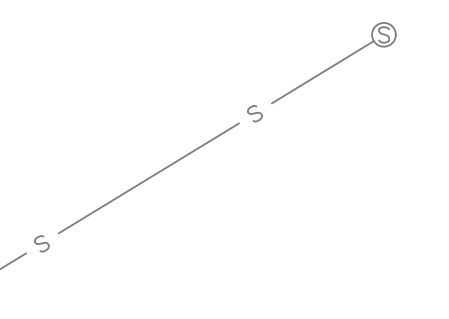
3.7 PROTECTION

- A. After installation, protect fire detection and alarm system equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

3.8 MAINTENANCE

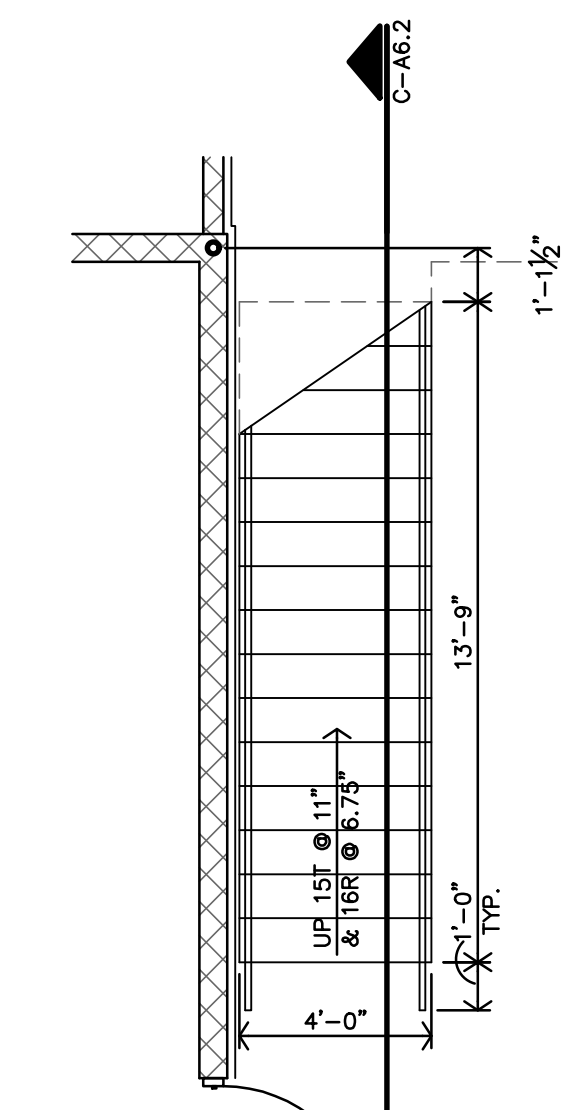
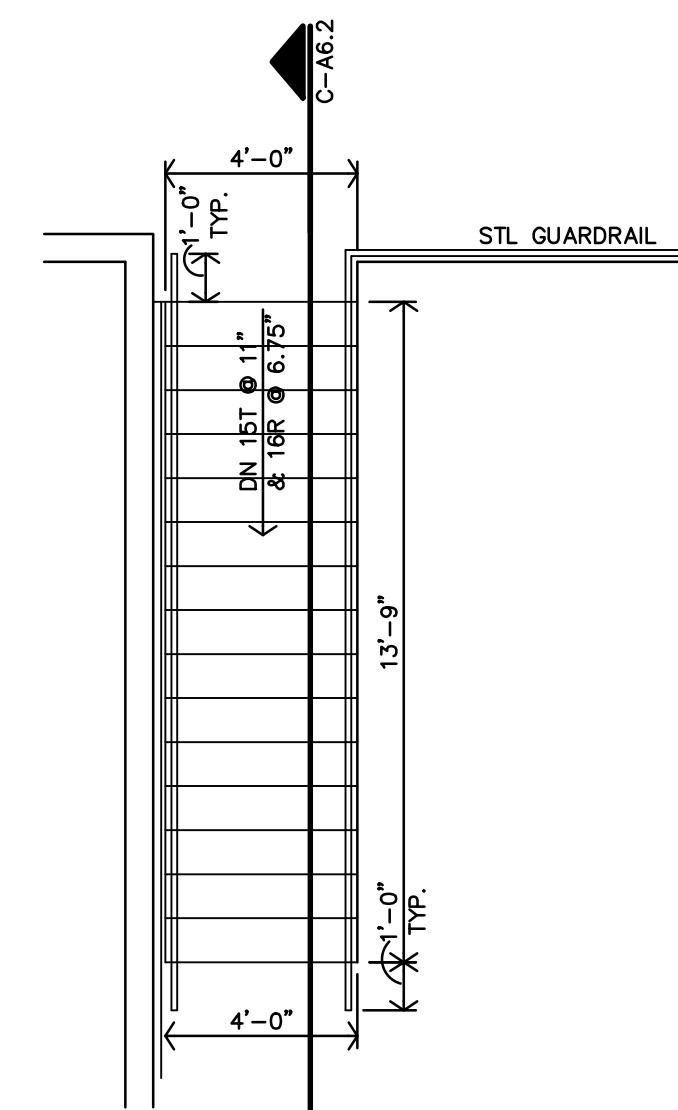
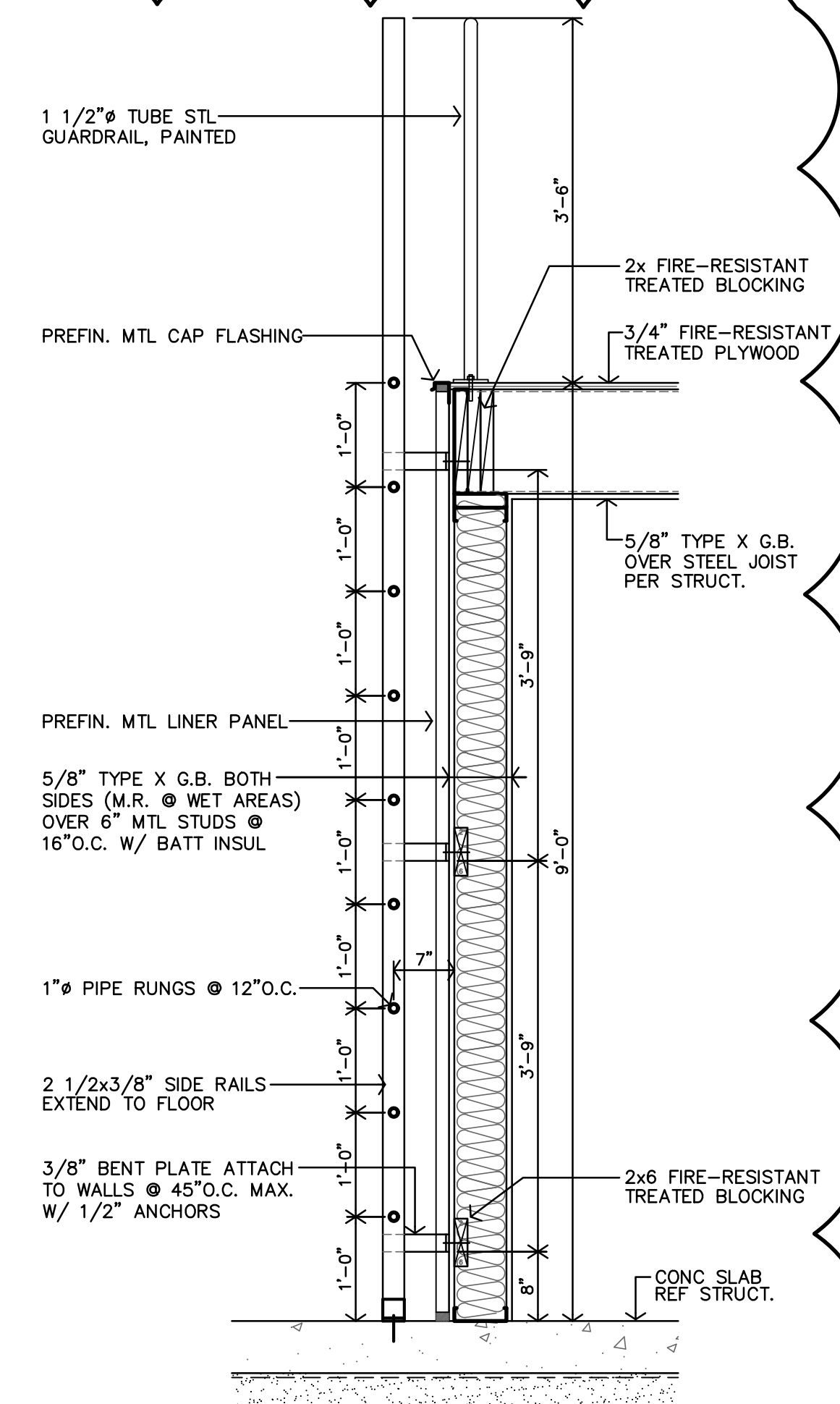
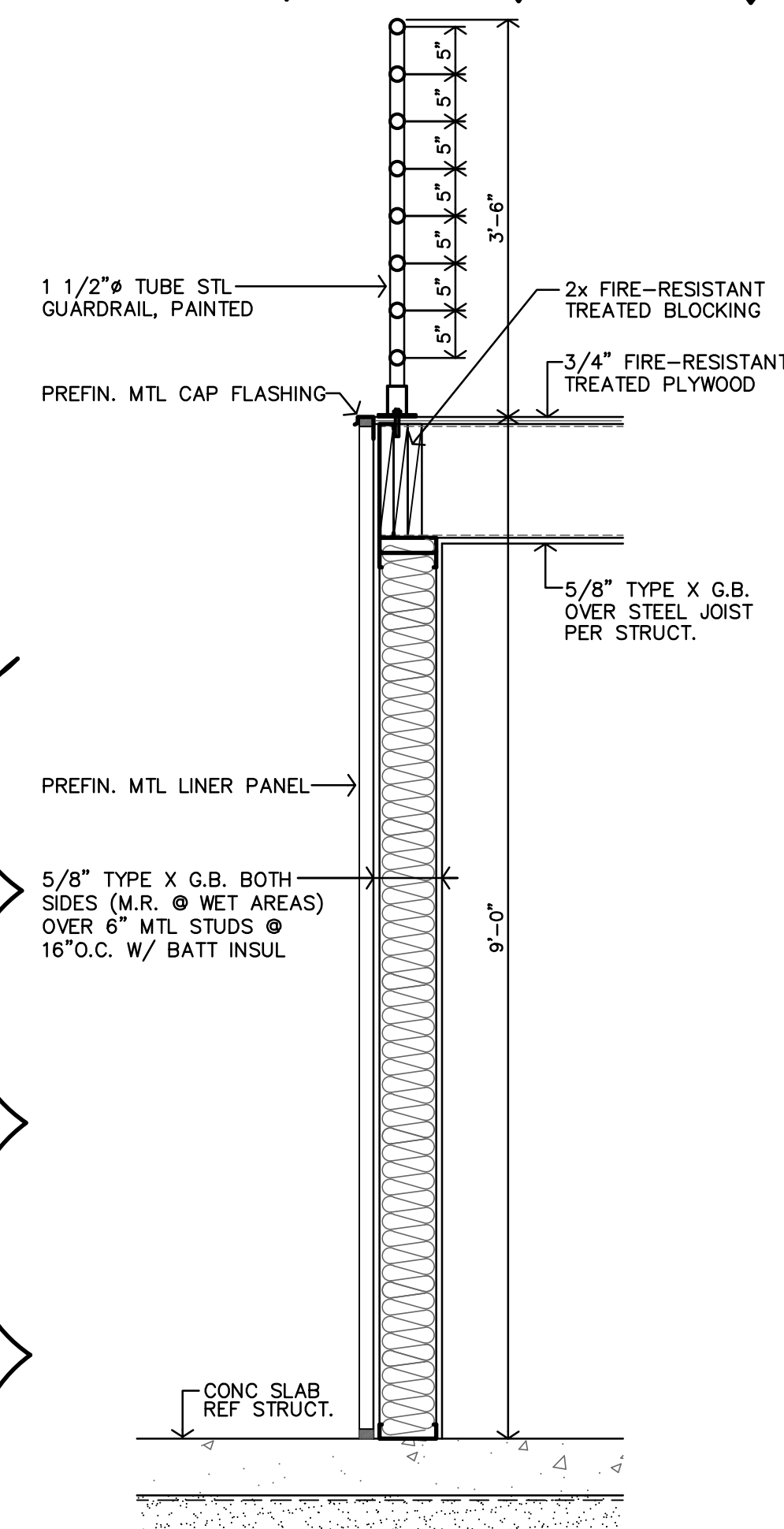
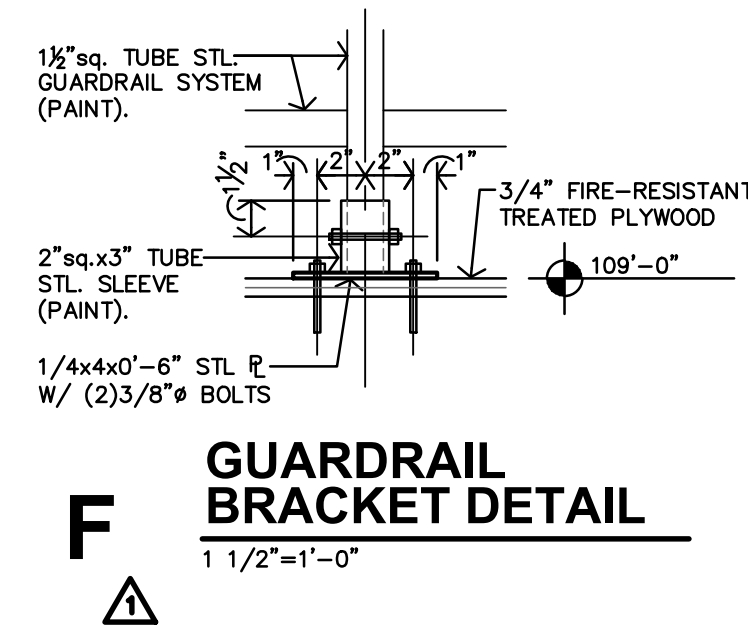
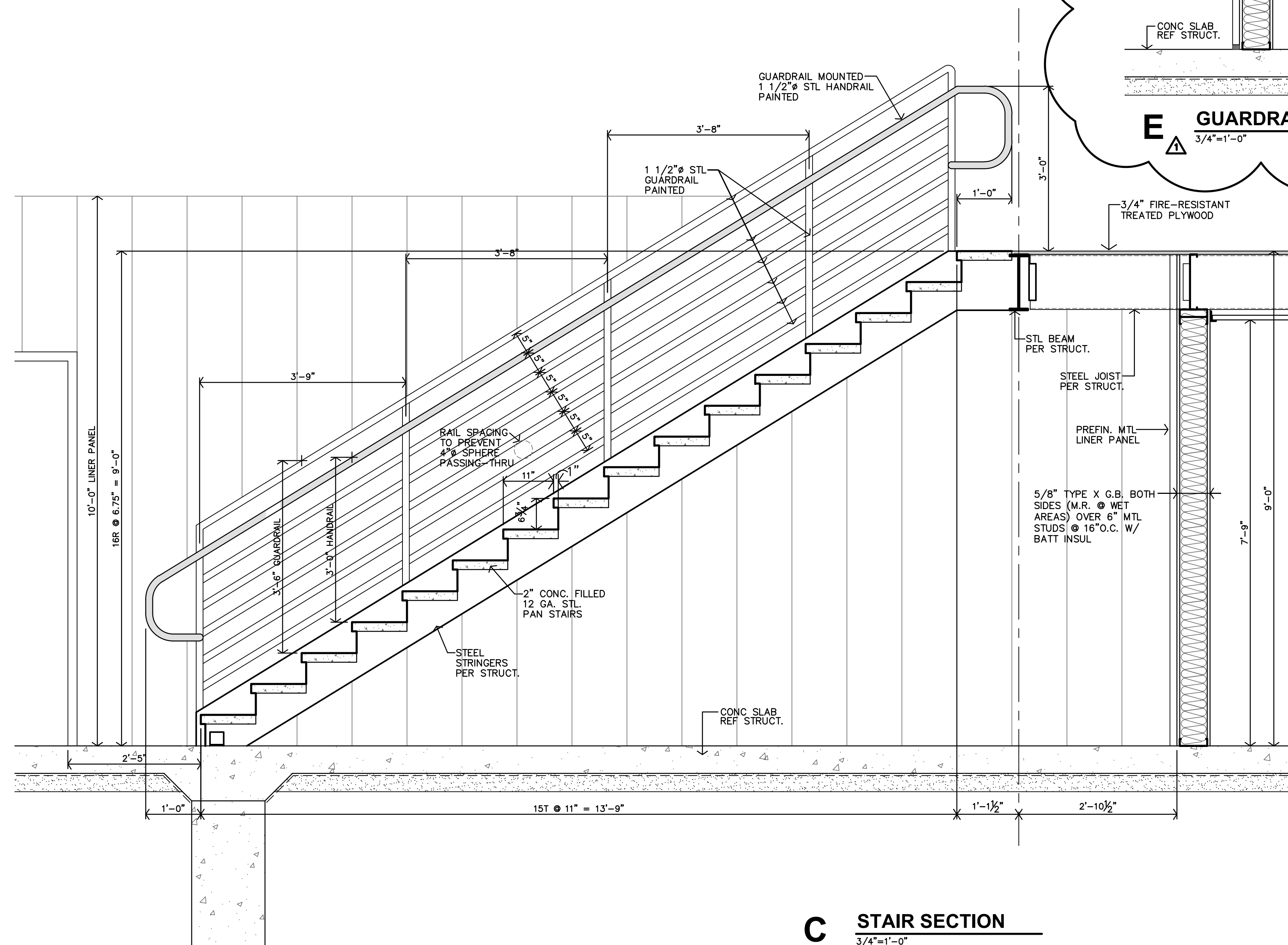
- A. Maintenance Service Agreement: Beginning at Substantial Completion, verify that maintenance service agreement includes one-year period for full maintenance by manufacturer's authorized service representative. Include quarterly preventive maintenance, repair, or replacement of worn or defective components; cleaning; and adjusting as required for proper fire detection and alarm system operation. Verify that parts and supplies are manufacturer's authorized replacement parts and supplies.

END OF SECTION 284600



THE UNDERGROUND UTILITIES SHOWN HEREON ARE DEPICTED FROM FIELD SURVEY INFORMATION PROVIDED BY GARBER SURVEYING SERVICES DATED 6/12/25. THE PLANS DO NOT CERTIFY THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL UNDERGROUND UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. FURTHERMORE, THE PLANS DO NOT CERTIFY THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION DEPICTED ALTHOUGH THEY ARE DEPICTED AS ACCURATELY AS POSSIBLE FROM INFORMATION MADE AVAILABLE.

PROJ. NO.		E25D4062	
DESIGNER		DRAWN BY	
MJR		TDA	
CFN			
4062UP			
SHEET		REV	
C-5		1	



- NOTES BY SYMBOL
- 1

MOUNT CONDENSING UNIT ON 3-1/2" THICK CONCRETE PAD. COORDINATE REQUIREMENTS WITH G.C.
- 2

ROUTE REFRIGERANT PIPING FROM CONDENSING UNIT TO MATCHING EVAPORATOR COIL. PENETRATE EXTERIOR WALL 18" A.F.G. AND PROVIDE AIREX TITAN OUTLET PENETRATION SEAL.
- 3

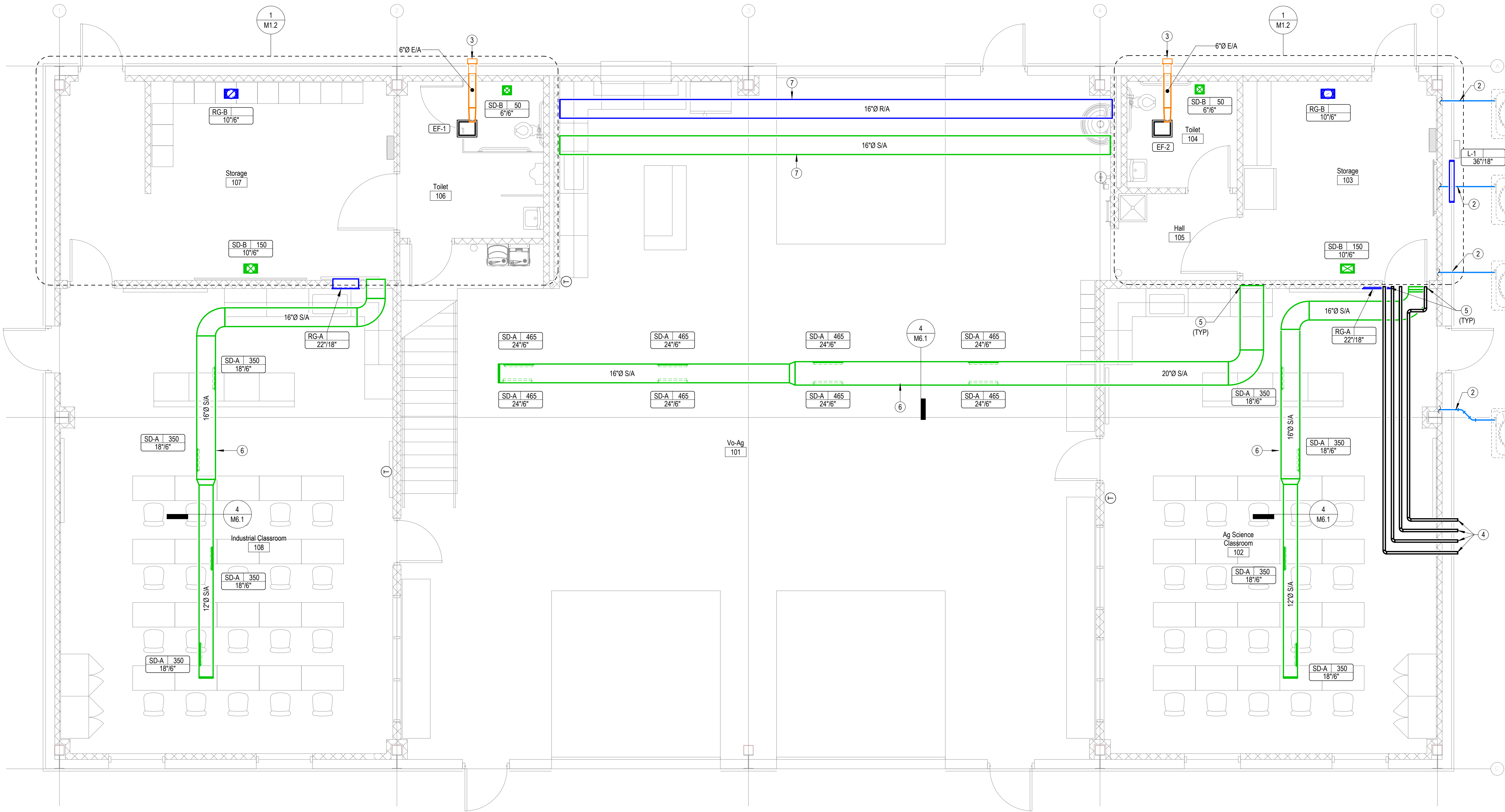
ROUTE EXHAUST DUCT TO WALL CAP. COORDINATE EXACT LOCATION AND FINISH COLOR WITH ARCHITECT.
- 4

ROUTE PIC INTAKE AND VENT TO CONCENTRIC VENT WALL TERMINATION. MAINTAIN 10'-0" MIN. FROM O.A. INTAKES.
- 5

PROVIDE FIRE DAMPER AT ALL DUCT PENETRATIONS OF CLASSROOM WALLS. COORDINATE REQUIREMENTS WITH ARCH.
- 6

COORDINATE EXACT ELEVATION OF EXPOSED DUCTWORK WITH ARCHITECT.
- 7

ROUTE DUCTWORK AS HIGH AS POSSIBLE. COORDINATE EXACT ROUTING WITH ARCHITECT AND OTHER TRADES.



1

M1.1

MAIN LEVEL HVAC PLAN

1/4" = 1'-0"

USD 419 CANTON-GALVA SCHOOLS

JR/SR HIGH SCHOOL

CANTON,

KANSAS

REVISIONS:		
NO	DATE	REVISION
1	10/29/2025	Addendum 1

DATE:	10-17-2025
JOB:	24-3458
SHEET NO.:	

M1.1

JonesGillamRenz

1881 Main Street, Suite 301
Salina, KS 67401
785.827.0386
jgr@jgarchitects.com

JGR

NOTES BY SYMBOL

1

TRANSITION TO CONNECTION AT LOUVER. SLOPE DUCT WITHIN 5' OF LOUVER TOWARDS EXTERIOR.

2

ROUTE RETURN DUCT UP AND TERMINATE OPEN ENDED RETURN COVERED WITH WELDED WIRE FABRIC 12" ABOVE MEZZANINE FLOOR.

3

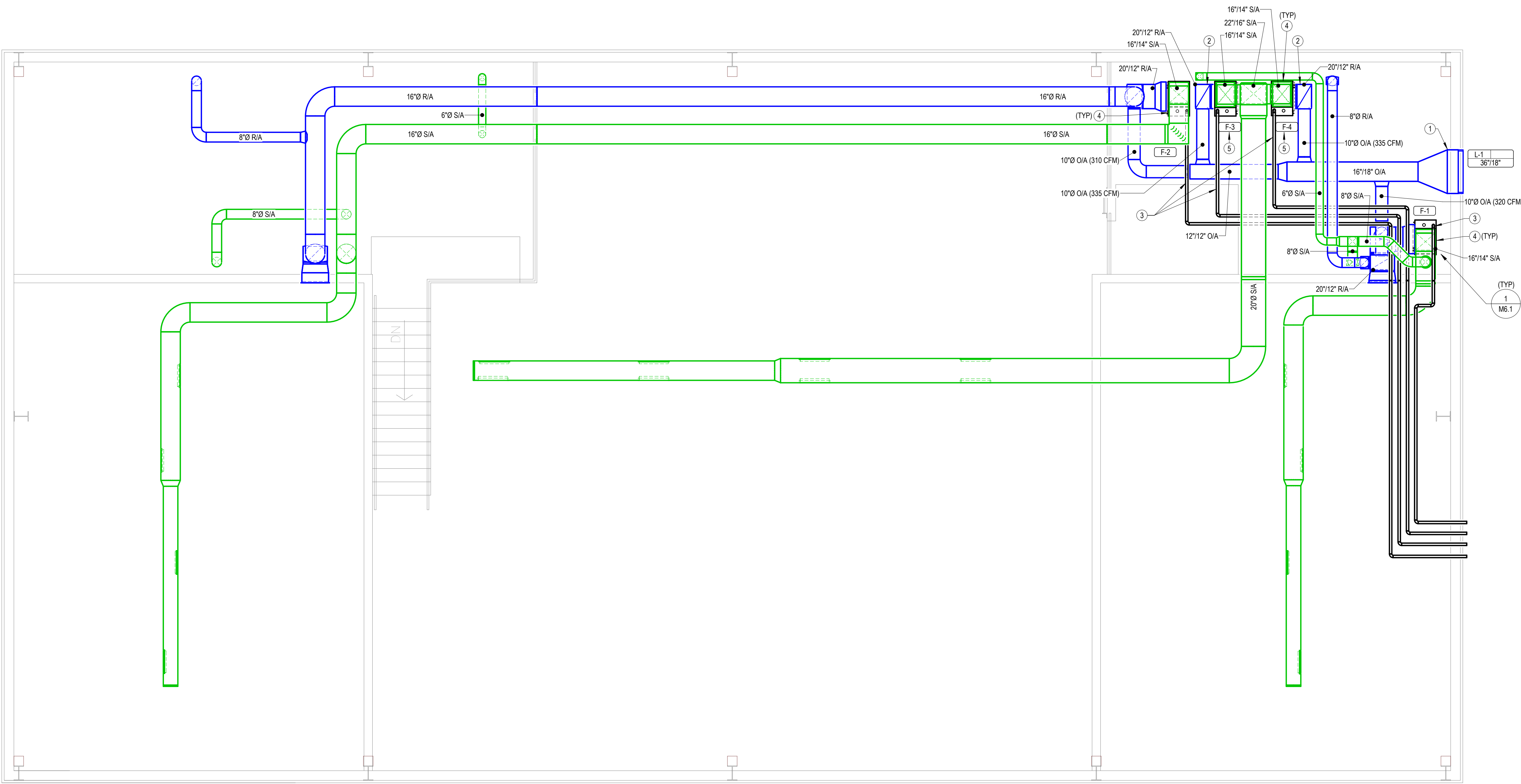
ROUTE PVC INTAKE AND VENT TO CONCENTRIC VENT WALL TERMINATION. MAINTAIN 10'-0" MIN. FROM O.A. INTAKES.

4

ROUTE CONDENSATE FROM FURNACE AND EVAPORATOR COIL TO ABOVE NEAREST FLOOR DRAIN.

5

FURNACE F-3 AND F-4 SHALL BE TWINNED. PROVIDE ANY REQUIRED ACCESSORIES. COORDINATE INSTALLATION REQUIREMENTS WITH E.C.



1

M1.2

MEZZANINE HVAC PLAN

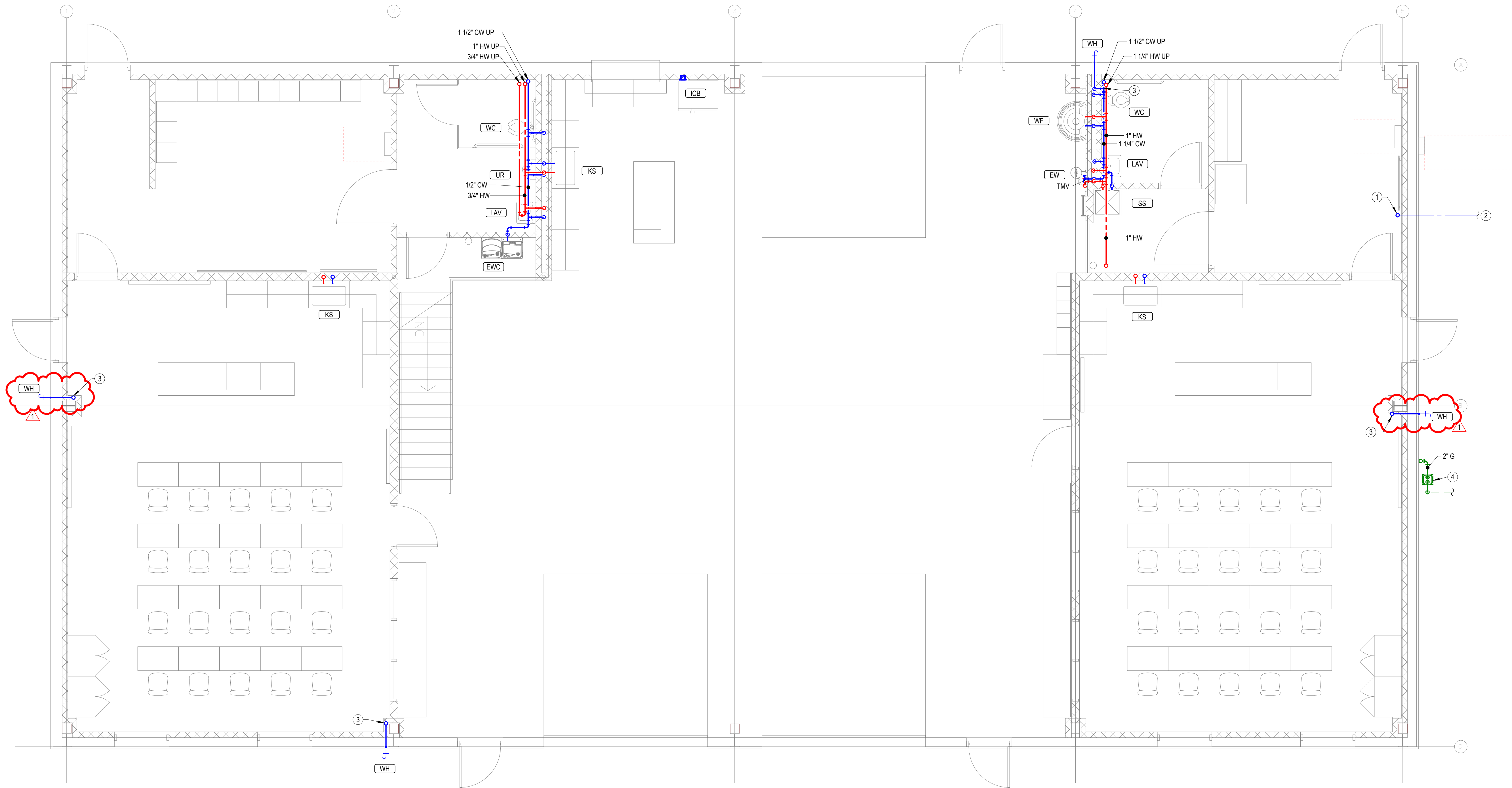
1/4" = 1'-0"

REVISIONS:		
NO	DATE	REVISION
1	10/29/2025	Addendum 1

DATE: 10-17-2025

JOB: 24-3458

SHEET NO.:



1
P1.2 MAIN LEVEL DOMESTIC WATER & GAS PLAN
1/4" = 1'-0"



- NOTES BY SYMBOL**
- 1 PROVIDE SHUT-OFF VALVE AND PRESSURE REDUCING VALVE SET TO 80 PSI, IF REQUIRED, IN WATER SERVICE RISER. COORDINATE EXACT REQUIREMENTS WITH CITY OF CANTON.
 - 2 SEE CIVIL DRAWINGS FOR CONTINUATION.
 - 3 PROVIDE SHUT-OFF VALVE IN ACCESSIBLE LOCATION FOR EACH WALL HYDRANT.
 - 4 CONNECT TO GAS METER AND REGULATOR PROVIDED BY KANSAS GAS SERVICE. COORDINATE EXACT REQUIREMENTS WITH KANSAS GAS SERVICE AND PAY ALL ASSOCIATED FEES. TOTAL CONNECTED LOAD = 320 CFH @ 7" W.C.

USD 419 CANTON-GALVA SCHOOLS

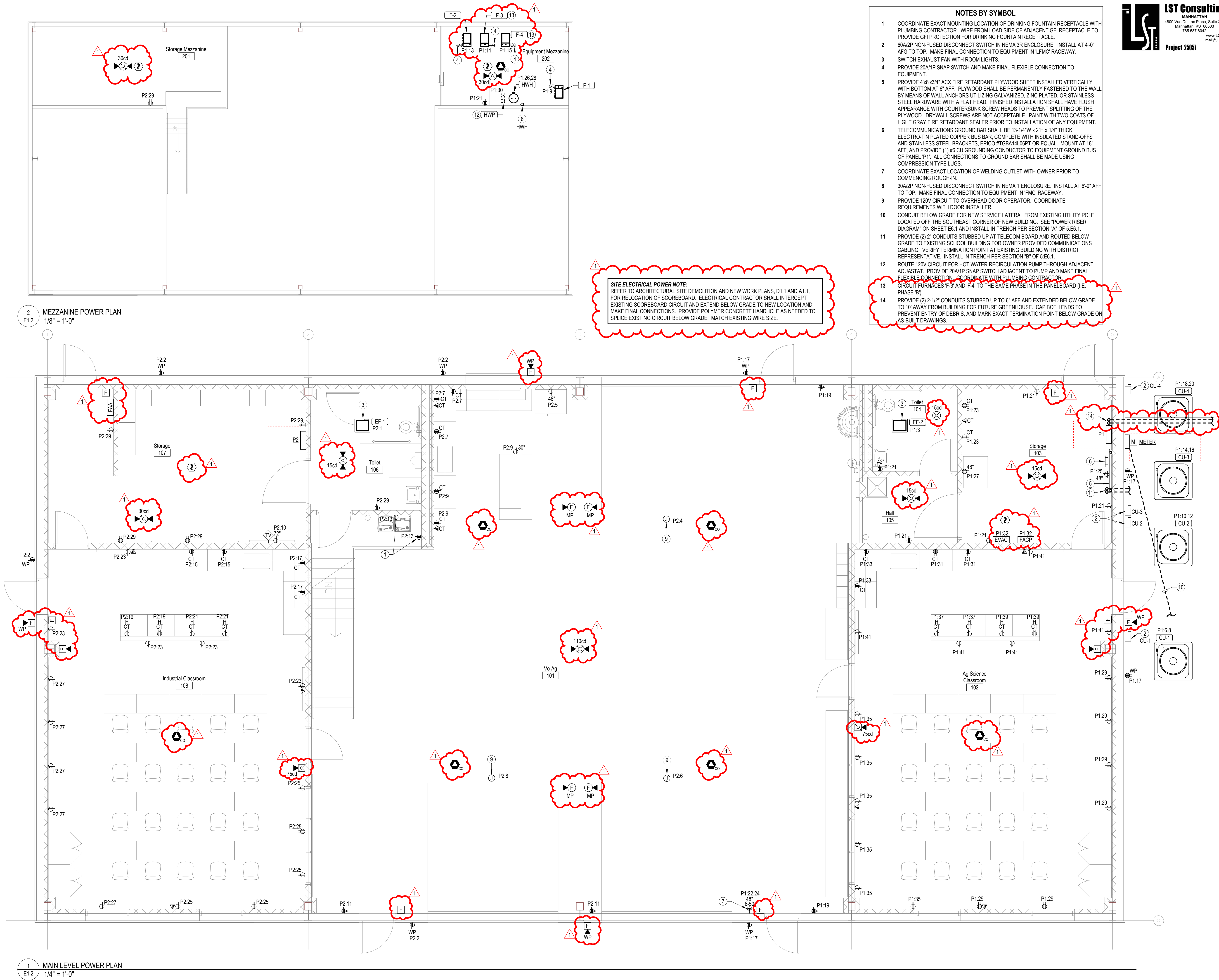
JR/SR HIGH SCHOOL

CANTON,

KANSAS

REVISIONS:		
NO	DATE	REVISION
1	10/29/2025	Addendum 1

DATE:	10-17-2025
JOB:	24-3458
SHEET NO.:	



LIGHT FIXTURE SCHEDULE

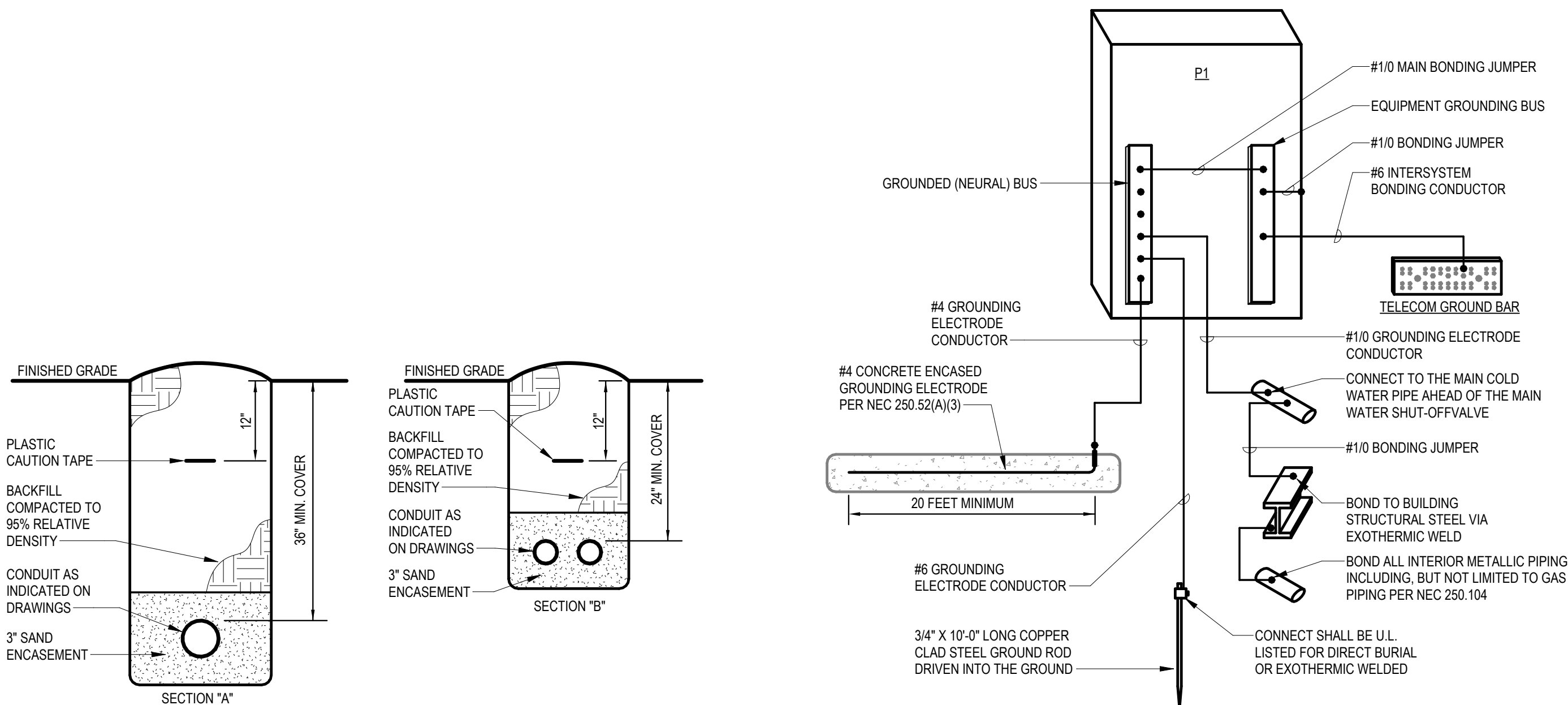
GENERAL: *ALL LEDS SHALL BE 4000K CORRELATED COLOR TEMPERATURE, MINIMUM 80 CRI
*ALL LED FIXTURES SHALL ADHERE TO LM79 AND LM80 STANDARDS

- NOTES:**
1. PROVIDE FIXTURE WITH INTEGRAL EMERGENCY BATTERY AND CHARGER WITH SELF-DIAGNOSTIC/SELF-TESTING ELECTRONICS.
 2. FIXTURE SHALL BE CAPABLE OF WALL OR CEILING MOUNT APPLICATIONS AND SHALL HAVE BREAK-OUT DIRECTIONAL CHEVRONS.
 3. INSTALL FIXTURE PER "RECESSED LUMINAIRE SUPPORT" DETAIL, THIS SHEET.
 4. SUSPEND FIXTURE WITH AIRCRAFT CABLE TO HEIGHT INDICATED ON SCHEDULE OR NOTED ON PLANS. UTILIZE WHITE 'SO' CORD FOR WIRING CONNECTION TO TYPE 'C' FIXTURES. WHERE SUSPENDING FROM ROOF STRUCTURE, ATTACH STEEL CHANNEL TO ROOF PURLINS.
 5. FIXTURE SHALL BE CAPABLE OF OPERATION IN TEMPERATURES RANGING FROM -40F THROUGH 104F.
 6. U.L. LISTED FOR WET LOCATION.....

MARK	MANUFACTURER	MODEL NUMBER	WATTAGE	LUMEN OUTPUT	DRIVER	MOUNTING	FINISH	DESCRIPTION	NOTES
A	PACLIGHTS	FPNB3-24D	40 W	5000 lm	0-10V DIMMING TO 10%	LAY-IN	WHITE	2X4 LED FLAT PANEL TROFFER WITH SELECTABLE CCT AND LUMEN OUTPUT	3
B	PACLIGHTS	FSLA/3-8D/80/70/60-8CT-AC	70 W	9600 lm	0-10V DIMMING TO 10%	SUSPENDED	WHITE	8" STANDARD STRIP WITH CURVED FROSTED ACRYLIC LENS, SELECTABLE CCT AND LUMEN OUTPUT	4
C	LEDALITE	2901L94040QN08DE1NNWA3	84 W	8000 lm	0-10V DIMMING TO 1%	SUSPENDED AT 12'-0" AFF	WHITE	8" LINEAR DIRECT, EXTRUDED ALUMINUM HOUSING, SYMMETRICAL BATWING DISTRIBUTION; ACRYLIC LENS	4
D2	ADVANTAGE ENVIRONMENTAL LIGHTING	MEM24401000LFGM	7 W	1000 lm	0-10V DIMMING TO 10%	SURFACE	WHITE	24" SOLID FRONT UNDERCABINET LIGHT WITH FROSTED SATIN LENS	--
D4	ADVANTAGE ENVIRONMENTAL LIGHTING	MEM48402000LFGM	14 W	2000 lm	0-10V DIMMING TO 10%	SURFACE	WHITE	48" SOLID FRONT UNDERCABINET LIGHT WITH FROSTED SATIN LENS	--
E	LIFE SAFETY LIGHTING	LSLEDXR65	12 W	1200 lm	--	WALL AT 10'-0" AFF	WHITE	TWIN HEAD EMERGENCY LIGHT WITH INTEGRAL BATTERY BACKUP & (2) 6W LED HEADS	--
ER	LIFE SAFETY LIGHTING	LSRHLED-2-SDT-WP-MV	2 W	220 lm	--	WALL AT 7'-6" AFF	GRAY	DUAL REMOTE WEATHERPROOF EMERGENCY LIGHTING HEADS	6
F	PACLIGHTS	FSLA/3-4D-40/30/20-8CT-AC	30 W	4100 lm	0-10V DIMMING TO 10%	SUSPENDED	WHITE	4" STANDARD STRIP WITH CURVED FROSTED ACRYLIC LENS, SELECTABLE CCT AND LUMEN OUTPUT	4
G	GARCO	PWS-C-A03-840-2-UNV-010V-BK	51 W	5310 lm	0-10V DIMMING TO 10%	WALL AT 14'-0" AFF	BLACK	DIE-CAST ALUMINUM WALL PACK, IES TYPE II DISTRIBUTION, COMFORT OPTICS	5, 6
XE	LIFE SAFETY LIGHTING	LSLEDXCU-2-R-W-RC/SDT	4 W	200 lm	--	WALL AT 7'-6" AFF	WHITE	COMBINATION EXIT SIGN/TWIN HEAD EMERGENCY LIGHT WITH REMOTE BATTERY CAPACITY	1, 2

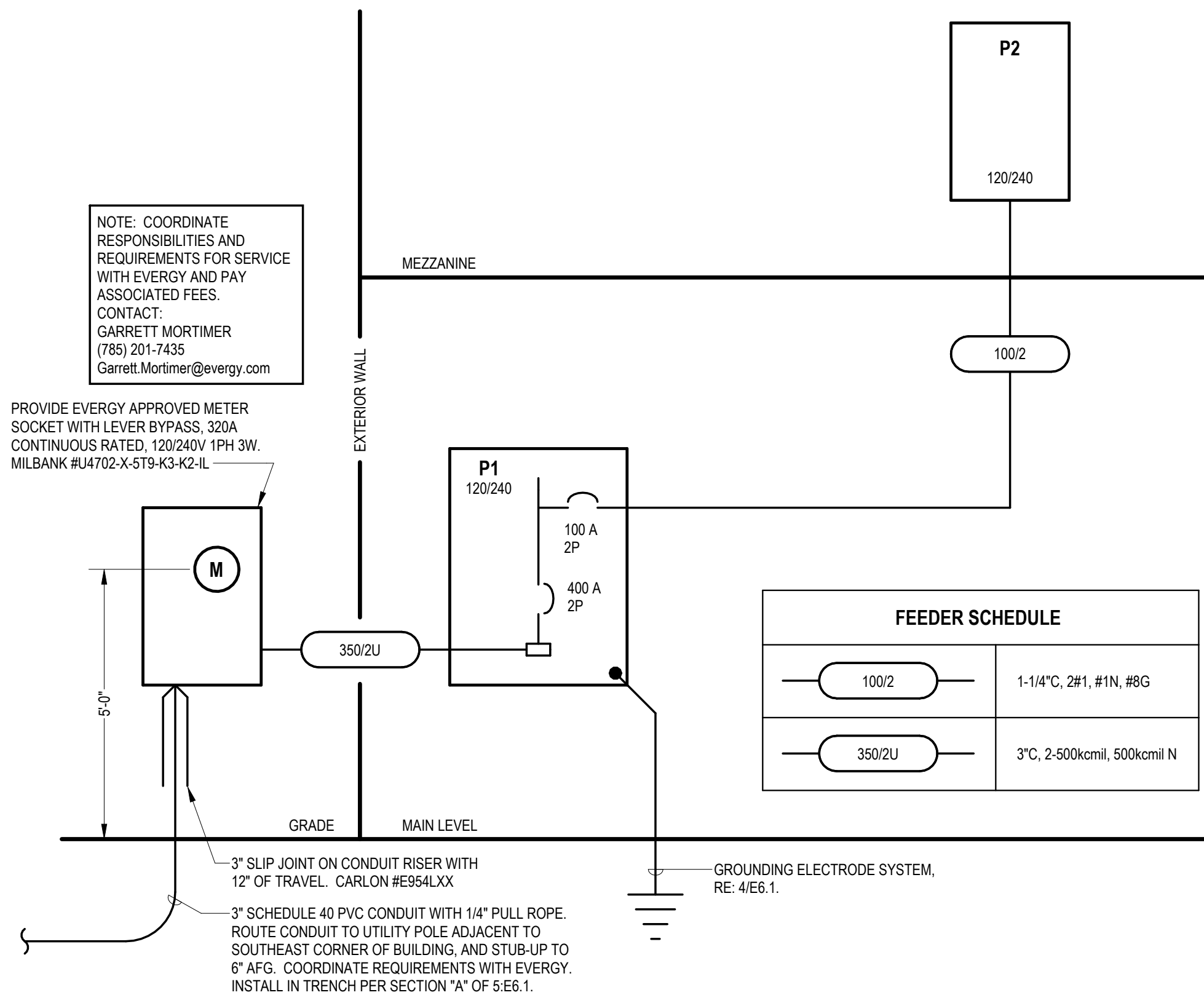
Breaker Function Schedule

#	For any number, see panel schedule footer note
A	Arc-Fault Interrupter (AFCI) Protection
EM	Provide identification per NEC 700.12(I)(2)(4)
G	Ground-Fault Circuit Interrupter (GFCI) Protection (5 mA)
GE	Ground-Fault Protection for Equipment (30 mA)
H	Breaker hasp to prevent unintentional opening
HR	Heating, Air Conditioning and Refrigeration Rated (HACR) Breaker
L	Lockable open according to NEC 110.25



5 CONDUIT TRENCH SECTIONS
E6.1 NO SCALE

4 GROUNDING ELECTRODE SYSTEM DIAGRAM
E6.1 NO SCALE



3 POWER RISER DIAGRAM
E6.1 NO SCALE

Designation: P1

Installed Location: 103 STORAGE
Voltage: 120/240-1Ph-3W
Mounting: Surface
Enclosure: NEMA 1

Bus Amps: 400
MCB Amps: 400

SCCR/AIC: 10.0 kA
Mains FN/Note: -

Features & Modifications: PANEL SHALL BE U.L. LISTED FOR USE AS SERVICE EQUIPMENT; PROVIDE PANEL WITH INTEGRAL SURGE PROTECTION PER SPECIFICATIONS

Ckt	Description	Circuitry	Trip (A)	FN	A	B	FN	Trip (A)	Circuitry	Description	Ckt
P1-1	LTG: AG SCIENCE CLASSROOM 102	1/2"C, 1#12, #12N, #12G	20		606	7575		100	1-1/4"C, 2#1, #1N, #8G	PANEL "P2"	P1-2
P1-3	LTG: STOR 103, HALL, TLT 104, MEZZ 202	1/2"C, 1#12, #12N, #12G	20			329	6786				P1-4
P1-5	LTG: VO-AG ROOM 101	1/2"C, 1#12, #12N, #12G	20		961	2148		40	1/2"C, 2#8, #10G	CONDENSING UNIT 'CU'-1	P1-6
P1-7	LTG: EXTERIOR BLDG	1/2"C, 1#12, #12N, #12G	20			473	2148	HR			P1-8
P1-9	FURNACE F-1	1/2"C, 1#12, #12N, #12G	15		1087	2148		40	1/2"C, 2#8, #10G	CONDENSING UNIT 'CU'-2	P1-10
P1-11	FURNACE F-3	1/2"C, 1#12, #12N, #12G	15			1087	2148	HR			P1-12
P1-13	FURNACE F-2	1/2"C, 1#12, #12N, #12G	15		1087	2148		40	1/2"C, 2#8, #10G	CONDENSING UNIT 'CU'-3	P1-14
P1-15	RCPT: EAST EXTERIOR	1/2"C, 1#12, #12N, #12G	20			720	2148	HR			P1-16
P1-17	RCPT: VO-AG 101 EAST	1/2"C, 1#12, #12N, #12G	20			720	2148	HR			P1-18
P1-19	RCPT: STOR 103, HALL, TLT 104, MEZZ 202	1/2"C, 1#12, #12N, #12G	20		1080	4900		50	1/2"C, 2#8, #10G	CONDENSING UNIT 'CU'-4	P1-20
P1-21	RCPT: STORAGE 103 COUNTER	1/2"C, 1#12, #12N, #12G	20			360	4900		3/4"C, 2#8, #10G	WELDER OUTLET	P1-22
P1-23	RCPT: TELECOM BOARD	1/2"C, 1#12, #12N, #12G	20	H	500	2250		30	1/2"C, 2#10, #10G	WATER HEATER	P1-24
P1-25	RCPT: STORAGE 103 FLOWER COOLER	1/2"C, 1#12, #12N, #12G	20			800	2250				P1-26
P1-27	RCPT: AG CLASSRM 102 EAST	1/2"C, 1#12, #12N, #12G	20		1080	132		20	1/2"C, 1#12, #12N, #12G	HOT WATER RECIRC PUMP HWF	P1-28
P1-29	RCPT: AG CLASSRM 102 CNTR	1/2"C, 1#12, #12N, #12G	20		360	0		20	1/2"C, 1#12, #12N, #12G	FIRE ALARM SYSTEM	P1-30
P1-31	RCPT: AG CLASSRM 102 WEST	1/2"C, 1#12, #12N, #12G	20		360	0		20	--	Spare	P1-32
P1-33	RCPT: AG CLASSRM 102 ISLAND COUNTER	1/2"C, 1#12, #12N, #12G	20		360	0		20	--	Spare	P1-34
P1-35	RCPT: AG CLASSRM 102 KNEE WALL	1/2"C, 1#12, #12N, #12G	20		360	--		20	--	Spare	P1-36
P1-37	RCPT: AG CLASSRM 102 KNEE WALL	1/2"C, 1#12, #12N, #12G	20		900	--		20	--	Spare	P1-38
P1-39	RCPT: AG CLASSRM 102 KNEE WALL	1/2"C, 1#12, #12N, #12G	20		900	--		20	--	Spare	P1-40
P1-41	RCPT: AG CLASSRM 102 KNEE WALL	1/2"C, 1#12, #12N, #12G	20		900	--		20	--	Spare	P1-42

Connected Load: 32189 VA
Connected Amps: 268 A

29904 VA
249 A

Designation: P2

Installed Location: STORAGE 107
Voltage: 120/240-1Ph-3W
Mounting: Surface
Enclosure: NEMA 1

Bus Amps: 100
MCB Amps: MLO

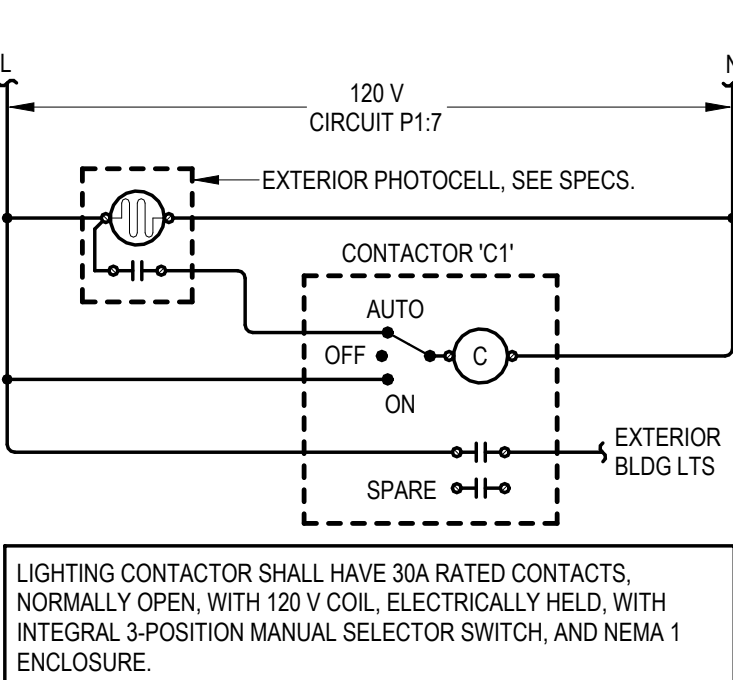
SCCR/AIC: 10.0 kA
Mains FN/Note: -

Features & Modifications: PROVIDE PANEL WITH INTEGRAL SURGE PROTECTION PER SPECIFICATIONS

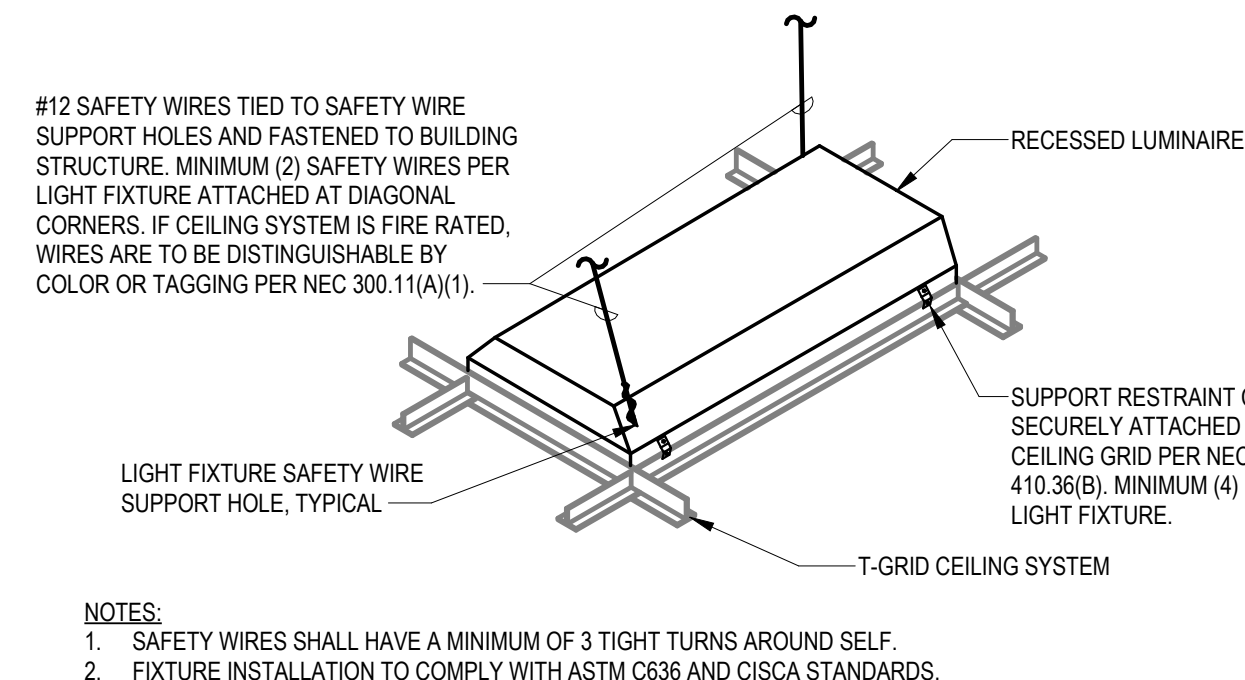
Ckt	Description	Circuitry	Trip (A)	FN	A	B	FN	Trip (A)	Circuitry	Description	Ckt
P2-1	LTG: STOR 107, TLT 106, MEZZ 201	1/2"C, 1#12, #12N, #12G	20		485	720		20	1/2"C, 1#12, #12N, #12G	RCPT: WEST EXTERIOR	P2-2
P2-3	LTG: INDUSTRIAL CLASSROOM 108	1/2"C, 1#12, #12N, #12G	20			606	1200	20	1/2"C, 1#12, #12N, #12G	NORTH OVERHEAD DOOR	P2-4
P2-5	RCPT: VO-AG REFRIGERATOR	1/2"C, 1#12, #12N, #12G	20		850	1200		20	1/2"C, 1#12, #12N, #12G	SOUTHEAST OVERHEAD DOOR	P2-6
P2-7	RCPT: VO-AG 101 COUNTER	1/2"C, 1#12, #12N, #12G	20			540	1200	20	1/2"C, 1#12, #12N, #12G	SOUTHWEST OVERHEAD DOOR	P2-8
P2-9	RCPT: VO-AG 101 COUNTER	1/2"C, 1#12, #12N, #12G	20		540	250		20	1/2"C, 1#12, #12N, #12G	RCPT: STORAGE 107 TV	P2-10
P2-11	RCPT: VO-AG 101 SW	1/2"C, 1#12, #12N, #12G	20			720	0	20	--	Spare	P2-12
P2-13	RCPT AND DRINKING FOUNTAIN VO-AG 101	1/2"C, 1#12, #12N, #12G	20		830	0		20	--	Spare	P2-14
P2-15	RCPT: INDUST. CLASSRM 108 COUNTER	1/2"C, 1#12, #12N, #12G	20			360	0	20	--	Spare	P2-16
P2-17	RCPT: INDUST. CLASSRM 108 COUNTER	1/2"C, 1#12, #12N, #12G	20		360	0		20	--	Spare	P2-18
P2-19	RCPT: INDUST. CLASSRM 108 ISLAND ...	1/2"C, 1#12, #12N, #12G	20		360	--		20	--	Spare	P2-20
P2-21	RCPT: INDUST. CLASSRM 108 ISLAND ...	1/2"C, 1#12, #12N, #12G	20		360	--		20	--	Spare	P2-22
P2-23	RCPT: INDUST. CLASSRM 108 KNEE WALL	1/2"C, 1#12, #12N, #12G	20			900	--	--	--	Spare	P2-24
P2-25	RCPT: INDUST. CLASSRM 108 EAST	1/2"C, 1#12, #12N, #12G	20		900	--		--	--	Spare	P2-26
P2-27	RCPT: INDUST. CLASSRM 108 WEST	1/2"C, 1#12, #12N, #12G	20			900	--	--	--	Spare	P2-28
P2-29	RCPT: STOR 107, TLT 106, MEZZ 201	1/2"C, 1#12, #12N, #12G	20		1080	--		--	--	Spare	P2-30

Connected Load: 17575 VA
Connected Amps: 63 A

6786 VA
57 A



2 EXTERIOR LIGHTING CONTROL DIAGRAM
E6.1 NO SCALE



- NOTES:
1. SAFETY WIRES SHALL HAVE A MINIMUM OF 3 TIGHT TURNS AROUND SELF.
 2. FIXTURE INSTALLATION TO COMPLY WITH ASTM C636 AND Cisca STANDARDS.

1 RECESSED LUMINAIRE SUPPORT
E6.1 NO SCALE