

ADDENDUM #2  
DATE: 2024-03-18

Page 1 of 1

TO CONTRACT DOCUMENTS ENTITLED:

PROJECT MANUAL FOR: **Various Locations – Repair Masonry Stair Towers  
at Hudson & Gillett**  
Project Number: **CP231031**

**Student Recreation Center – East Elevation Masonry Repair**  
Project Number: **CP231201**

ADVERTISEMENT DATE: 2024-02-21

PREPARED FOR: The Curators of the  
University of Missouri

PREPARED BY: PWArchitects, Inc.  
ATTN: Eric Roselle, AIA  
2120 Forum Blvd, Ste 101  
Columbia, MO 65203  
Phone: (573) 449-2683  
Fax: (573) 442-6213

Drawings and Specifications for the above noted projects and the work covered thereby are herein modified as follows, and except as set forth herein, otherwise remain unchanged and in full force and effect:

ATTACHMENTS:

1. Addendum 2 – Volume 2: Various Locations – Repair Masonry Stair Towers at Hudson & Gillett: CP231031
2. Addendum 2 – Volume 3: Student Recreation Center – East Elevation Masonry Repair: CP231201

END OF ADDENDUM #2

ADDENDUM #2  
DATE: 2024-03-18

Page 1 of 1

TO CONTRACT DOCUMENTS ENTITLED:

PROJECT MANUAL FOR: **Volume 2: Various Locations – Repair Masonry Stair Towers  
at Hudson & Gillett**  
Project Number: **CP231031**

ADVERTISEMENT DATE: 2024-02-21

PREPARED FOR: The Curators of the  
University of Missouri

PREPARED BY: PWArchitects, Inc.  
ATTN: Eric Roselle, AIA  
2120 Forum Blvd, Ste 101  
Columbia, MO 65203  
Phone: (573) 449-2683  
Fax: (573) 442-6213



2024-03-18

Drawings and Specifications for the above noted projects and the work covered thereby are herein modified as follows, and except as set forth herein, otherwise remain unchanged and in full force and effect:

GENERAL:

1. CLARIFICATION: Elevator Access at Hudson & Gillett: Contractors and subcontractors on the project may utilize the elevator for small tools and personal use only. Students are given priority access to the elevator; contractor personnel will have to wait. If there are any issues that arise from the Contractor and/or subcontractor use of the elevator, access will be removed.
2. CLARIFICATION: While the existing stair and elevator may be used for contractor and/or subcontractor access to the roof, contractors and subcontractors are NOT allowed to prop open the exterior doors to the Residence Halls at any time.

END OF CP231031 ADDENDUM #2

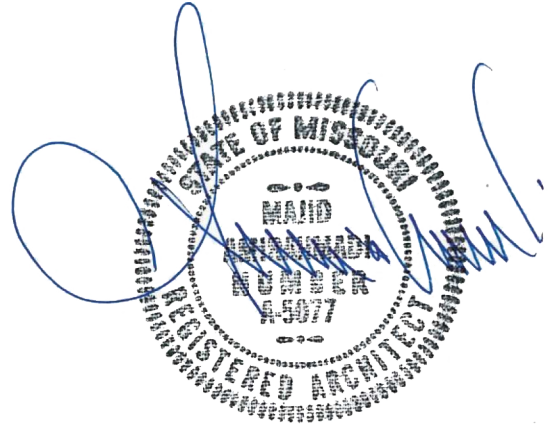
TO CONTRACT DOCUMENTS ENTITLED:

PROJECT MANUAL FOR: **Volume 3: Student Recreation Center – East Elevation Masonry Repair**  
Project Number: **CP231201**

ADVERTISEMENT DATE: 2024-02-21

PREPARED FOR: The Curators of the  
University of Missouri

PREPARED BY: International Architects Atelier  
912 Broadway Blvd, Suite 300  
Kansas City, Missouri 64105  
Phone: (816) 471-6522



03-18-2024

Drawings and Specifications for the above noted projects and the work covered thereby are herein modified as follows, and except as set forth herein, otherwise remain unchanged and in full force and effect:

SPECIFICATION CHANGES:

1. 000110 – TABLE OF CONTENTS  
**ADD:** DIVISION 26 – ELECTRICAL  
260500 – COMMON WORK RESULTS FOR ELECTRICAL  
260505 – ELECTRICAL TESTING  
260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES  
260533 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS  
260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS  
265600 – EXTERIOR LIGHTING
  
2. 075323 – MODIFIED BITUMINOUS MEMBRANE ROOFING  
**REMOVE:** Paragraph 1.6C  
  
**REMOVE:** The word “Manufacturer” at all locations in paragraphs 1.9A-2 and 1.9A-3.  
  
**REMOVE:** Paragraph 3.6D

DRAWING CHANGES:

1. G001 – GENERAL INFORMATION  
**ADD:** The following Electrical Sheets to SHEET INDEX AA1 for adding site lighting scope per Owner Direction:

**E000 – ELECTRICAL COVERSHEET**  
**E201.1 – LEVEL 02 PLAN – ELECTRICAL**  
**E600 – ELECTRICAL SCHEDULES**

2. D501 – OUTDOOR REC WALL DEMOLITION DETAILS  
**REVISE:** Demo Note #7 to state “REMOVE EXISTING LIGHT FIXTURE AND ALL ASSOCIATED WIRING FOR INSTALLATION OF NEW FIXTURE AT SAME LOCATION DURING NEW CONSTRUCTION. RE: ELECTRICAL”
  
3. A202 – EXTERIOR ELEVATIONS  
**REVISE:** Note 18 as indicated on attached Drawing Sheet.  
**ADD:** Note 21 as indicated on attached Drawing Sheet.  
**ADD:** New wall mounted light fixtures and stone trim as indicated on Elevation R7 and Plan B31 on attached Drawing Sheet.  
**ADD:** New light bollard fixtures as indicated on Plan B27 on attached Drawing Sheet.
  
4. A500 – WALL SECTION AND DETAILS  
**CLARIFICATION:** Details T5 and T13: New Modified Bituminous roofing shall terminate at the top of the parapet wall via metal termination bar and be covered with new stainless-steel flashing as shown. The new roofing shall not be installed underneath the re-set coping stones and copper fabric flashing. Install new copper fabric flashing, stainless steel drip edge and re-set stone as shown on the details.
  
5. A501 – SECTION DETAILS  
**ADD:** Detail J30, new Bollard Footing Detail for new light bollards. Refer to attached Drawing Sheet.
  
6. E000 – ELECTRICAL COVERSHEET  
**ADD:** Entire Sheet
  
7. E201.1 – LEVEL 02 PLAN - ELECTRICAL  
**ADD:** Entire Sheet for adding site lighting per Owner direction.
  
8. E600 – ELECTRICAL SCHEDULES  
**ADD:** Entire Sheet for adding site lighting per Owner direction.

ATTACHMENTS:

1. Specifications Sections 260500, 260505, 260519, 260533, 260553, 265600
2. Drawings A202, A501, E000, E201.1, E600

END OF CP231201 ADDENDUM #2

---

**SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL**

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.
- B. MU Division of IT Telecommunications Construction Standards and Specifications apply to this section. The Contractor shall obtain the latest revision of document and install all cables, pathways, boxes, equipment, and hardware in a manner to conform with MU Standards and Specifications.

1.2 SUMMARY

- A. Section Includes:
  - 1. Electrical equipment coordination and installation.
  - 2. Sleeves for raceways and cables.
  - 3. Grout.
  - 4. Coordination drawings.
  - 5. Project record drawings.
  - 6. Electrical demolition.
  - 7. Common electrical installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. All equipment furnished shall be U.L. Listed and labeled or equivalent approved.
- C. Comply with NFPA 70.
- D. Equipment Selection: Equipment of larger physical dimensions, higher capacities or ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical/electrical services are appropriately modified. Any additional costs as a result of these modifications shall be borne by the Contractor.

---

1.5 DELEVERY, STORAGE, AND HANDLING

- A. Deliver raceways in clean condition. Store to prevent entrance of dirt, debris and moisture.
- B. Protect stored raceways, wires, and connectors from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.

1.6 INTERPRETATION OF THE DRAWINGS

- A. The drawings indicate diagrammatically the conduit runs and the apparatus served in a general way. No attempt has been made to show exact location of every box, fitting or conduit offset. Such items are to be provided and all wiring connections and home runs are to be made as required. Where conduit runs are shown terminating in arrows, such conduit runs shall be extended to panels/boards or other equipment. Where equipment is specified to be wired, make connections as shown on approved equipment wiring diagrams. Consult equipment approved shop drawings for location of outlets and for miscellaneous controls. Where wire sizes are shown on drawings, the wire size for each circuit shall be for the entire circuit.
- B. Where conduit is shown without wiring symbols, install one (1) hot (phase) wire, one (1) neutral wire, and one (1) ground wire.
- C. Provide full size neutral for each circuit.
- D. No more than three circuits shall be installed in a conduit.

1.7 TEMPORARY POWER

- A. The contractor shall make all provisions for and furnish and install all necessary conduit, wire, and distribution equipment for a complete temporary wiring system for use during construction of the building. Temporary wiring shall include a system of temporary lights and power distribution. Refer to Division 01.

1.8 COORDINATION

- A. Coordinate arrangement, mounting, and support of electrical equipment:
  - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
  - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
  - 3. To allow right of way for piping and conduit installed at required slope.
  - 4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed.

- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping".
- E. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

#### 1.9 LOCATION OF OUTLETS

- A. Outlets are only approximately located on the construction drawings and great care must be used in the actual location of outlets by consulting architectural drawings and details and the various fixture drawings and by securing definite locations from the Architect.
- B. At various places where outlets are shown below exposed pipes or ducts, Contractor shall set outlet box to clear same by at least 12". Where outlets are installed over piping or ducts, outlets shall be moved so as to clear piping and ducts at no additional cost, using approved conduit and conduit fittings.
- C. Switch outlets shall generally be located on lock side of door. Check the latest general drawings on job for door swings before roughing in for switches.
- D. Check height of tile or similar wainscots and set switch outlet boxes so that same will clear top of wainscot or will come entirely within the wainscot.
- E. Wall outlets installed flush shall be provided with device (plaster) covers set to come flush with the finished surface.
- F. For electric water coolers, install box in accordance with manufacturer's shop drawings so that receptacle will be concealed by unit housing.
- G. For other equipment, provide electrical rough-in in accordance with the equipment installation instructions and architectural drawings.
- H. Do not use through-the-wall and back-to-back boxes.

### PART 2 - PRODUCTS

#### 2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
  - 1. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
    - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

---

2.2 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.3 COORDINATION DRAWINGS

- A. The contractor shall prepare CAD generated drawings (min. 1/4" scale) showing following systems/items as a minimum:
  - 1. Electrical equipment locations and clearances required.
  - 2. Routing of main feeders and conduits (3" dia. and larger), cable trays and bus ducts.
  - 3. Locations of items in ceiling such as light fixtures.
- B. The contractor shall submit the CAD generated drawings to the contractor for coordination with other trades. The drawings shall be submitted either in electronic format or printed copies as requested by the contractor.
- C. The contractor shall participate in coordination meetings when requested by the contractor.

2.4 PROJECT RECORD DRAWINGS

- A. Drawings shall be furnished in electronic-media (CD-Rewritable type) and at-least one hard copy prints.
  - 1. Format: Same CAD program, version and operating system as the original contract documents.
  - 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw and add details and notations where applicable.
- B. Identify and date each drawing and include the designation "PROJECT RECORD DRAWING" or "AS-BUILT DRAWING" in a prominent location.

**PART 3 - EXECUTION**

3.1 ELECTRICAL DEMOLITION

- A. Refer to Division 02 Section "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove electrical systems, fixtures, devices, and components indicated to be removed. In general, remove all fixtures, raceways, cables, junction boxes, and equipment not utilized in new construction. For circuits disconnects, remove raceways and cables all way to the source. Label breakers/switches from where circuits have been removed as "SPARE".
- C. Protect existing electrical equipment and installation indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.



- D. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- E. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish. Raceways shall not be abandoned within walls.
- F. Remove demolished material from Project site.
- G. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.
- H. Remove equipment to be salvaged, disconnect from power, and deliver to Owner as directed.

### 3.2 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.
- F. In general install raceways and boxes minimum 8" above hung ceiling. All raceways, boxes and equipment shall be independently supported from structure. Do not support from ductwork or piping.
- G. Where new devices are added to existing circuits, take readings prior to adding new devices, and submit to Architect for review. Do not proceed with new work until approved by Architect.

### 3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

- 
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
  - F. Extend sleeves installed in floors 2 inches above finished floor level.
  - G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
  - H. Seal space outside of sleeves with grout for penetrations of concrete and masonry.
    - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
  - I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
  - J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping." For communications cable penetrations, comply also with requirements in Division 27 Section "Common Work Results for Communications."
  - K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

#### 3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

**END OF SECTION 260500**

## SECTION 260505 – ELECTRICAL TESTING

### 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 general requirements for electrical field testing and inspecting. Detailed requirements are specified in each Section containing components that require testing. General requirements include the following:
  - 1. Suitability of test equipment.
  - 2. Calibration of test instruments.
  - 3. Coordination requirements for testing and inspecting.
  - 4. Reporting requirements for testing and inspecting.
- B. Emergency systems shall be tested as specified herein.

#### 1.3 QUALITY ASSURANCE

- A. The Electrical Contractor shall completely test and inspect all systems in accordance with the specifications and drawings. The Electrical Contractor shall certify that all systems are in complete working order prior to turning over the Owner.
- B. Except as modified by governing codes and by the contract documents, comply with the latest applicable provisions and latest recommendations of the following:
  - 1. NFPA.
  - 2. NEMA.
  - 3. NEC.
  - 4. IEEE.
  - 5. IPCEA.
  - 6. ANSI.
  - 7. UL.
  - 8. NECA.
  - 9. Local Fire Department.

---

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL TESTING

- A. It shall be the responsibility of this Contractor to furnish all testing instruments/equipment, materials and labor necessary to perform the following tests.
  - 1. After wires or cables are in place, but before being connected to devices and equipment, the system shall be tested for shorts, opens, intentional and unintentional grounds by means of wires in conduit that are shorted or unintentionally grounded shall be replaced.
  - 2. Voltage drops for panel and large feeders shall not exceed 3% hence the total voltage drop for a feeder and any branch circuit shall not exceed 5% of the service voltage. The test shall be made under design load or its' equal.
  - 3. Any wiring device or electrical apparatus in this contract, if grounded or shorted on an integral "line" part, shall be removed and the problem rectified.
  - 4. When required, complete test and inspection records shall be made and incorporated into a report for each piece of equipment tested. All readings taken shall be recorded. Four (4) copies shall be submitted to the Architect for approval.
  - 5. Notify the Architect, with minimum seven (7) days notice, about testing schedule.

3.2 WIRING TEST

- A. The wiring and cable tests shall be made before any circuits, main switches, motors, transformers or feeders are energized.
- B. Tests shall be made for continuity, identification and absence of shorts and grounds for each conductor. Both ends of a given conductor shall be identified alike. Before circuit terminal connections are made, continuity and identification of wiring shall be checked by means of a DC test device using a bell, light, meter, or buzzer.
- C. Insulation Resistance (IR) test shall be made using meggers at the following values:
  - 1. 208Y/120 Volt wiring at 500 Volts DC.
- D. Insulation resistance between phase conductors and neutral, phase conductors and ground shall not be less than the minimum requirements of 2000 meg-ohms.
  - 1. Wire terminations shall not be made to equipment (motors, MCCs, but ducts, etc.), until that piece of equipment has been tested and verified as specified in this section.
  - 2. Test motor feeders with motors disconnected, but with circuit breakers, switches or starters in the circuit opened so as to include only that portion of the feeder, required to be tested.
  - 3. Test lighting feeders with the circuit breakers and panelboards connected but with lighting branch circuit breakers or switches open so as to include only the branch circuit to be tested.

4. Contractor shall correct or replace any circuit which is defective or grounded and shall correct all other problems encountered by these tests. All defects whether due to faulty workmanship or material furnished by the Contractor shall be corrected under this section at the Contractor's expense.

### 3.3 LIGHTING TEST

- A. Check all lighting fixtures for proper operation. All Contractor supplied fixtures shall be 100% operable at no additional cost to the Owner. Repair cost to Owner-supplied fixtures shall not be the responsibility of the Contractor unless otherwise stated.
- B. Verify operation of Lighting Control Systems. Program time clocks per client's requirements, including holiday setbacks.

### 3.4 MOTOR TEST

- A. Perform motor tests in coordination with fire suppression, plumbing and HVAC contractors for motors furnished with their equipment.
- B. All 208/120V motors shall be "spot tested" with 500V DC in a similar manner. The minimum resistance to ground shall be 2000 meg-ohm (corrected to 20 degrees C). The Contractor shall record the ambient temperature of the motor and submit this value along with insulation resistance value. For motors from 7-½ to 20 HP, Contractor shall submit Dielectric Absorption Ratios. For motor above 20 HP, the Polarization Indexes of the motor shall also be submitted.
- C. Make the following checks on all motors prior to start up.
  1. Check motor nameplates for HP, speed, phase and voltages. Verify proper voltage available for terminal wiring.
  2. Check shaft for freedom of rotation.
  3. Verify that the motor is properly lubricated prior to energizing.
- D. Contractor shall furnish a proper sized heater for each overload relay.
- E. Make the following tests on all motors during or immediately after start-up:
  1. Check for proper shaft rotation.
  2. Check motor for smooth operation (vibration).
  3. Take a current reading using a clamp-on ammeter. (Record no-load readings and loaded readings).

### 3.5 PANELBOARD TESTS

- A. Test all equipment to be operated on the 208/120V system at 500V DC prior to connecting feeders. A minimum insulation resistance of 2000 meg-ohms shall be obtained between all phases and between phase and neutral, and phase and ground.

3.6 SPOT TEST

- A. “Spot Test” mentioned in this section shall be interpreted as the specific test method of obtaining insulation resistance by applying indicated test voltage for 60 seconds to the equipment or wiring being tested.

3.7 CONTROL WIRING/OUTLET TEST

- A. Control wiring shall perform the function as noted in operation methods and/or included schematics and single line diagrams.
- B. All 120-volt outlets shall be tested with a Daniel Woodhead Cat. No. 1750 and 1760 tester. Minimum acceptable tension is 10 oz. for receptacles.

**END OF SECTION 260505**

---

**SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Building wires and cables rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.
  - 3. Sleeves and sleeve seals for cables.
- B. Pre-wired systems such as type AC (armored cable), type MC (metal-clad and type NM (nonmetallic-sheathed cable) shall not be used. (Exception: MC may be used for lighting fixture whips up to 6'-0" long. They must be dedicated, not daisy chained together).

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
  - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- C. Comply with NFPA 70.
- D. All conductors and cables shall be UL labeled.

1.6 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- B. Coordinate layout and installation of conductors and cables with other trades.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery conductors and cables according to NEMA WC 26.
- B. Protect stored conductors and cables from moisture and dirt. Do not store outside, exposed to elements. Elevate above grade. Do not exceed structural capacity of floor, when stored inside.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Encore Wire and Cable.
  - 2. Senator Wire & Cable Company.
  - 3. Southwire Company.
  - 4. Cerro Wire.
- B. Copper Conductors: Comply with NEMA WC 70.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.
- D. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC or mineral-insulated, metal-sheathed cable, Type MI with ground wire.

2.2 CONNECTORS AND SPLICES

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. AMP Incorporated/Tyco International.
  - 3. Hubbell Power Systems, Inc.
  - 4. O-Z/Gedney; EGS Electrical Group LLC.
  - 5. 3M; Electrical Products Division.
  - 6. Panduit Corporation.
  - 7. Tyco Electronics Corp.



- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

### 2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL AND SIZE APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. Conductors smaller than No. 12 AWG shall not be utilized anywhere, unless specifically noted on drawings.
- D. The minimum conductor size for branch circuits shall be #12 AWG copper. To compensate for voltage drop, where branch circuit lengths are between 100 and 150 feet, use #10 AWG copper. For branch circuit lengths exceeding 150 feet, use #8 AWG copper.
- E. Wire size ampacity shall equal or exceed its overload protective device. Where wire sizes shown on the drawings are greater than the apparent ampacity requirements, the size shown shall prevail to compensate for voltage drop. In no instance shall conductors be installed that are less than required by NEC.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- B. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- C. Feeders at all other locations: Type THHN-THWN, single conductors in raceway.
- D. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.

- E. Branch Circuits below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits at all other locations: Type THHN-THWN, single conductors in raceway.
- G. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- H. Class 2 Control Circuits: Type THHN-THWN, in raceway.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal conduits in finished walls, and above ceilings, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed conduits parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support conduits according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and factory color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

### 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  - 1. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

### 3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

- D. Rectangular Sleeve Minimum Metal Thickness:
  - 1. For sleeve rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
  - 2. For sleeve rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- F. Cut sleeves to length for mounting flush with both wall surfaces.
- G. Extend sleeves installed in floors 2 inches above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and cable.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants."
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07 Section "Penetration Firestopping."

### 3.6 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

### 3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
  - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and branch circuit conductors for compliance with requirements.
  - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
    - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of final acceptance.

- b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
  - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- C. Test Reports: Prepare a written report to record the following:
- 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

**END OF SECTION 260519**

---

**SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL 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.
- B. MU Division of IT Telecommunications Construction Standards and Specifications apply to this section. The Contractor shall obtain the latest revision of document and install all cables, pathways, boxes, equipment, and hardware in a manner to conform with MU Standards and Specifications.

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. All empty conduit shall be furnished with a pull string.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LFMC: Liquidtight flexible metal conduit.
- F. LFNC: Liquidtight flexible nonmetallic conduit.
- G. RNC: Rigid nonmetallic conduit.
- H. RMC: Rigid metal conduit (rigid steel conduit).

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Custom enclosures and cabinets.

- 
- C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
    - 1. Structural members in the paths of conduit groups with common supports.
    - 2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.

## 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

## PART 2 - PRODUCTS

### 2.1 METAL CONDUIT AND TUBING

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Allied Tube & Conduit; a Tyco International Ltd. Co.
  - 2. Republic Conduit.
  - 3. Western Tube and Conduit.
  - 4. Wheatland Tube Company.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. IMC: ANSI C80.6.
- D. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
  - 1. Comply with NEMA RN 1.
  - 2. Coating Thickness: 0.040 inch, minimum.
- E. EMT: ANSI C80.3.
- F. FMC: Zinc-coated steel.
- G. LFMC: Flexible steel conduit with PVC jacket.
- H. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
  - 1. Fittings for EMT: Steel or die-cast, compression type, and rated for ground connection.
  - 2. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.
- I. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

---

**2.2 NONMETALLIC CONDUIT AND TUBING**

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AFC Cable Systems, Inc.
  - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 3. CANTEX Inc.
  - 4. CertainTeed Corp.; Pipe & Plastics Group.
  - 5. Condux International, Inc.
  - 6. Lamson & Sessions; Carlon Electrical Products.
  - 7. Manhattan/CDT/Cole-Flex.
  - 8. RACO; a Hubbell Company.
  - 9. Thomas & Betts Corporation.
- B. ENT: NEMA TC 13.
- C. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- D. LFNC: UL 1660.
- E. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
- F. Fittings for LFNC: UL 514B.

**2.3 METAL WIREWAYS**

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper B-Line, Inc.
  - 2. Hoffman.
  - 3. Keystone/Rees Inc.
  - 4. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 3R, unless otherwise indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type. Flanged-and-gasketed type where shown on drawings.
- E. Finish: Manufacturer's standard enamel finish.

**2.4 BOXES, ENCLOSURES, AND CABINETS**

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
  - 2. EGS/Appleton Electric.
  - 3. Erickson Electrical Equipment Company.

- 
4. Hoffman.
  5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
  6. O-Z/Gedney; a unit of General Signal.
  7. RACO; a Hubbell Company.
  8. Thomas & Betts Corporation.
  9. Walker Systems, Inc.; Wiremold Company (The).
- B. Pull and junction boxes shall be minimum 4" x 4".
- C. Communications back-boxes for outlets shall be 4" x 4", 2-1/2" depth, with 2" x 4" single-gang reducer for single-gang faceplate mounting. Joint/shared boxes for power and Communications are not allowed.
- D. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- E. Cast-Metal Outlet and Device Boxes: NEMA FB 1, Type FD, with gasketed cover.
- F. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- G. Metal Floor Boxes: Cast or sheet metal, fully adjustable, rectangular.
- H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- I. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, with gasketed cover.
- J. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
  1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.
- K. Cabinets:
  1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
  2. Hinged door in front cover with flush latch and concealed hinge.
  3. Key latch to match panelboards.
  4. Metal barriers to separate wiring of different systems and voltage.
  5. Accessory feet where required for freestanding equipment.
- 2.5 SLEEVES FOR RACEWAYS
- A. Steel Pipe Sleeves: ASTM A 53, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052- or 0.138-inch thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."



---

**PART 3 - EXECUTION**

**3.1 RACEWAY APPLICATION**

- A. Comply with the following indoor applications, unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
  2. Exposed and Subject to Physical Damage: Rigid steel conduit or IMC. Includes raceways in the following locations:
    - a. Loading dock.
    - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
    - c. Mechanical rooms.
    - d. Electrical rooms.
    - e. Stairwells.
    - f. Within block or masonry walls.
  3. Concealed Above Hung Ceilings and Within Interior Sheet Rock Walls and Partitions: EMT.
  4. Underground Conduit: Rigid steel conduit or IMC, below concrete. Conduit is not allowed within poured concrete.
  5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations. Length not to exceed 6 ft.
  6. Damp or Wet Locations: Rigid steel conduit.
  7. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical fiber/communications cable raceway or EMT.
  8. Raceways for Optical Fiber or Communications Cable Risers in Vertical Shafts: EMT.
  9. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, nonmetallic in damp or wet locations.
- B. Concealed: FMC ½" inch – only in specific locations, in existing areas, within existing walls to remain. Utilize only between box in wall to junction box above ceiling. Junction box shall be located within 12" above hung ceiling. FMC, within walls, not acceptable in other locations.
- C. Minimum Raceway Size: ¾-inch trade size, except for Communications cabling which shall be minimum raceway size 1-inch.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
  2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
- E. Install raceways underground or below floor only for locations indicated on drawings.

**3.2 INSTALLATION**

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

- 
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping. Do not install horizontal raceway directly and parallel under cold water or chilled water pipes. In general, install raceways as high as possible, closer to underside of structure. Install horizontal raceways minimum 8 inches above ceilings.
  - C. Complete raceway installation before starting conductor installation.
  - D. Support raceways as specified in Division 26 Section "Hangers and Supports for Electrical Systems."
  - E. Install temporary closures to prevent foreign matter entering the raceways.
  - F. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
  - G. Install no more than the equivalent of three 90-degree bends in any conduit run.
  - H. Conceal conduit and EMT within finished walls and ceilings, unless otherwise indicated.
  - I. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.
    - 1. Run parallel or banked raceways together on common supports.
    - 2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
  - J. Join raceways with fittings designed and approved for that purpose and make joints tight.
    - 1. Use insulating bushings to protect conductors.
  - K. Utilize compression fittings only with suitable tools.
  - L. Raceways embedded in slabs is not allowed.
  - M. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
  - O. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
  - P. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with one (1) locknut, use two (2) locknuts: one (1) inside and one (1) outside the box.
  - Q. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.
  - R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

- 
- S. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
1. Raceway shall be sized to include minimum 33% spare cable capacity for future adds.
  2. 1-Inch Trade Size and Larger:
    - a. Install raceways in maximum lengths of 150 feet.
    - b. Install with a maximum of three 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements.
    - c. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
  3. Conduits shall not be daisy-chained together.
  4. Conduit inside bend radius must be:
    - a. 2" Trade size and smaller conduit: minimum bend radius of six times the conduit inside diameter.
    - b. Larger than 2" Trade size conduit: minimum bend radius of 10 times the conduit inside diameter.
  5. Conduit fill limits in terms of maximum number of Category 6 cables shall be as follows:
    - a. 1" Conduit: 5 cables
    - b. 1-1/4" Conduit: 8 cables
    - c. 1-1/2" Conduit: 11 cables
    - d. 2" Conduit: 20 cables
    - e. 3" Conduit: 47 cables
    - f. 4" Conduit: 84 cables
  6. Maintain following minimum clearances from cable pathways, to avoid electromagnetic interference, from the following:
    - a. Motors and transformers: 4-feet
    - b. Conduit and cables used for electrical power distribution: 1-foot
    - c. Fluorescent lighting: 5-inches
  7. Pull boxes shall be placed directly after a bend where possible, or sized accordingly if the pull box is located at the bend.
  8. 1-inch minimum conduit shall extend from outlet backbox, to above accessible ceiling with minimum 12-inches clearance above ceiling, turn 90-degrees, and be reamed and installed with a nylon insulated bushing to avoid damage to cables. This conduit must terminate before passing through a fire rated wall.
  9. When using architect- and owner- approved surface mount raceway, a Wiremold # 5744S outlet box or approved equal shall be provided. Dual channel raceway such as Wiremold 4000 shall use a V/G4007C-1 device plate.
- T. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  2. Where otherwise required by NFPA 70.
- U. Expansion-Joint Fittings: Install UL approved expansion fittings in each run of aboveground conduit that is located at building expansion joint. Length of fittings shall not exceed 6 inches.
- V. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit from junction boxes to recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations subject to severe physical damage.
  2. Flexible conduit from light fixture to lighting fixture not allowed.

- W. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
- X. Set metal floor boxes level and flush with finished floor surface.
- Y. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- Z. All raceways terminating a junction boxes, located above ceiling shall be provided with color coded vinyl tape indicating the service. Color coding tape shall be applied next to the junction box. Tape color shall match junction box cover color.
- AA. The height of the center of outlets above the finished floor, if not otherwise specified or shown on drawings, shall be as following:

Lighting Brackets .....	As indicated on drawings	
Switch Outlets.....	3'-10" to centerline	
Convenience Receptacle .....	1'-6" (1'-3" to bottom of box)	*
Telephone Outlet .....	1'-6" (1'-3" to bottom of box)	*
Data Outlet .....	1'-6" (1'-3" to bottom of box)	*
Wall Telephone Outlet.....	3'-10" to centerline	**
Fire Alarm Manual Pull Stations .....	3'-10" to centerline	
Audio /Visual Alarms .....	6'-8" to bottom of device	***

- \* Minimum height of 1'-3" to meet ADA Standards
- \*\* Mount at 5'-6" in Mechanical Rooms
- \*\*\* Maximum of 6' below finished ceiling whichever is least unless shown or indicated otherwise

Note: Where receptacles are shown installed above countertops, mount receptacles no less than 6" centerline above tops of splash back. See architectural elevations case work shop drawings for determining exact heights.

**3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS**

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve Minimum Metal Thickness:
  - 1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
  - 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

- 
- F. Cut sleeves to length for mounting flush with both surfaces of walls.
  - G. Extend sleeves installed in floors 2 inches above finished floor level.
  - H. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway unless sleeve seal is to be installed.
  - I. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
  - J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
  - K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Penetration Firestopping."

### 3.4 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

### 3.5 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

### 3.6 CLEANING

- A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes. Remove burrs, dirt, and construction debris.

**END OF SECTION 260533**

THIS PAGE INTENTIONALLY LEFT BLANK

## SECTION 260553 - IDENTIFICATION FOR ELECTRICAL 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. Identification for raceways.
  2. Identification of power and control cables.
  3. Identification for conductors.
  4. Underground-line warning tape.
  5. Warning labels and signs.
  6. Instruction signs.
  7. Equipment identification labels.
  8. Miscellaneous identification products.

#### 1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

#### 1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

---

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage and system or service type.
- C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.2 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Colors for Raceways Carrying Circuits at 600 V and Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage and system or service type.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.3 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.



- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

#### 2.4 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding of Conductor Tape: All service, feeder and branch circuit conductors, rated for 600V or less shall be factory color-coded as specified herein. Field applied labels, tapes or bands not acceptable.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

#### 2.5 FLOOR MARKING TAPE

- A. 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

#### 2.6 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Baked-Enamel Warning Signs:
  - 1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
  - 2. 1/4-inch grommets in corners for mounting.
  - 3. Nominal size, 7 by 10 inches.
- D. Warning label and sign shall include, but are not limited to, the following legends:
  - 1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

#### 2.7 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
  - 1. Engraved legend with black letters on white face.
  - 2. Punched or drilled for mechanical fasteners.
  - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

---

2.8 EQUIPMENT IDENTIFICATION LABELS

- A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Minimum 0.0625 inch thick adhesive backed, with white letters on a black background. Minimum letter height shall be 3/8 inch.

2.9 JUNCTION/PULL BOX COVER IDENTIFICATION

- A. Paint all junction and pull box covers to identify service and voltage as follows:
  - 1. 120V Normal power – Green.
  - 2. Fire alarm System – Red.
- B. All covers shall identify circuit numbers, panel designation, voltage and service. Identification shall be done by black magic markers.

2.10 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
  - 3. Temperature Range: Minus 40 to plus 185 deg F.
  - 4. Color: Black except where used for color-coding.
- B. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
  - 1. Minimum Width: 3/16 inch.
  - 2. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
  - 3. UL 94 Flame Rating: 94V-0.
  - 4. Temperature Range: Minus 50 to plus 284 deg F.
  - 5. Color: Black.

2.11 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas, within mechanical rooms, chiller rooms and boiler rooms.
- G. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
  - 1. Outdoors: UV-stabilized nylon.
  - 2. In Spaces Handling Environmental Air: Plenum rated.
- H. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

### 3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for All Service, All Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label or self-adhesive vinyl tape applied in bands. Install labels at 20-foot maximum intervals. The identification will include source board/panel and target board/panel. Use black letters on orange background.
- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box as specified herein.
- C. Power-Circuit Conductor Identification, 600 V or Less: Factory color-code conductors as listed below:
  - 1. Colors for 208/120-V Circuits:
    - a. Phase A: Black.
    - b. Phase B: Red.
    - c. Phase C: Blue.
    - d. Neutral: White.
    - e. Ground: Green.
    - f. Switch Legs: Pink.
- D. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- E. Conductors to Be Extended in the Future: Attach marker tape to conductors and list source.
- F. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
  - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
  - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.

- 
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
  - G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
  - H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels or Baked-enamel warning signs or Metal-backed, butyrate warning signs.
    1. Comply with 29 CFR 1910.145.
    2. Identify system voltage with black letters on an orange background.
    3. Apply to exterior of door, cover, or other access.
    4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
      - a. Power transfer switches.
      - b. Controls with external control power connections.
  - I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
  - J. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch-high letters for emergency instructions at equipment used for power transfer.
  - K. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
    1. Labeling Instructions:
      - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label or Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.
      - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label 4 inches high.
      - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
      - d. Unless provided with self-adhesive means of attachment, fasten labels with
      - e. Use appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
      - f. The label shall include voltage, phases, number of wires, and board/switchgear/equipment served from. (Example: Panelboard BL-20-LN; 120/208 volts, 3 phase, 4 wire, served from board DP-B1-HN).
    2. Equipment to Be Labeled:
      - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
      - b. Enclosures and electrical cabinets.

- c. Access doors and panels for concealed electrical items.
- d. Switchboards.
- e. Enclosed switches.
- f. Enclosed circuit breakers.
- g. Enclosed controllers.
- h. Push-button stations.
- i. Contactors.
- j. Remote-controlled switches, dimmer modules, and control devices.
- k. Battery-inverter units.
- l. Monitoring and control equipment.

**END OF SECTION 260553**

THIS PAGE INTENTIONALLY LEFT BLANK

---

**SECTION 265600 - EXTERIOR LIGHTING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Exterior luminaires, LED modules and drivers.
  - 2. Luminaire-mounted photoelectric relays.
  - 3. Poles and accessories.

1.3 DEFINITIONS

- A. CRI: Color-rendering index.
- B. Luminaire: Complete lighting fixture, including ballast housing if provided.
- C. Pole: Luminaire support structure, including tower used for large area illumination.
- D. Standard: Same definition as "Pole" above.

1.4 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

- A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4.
- B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4.
- C. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4.
- D. Wind Load: Pressure of wind on pole and luminaire, calculated and applied as stated in AASHTO LTS-4.
  - 1. Wind speed for calculating wind load for poles exceeding 50 feet in height is 70 mph.
  - 2. Wind speed for calculating wind load for poles 50 feet or less in height is 70 mph.

1.5 SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:
  - 1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.

- 
2. Details of attaching luminaires and accessories.
  3. Details of installation and construction.
  4. Luminaire materials.
  5. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.
    - a. For indicated luminaires, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
    - b. Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
  6. Photoelectric relays.
  7. Drivers, including energy-efficiency data.
  8. LED modules, including life, output, and energy-efficiency data.
  9. Materials, dimensions, and finishes of poles.
  10. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
  11. Anchor bolts for poles.
  12. Manufactured pole foundations.
- B. Shop Drawings:
1. Anchor-bolt templates keyed to specific poles and certified by manufacturer.
  2. Design calculations, certified by a qualified professional engineer, indicating strength of screw foundations and soil conditions on which they are based.
  3. Wiring Diagrams: Power and control wiring.
- C. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4 and that load imposed by luminaire has been included in design.
- D. Qualification Data: For agencies providing photometric data for lighting fixtures.
- E. Field quality-control test reports.
- F. Operation and Maintenance Data: For luminaries and poles to include in emergency, operation, and maintenance manuals.
- G. Warranty: Special warranty specified in this Section.
- 1.6 QUALITY ASSURANCE
- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with IEEE C2, "National Electrical Safety Code".
- D. Comply with NFPA 70.



---

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Package aluminum poles for shipping according to ASTM B 660.
- B. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- C. Handle wood poles so they will not be damaged. Do not use pointed tools that can indent pole surface more than 1/4 inch deep. Do not apply tools to section of pole to be installed below ground line.
- D. Retain factory-applied pole wrappings on fiberglass and laminated wood poles until right before pole installation. Handle poles with web fabric straps.
- E. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.
  - 1. Warranty Period for Luminaires: Five (5) years from date of final acceptance by Owner.
  - 2. Warranty Period for Metal Corrosion: Five (5) years from date of final acceptance by Owner.
  - 3. Warranty Period for Color Retention: Five (5) years from date of final acceptance by Owner.
  - 4. Warranty Period for LED modules and drivers: Replace LED modules and drivers that fail within twelve (12) months from date of Substantial Completion; furnish replacement LED modules and drivers that fail within the second twelve (12) months from date of final acceptance by Owner.
  - 5. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three (3) years from date of final acceptance by Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
- B. In Exterior Lighting Device Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:
  - 1. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
    - a. Antique Street Lighting.
    - b. Architectural Arc Lighting.

- c. Bega/US.
- d. Beta Lighting.
- e. Devine Lighting; Division of Hubbell Lighting.
- f. Gurz Co.
- g. General Electric Lighting Systems, Inc.
- h. Hubbell Lighting Inc.
- i. Holophane.
- j. Kiln Lighting.
- k. Lithonia Lighting.
- l. LSI Lighting Systems.
- m. Lumec.
- n. McGraw-Edison Co.
- o. McPhiblen; division of Thomas Lighting.
- p. North Star Lighting.
- q. Stremer.

## 2.2 LUMINAIRES, GENERAL REQUIREMENTS

- A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
- B. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.
- G. Exposed Hardware Material: Stainless steel.
- H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- J. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
  - 1. White Surfaces: 85 percent.
  - 2. Specular Surfaces: 83 percent.
  - 3. Diffusing Specular Surfaces: 75 percent.
- K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

- 
- L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
  - M. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
    - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning", to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning", or SSPC-SP 8, "Pickling".
    - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
      - a. Color: As selected from manufacturer's standard catalog of colors.
  - N. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
    - 1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
    - 2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
    - 3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
    - 4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
      - a. Color: As selected by Architect.

### 2.3 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

- A. Comply with UL 773 or UL 773A.
- B. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.
  - 1. Relay with locking-type receptacle shall comply with NEMA C136.10.
  - 2. Adjustable window slide for adjusting on-off set points.

### 2.4 LED MODULES AND DRIVERS

- A. Comply with LM-79, LM-80 and TM-21 standards for the following:
  - 1. Color Rendering Index (CRI): Minimum 80.
  - 2. Color Corrected Temperature (CCT): As noted in Light Fixture Schedule.
  - 3. Lumen Output: As noted in Light Fixture Schedule.
  - 4. Lifetime: L70 minimum 50,000 hours.
- B. Dimming: Drivers shall be dimmable down to 1% standard, unless noted otherwise in Light Fixture Schedule, and flicker-free.

- C. Control Voltage: As noted in Light Fixture Schedule.
  - 1. Ballast Manufacturer Certification: Indicated by label.

**PART 3 - EXECUTION**

**3.1 LUMINAIRE INSTALLATION**

- A. Fasten luminaire to indicated structural supports.
  - 1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- B. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources.

**3.2 BOLLARD LUMINAIRE INSTALLATION**

- A. Align units for optimum directional alignment of light distribution.
- B. Install on concrete base with top 4 inches above finished grade or surface at bollard location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Division 03 Section "Cast-in-Place Concrete".

**3.3 INSTALLATION OF INDIVIDUAL GROUND-MOUNTING LUMINAIRES**

- A. Install on concrete base with top 4 inches above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Division 03 Section "Cast-in-Place Concrete".

**3.4 CORROSION PREVENTION**

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Division 26 Section "Raceway and Boxes for Electrical Systems". In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

**3.5 GROUNDING**

- A. Ground metal poles and support structures according to Division 26 Section "Grounding and Bonding for Electrical Systems".
  - 1. Install grounding electrode for each pole, unless otherwise indicated.
  - 2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

- B. Ground nonmetallic poles and support structures according to Division 26 Section "Grounding and Bonding for Electrical Systems".
  - 1. Install grounding electrode for each pole.
  - 2. Install grounding conductor and conductor protector.
  - 3. Ground metallic components of pole accessories and foundations.

**3.6 FIELD QUALITY CONTROL**

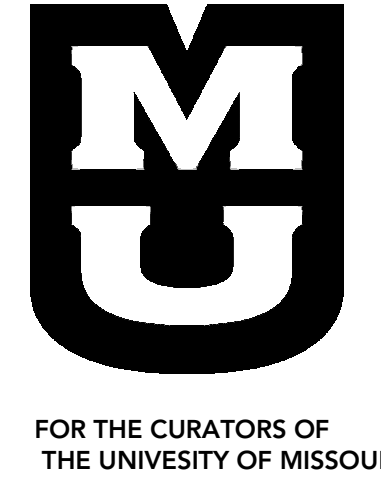
- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.
  - 1. Verify operation of photoelectric controls.
- C. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

**3.7 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain luminaire lowering devices. Refer to Division 01 Section "Demonstration and Training".

**END OF SECTION 265600**

THIS PAGE INTENTIONALLY LEFT BLANK



STUDENT RECREATION CENTER - EAST ELEVATION MASONRY REPAIR

ISSUED FOR BID  
1000 Rollins St, Columbia, MO 65203

Table with columns: DATE, PROJ. NO., DESIGNED BY, DRAWN BY, CHECKED BY, APPROVED BY



The Professional Architect's seal affixed to this sheet applies only to the material and items shown on this sheet. All drawings, statements, or other documents not exhibiting this seal and not considered prepared by this architect, and this architect expressly disclaims any and all responsibility for such plans, drawings, or documents not exhibiting this seal.

Table with columns: NO., REVISION SUBMISSION, DATE

EXTERIOR ELEVATIONS  
A202

GENERAL MASONRY NOTES:

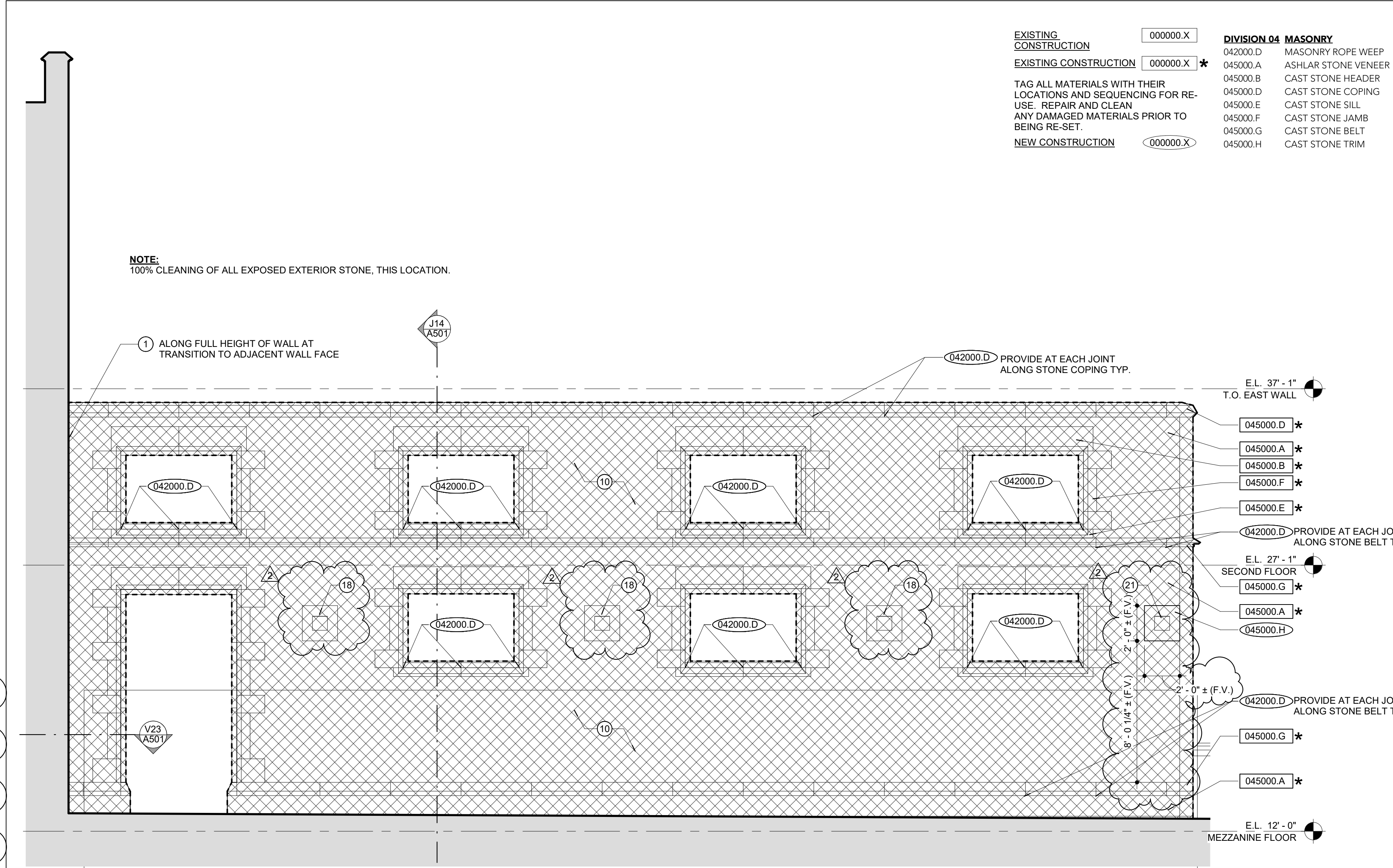
- 1. PROTECT ALL VEGETATION, GROUND COVER, TREES, AND EXISTING ROOF DURING CONSTRUCTION.
2. CONTRACTOR SHALL PROTECT ALL LIGHT FIXTURES, SECURITY CAMELERS, HOSE BIBBS, AND OTHER EXISTING ITEMS WITHIN LIMITS OF CONSTRUCTION. ANY DAMAGED ITEMS SHALL BE REPAIRED OR REPLACED AT CONTRACTOR'S EXPENSE.
3. CONTRACTOR SHALL CLEAN ALL STONE AND BRICK MASONRY SURFACES...
4. CLEAN ALL TAR RESIDUE LEFT FROM PREVIOUS STRUCTURE.
5. INSPECT ALL EXISTING SEALANT JOINTS WITHIN CONSTRUCTION LIMITS...
6. BEFORE ANY RAKING OR REPOINTING OF MORTAR JOINTS AT LINTELS...
7. CONTRACTOR SHALL PROTECT ALL OPEN, RAKED JOINTS DURING ADVERSE WEATHER CONDITIONS...
8. ALL MORTAR JOINTS ON THE HORIZONTAL SURFACES SHALL BE RAKED TO A MINIMUM OF 1" DEPTH...
9. TYPICAL REPOINTING: CONTRACTOR SHALL RAKE AND RE-POINT ALL JOINTS...
10. REPOINTING AT VOIDS < 2": AT LOCATIONS WHERE VOIDS IN MORTAR JOINTS EXIST UP TO 2" FROM THE SURFACE OF MASONRY...
11. GROUT INJECTION & POINTING AT VOIDS > 2": AT LOCATIONS WHERE VOIDS IN MORTAR JOINTS EXIST GREATER THAN 2" FROM THE SURFACE OF THE MASONRY...

AREA OF SEVERE SOILING AND ALGAE GROWTH SHALL BE CLEANED IN ADDITION & PRIOR TO 100% CLEANING OF THE BUILDING FACADES.

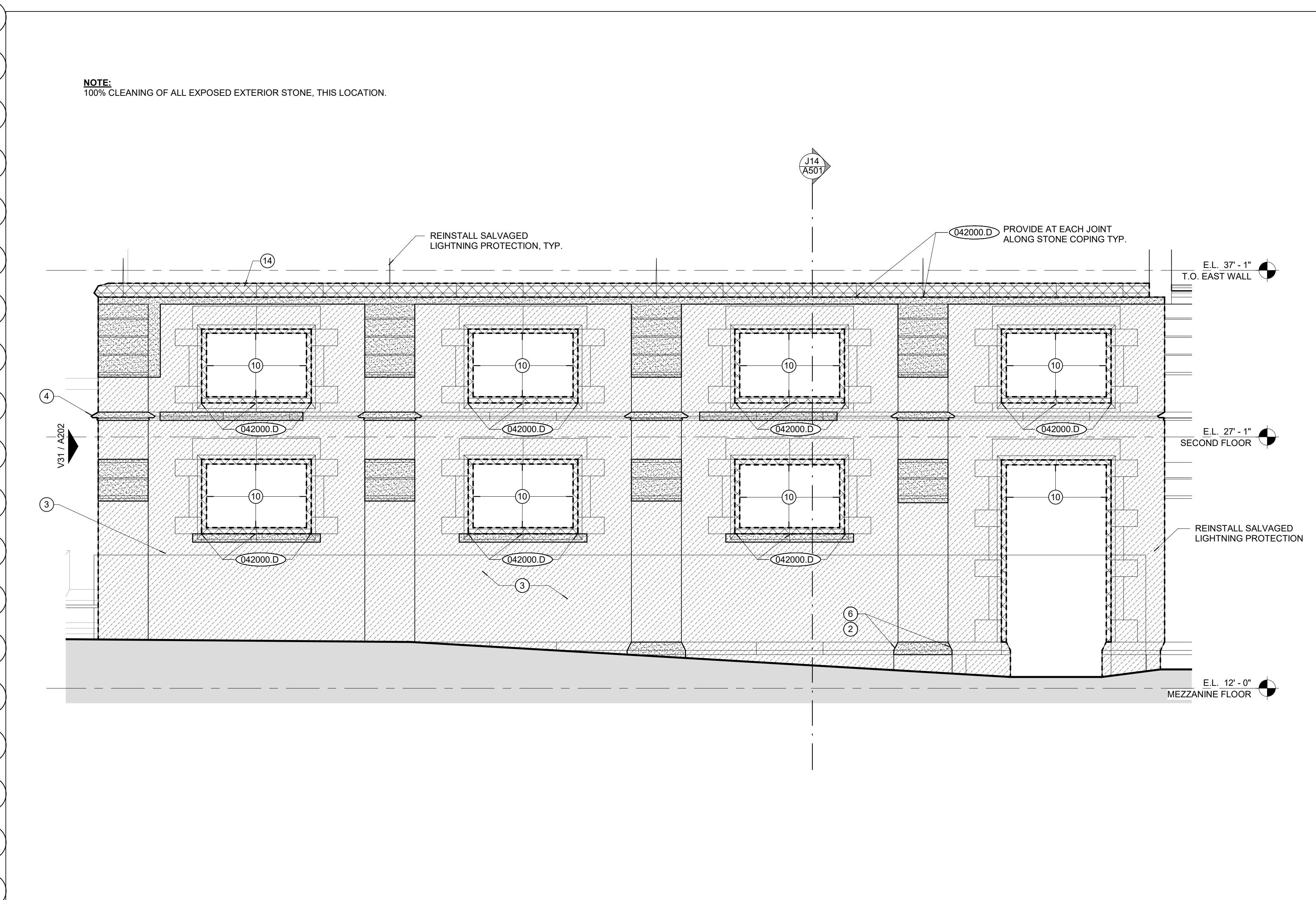
MASONRY RESTORATION KEYNOTES:

- 1. EXPANSION JOINT: CUT STONE TO MIN. 6" DEPTH. PROVIDE A MIN. 1-1/2" EXPANSION JOINT. INFILL THE JOINT WITH PRE-COMPRESSED EXPANSION JOINT FILLER.
2. CRACK INJECTION: ALL FRACTURES OR CRACKS THAT ARE LESS THAN OR EQUAL TO 1/8" SHALL BE INJECTED WITH DISPENSED HYDRATED LIME (DHL). IF A CAVITY IS TOO DEEP TO BE FILLED USING DHL, AN APPLICATION OF NHL SHALL BE USED TO TOP OVER THE OPENING. DHL SHALL BE CUSTOM MATCHED TO LIMESTONE.
3. RAKE ALL MORTAR JOINTS TO A MINIMUM OF 1.5 TIMES THE WIDTH OF THE JOINT BUT NOT LESS THAN MINIMUM 1" WHICH EVER IS GREATER. AND TUCK POINT WITH MATCHING HISTORICAL POINTING MORTAR.
4. STONE PATCH: PREPARE SPALLING STONE PER DETAILS W26 / A502 AND M26 / A502 PATCH WITH HISTORICAL PATCHING MATERIAL TO MATCH EXISTING STONE AND PROFILE.
5. DUTCHMAN: CUT AND PREPARE STONE TO RECEIVE DUTCHMAN REPAIR. RE: W5 / A502
6. MICRO-PIN REPAIR: USE MICRO-PINS FOR LOCATIONS OF DETACHED STONE WHERE THE THICKNESS OF THE SPALL IS LESS THAN OR EQUAL TO 2". USE 4 MM STAINLESS STEEL OR TITANIUM SURGICAL BONE SCREWS INSERTED BY HAND USING A HEX KEY. ALL PINS SHALL HAVE A MINIMUM EMBEDMENT DEPTH OF 2" INTO THE PARENT STONE. SCREW HEADS SHALL HAVE A 1/4" COUNTERSUNK DEPTH. PINS SHALL BE SPACED A MINIMUM DISTANCE OF 6" APART. PROVIDE A MINIMUM DISTANCE OF 3" FROM THE EDGE OF THE STONE UNIT. RE: M16 / A502
7. 1/8" THREADED ROD REPAIR: ANCHOR 1/8" THREADED RODS INTO PILOT HOLES USING MASONRY ADHESIVE GROUT. ALL PINS SHALL HAVE A MINIMUM EMBEDMENT DEPTH OF 2" INTO THE PARENT STONE. THREADED RODS SHALL HAVE A 1/4" COUNTERSUNK DEPTH. PINS SHALL BE SPACED A MINIMUM DISTANCE OF 6" APART. PROVIDE A MINIMUM DISTANCE OF 3" FROM THE EDGE OF THE STONE UNIT. RE: W16 / A502
8. LINTEL REPAIR: REMOVE STONE AS INDICATED ON ELEVATIONS. EXPOSE ENTIRE BRICK ARCH BEYOND AND INSPECT BRICK FOR ANY DAMAGE, DISPLACEMENT, OR CRACKING IN NEED OF REPAIRS. FILL ANY VOIDS IN BACKUP WALL WITH GROUT AND RAKE AND REPOINT PORTION OF BRICK MASONRY TO EXTENT POSSIBLE. BROKEN PIECES OF STONE SHALL BE PINNED TOGETHER WITH 3/4" THREADED RODS AND THE CRACK SHALL BE PATCHED. INSTALL NEW HOT-DIPPED GALVANIZED STEEL LOSSE LINTEL PRIOR TO RESETTING STONE. RE: SHEET A500 FOR DETAILS.
9. 3/8" THREADED ROD REPAIR: ANCHOR 3/8" THREADED RODS INTO PILOT HOLES USING MASONRY ADHESIVE GROUT. ALL PINS SHALL HAVE A MINIMUM EMBEDMENT DEPTH OF 2" INTO THE PARENT STONE. THREADED RODS SHALL HAVE A 1/4" COUNTERSUNK DEPTH. PINS SHALL BE SPACED A MINIMUM OF 6" APART. PROVIDE A MINIMUM DISTANCE OF 3" FROM THE EDGE OF THE STONE UNIT. RE: W16 / A502
10. RESET DISPLACED STONE: RAKE MORTAR JOINTS AROUND THE DISPLACED STONE. RESET STONE TO ITS ORIGINAL LOCATION AND TUCK POINT MORTAR JOINT AROUND THE STONE.
11. CONTRACTOR SHALL PATCH ALL STONE COPINGS AT ALL FASTENER LOCATIONS FROM REMOVAL OF EXISTING CONTINUOUS CLEAT. REPLACE FLASHING AT COPING WITH NEW COPPER FABRIC FLASHING AND STAINLESS STEEL DRIP EDGE. PATCH ROOFING MEMBRANE AND REINSTALL LIGHTNING PROTECTION AFTER MASONRY RESTORATION IS COMPLETE. RE: T13 / A500
12. RAKE AND CLEAN MORTAR JOINT BETWEEN STONE AND CONCRETE. PREPARE JOINT AND INSTALL STAINLESS STEEL CAP FLASHING OVER CONCRETE LEDGE PER DETAIL: J23 / A501
13. REMOVE AND RESET FLASHING IN A NEW REGLET JOINT AND APPLY NEW SEALANT TO ACHIEVE A WATERTIGHT CONDITION. REMOVE ALL OLD SEALANT AND RAKE AND REPOINT ANY DAMAGED MORTAR JOINTS IN THE SURROUNDING ASHLAR STONE. RE: Q23 / A501
14. RESET COPING AFTER WEST ELEVATION OF WALL IS REBUILT. REPLACE FLASHING AT COPING WITH NEW COPPER FABRIC FLASHING AND STAINLESS STEEL DRIP EDGE. REINSTALL LIGHTNING PROTECTION AFTER MASONRY RESTORATION IS COMPLETE. RE: V5 / A501
15. OWNER TO CLEAN OUT DEBRIS FROM DRAIN. CONTRACTOR TO REPLACE DRAIN STRAINER WITH NEW DOME STRAINER THAT PREVENTS DEBRIS FROM BLOCKING THE DRAIN. SEAL ANY CRACKS IN CONCRETE SURROUNDING DRAIN.
16. SAWCUT 3/4" DEPTH ALONG CRACK AND INSTALL NEW SEALANT JOINT.
17. INSTALL NEW SEALANT AROUND THRU-WALL SCUPPER
18. INSTALL NEW LIGHT FIXTURE IN SAME LOCATION AS DEMOED FIXTURE AND INSTALL NEW SEALANT JOINT AROUND LIGHT FIXTURE. RE: ELECTRICAL
19. ALL SEALANT JOINTS FOR WINDOW UNIT EXCEPT AT PERIMETER MASONRY OPENING SHALL BE REPLACED.
20. RAKE AND CLEAN MORTAR JOINT BETWEEN STONE AND CONCRETE. PREPARE JOINT AND INSTALL PRE-COMPRESSED EXPANSION JOINT
21. INSTALL NEW CAST STONE TRIM AND LIGHT FIXTURE AND INSTALL NEW SEALANT JOINT AROUND LIGHT FIXTURE. RE: ELECTRICAL

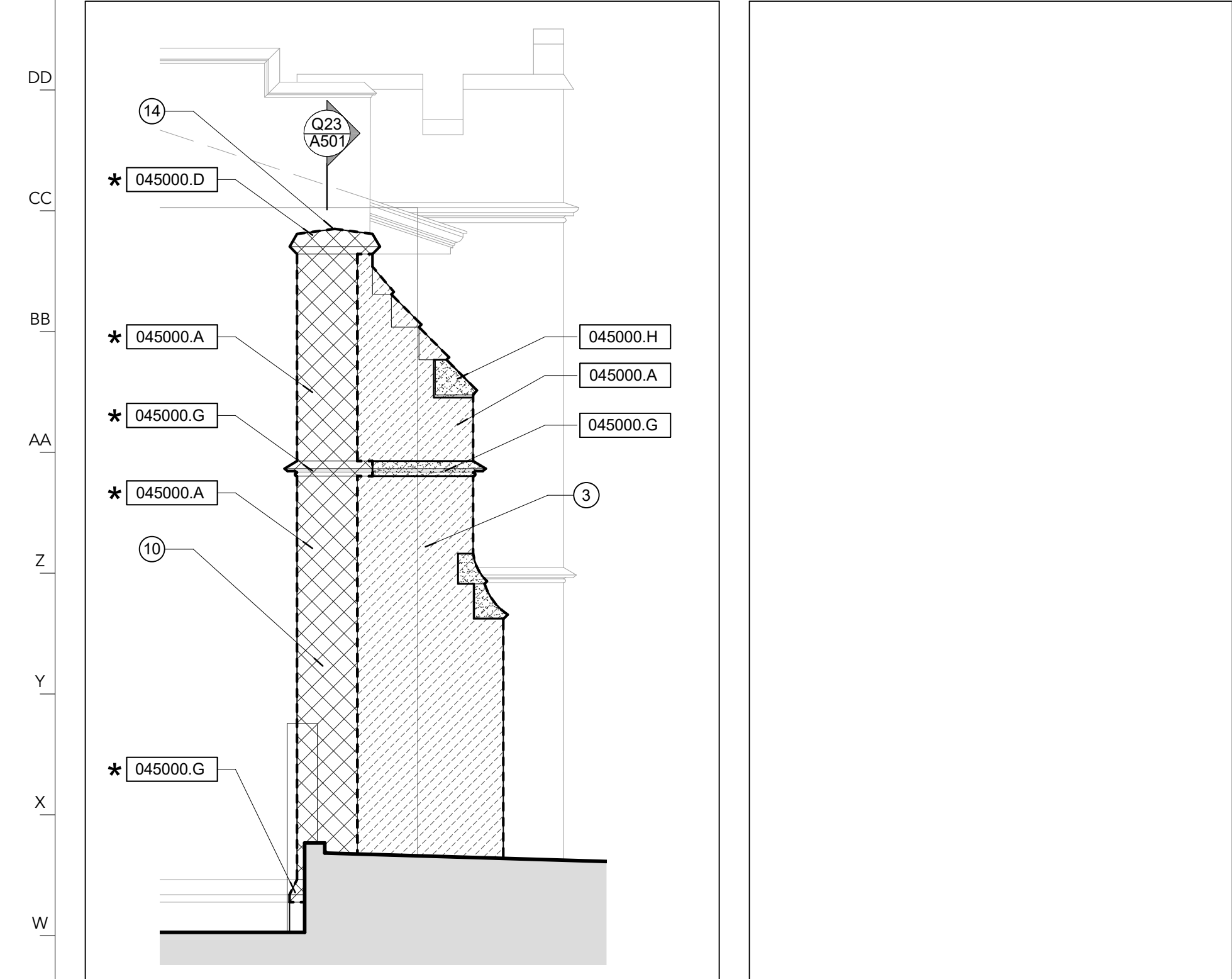
Table with columns: EXISTING CONSTRUCTION, NEW CONSTRUCTION, DIVISION 04 MASONRY



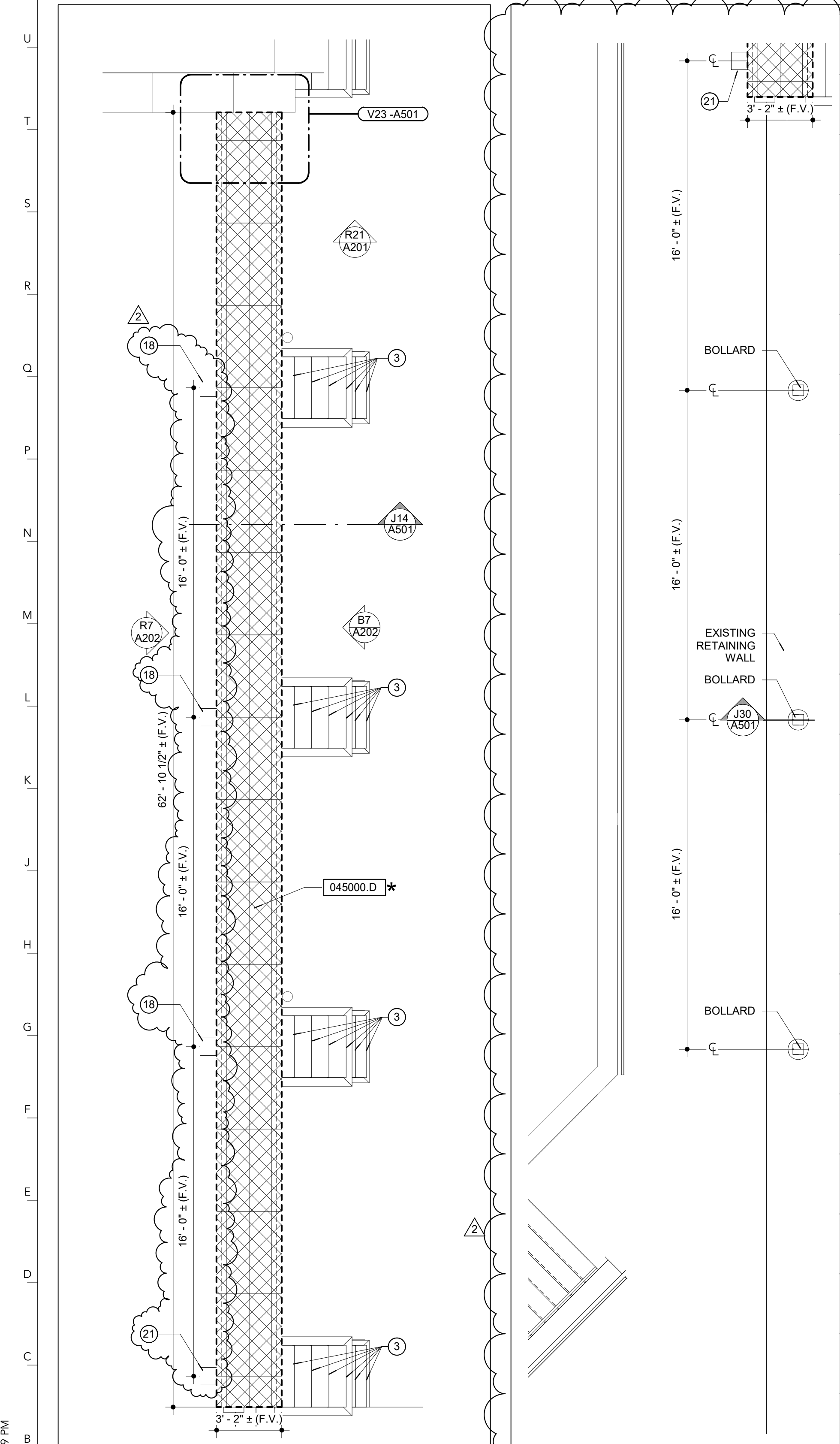
WEST ELEVATION R7  
SCALE: 1/4" = 1'-0"



EAST ELEVATION B7  
SCALE: 1/4" = 1'-0"



SOUTH ELEVATION V31 NOT USED V27  
SCALE: 1/4" = 1'-0"

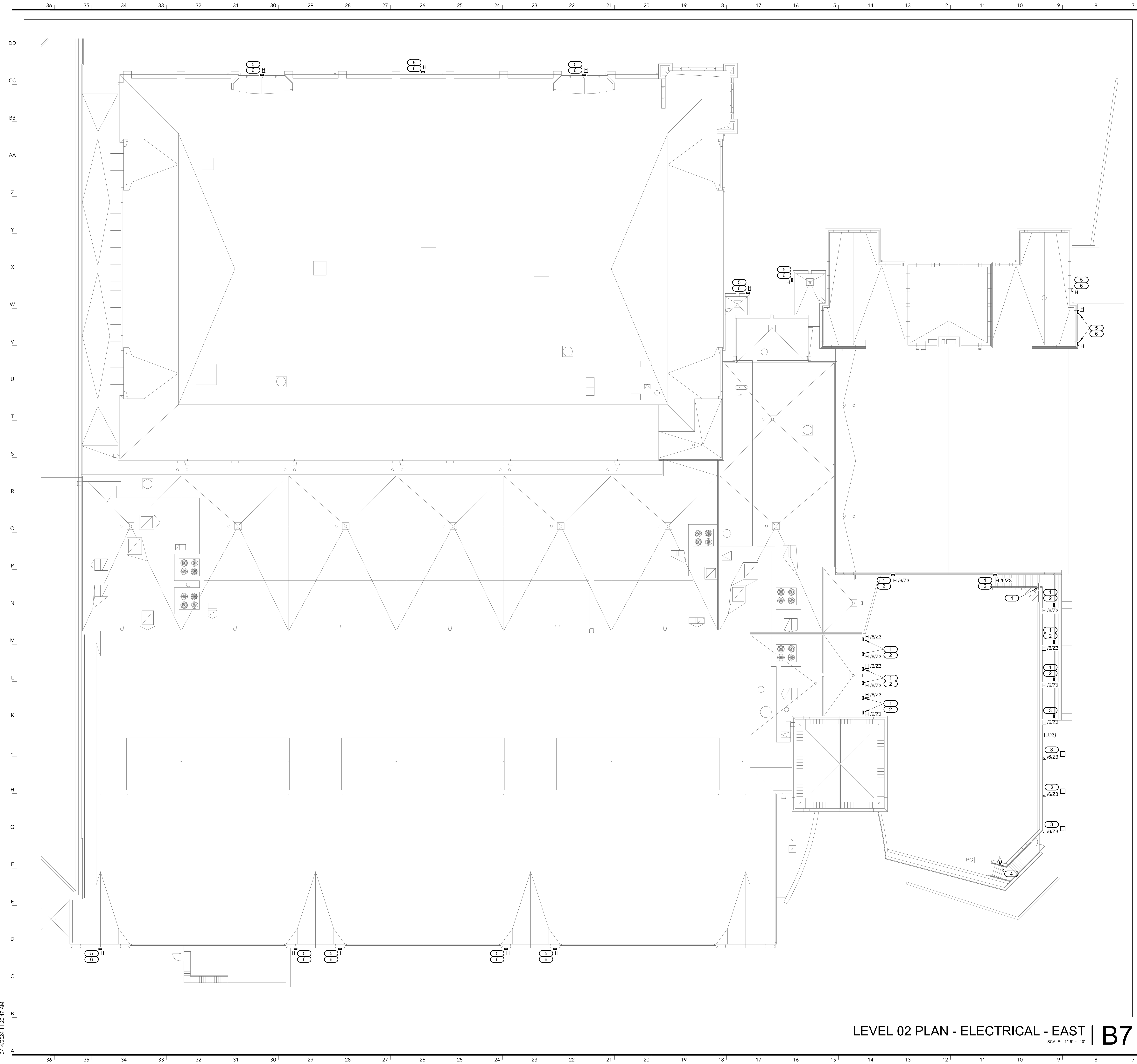


PARTIAL PLAN B31 PARTIAL PLAN B27  
SCALE: 1/4" = 1'-0"









- SHEET NOTES:**
- REFER TO SHEET E000 FOR GENERAL NOTES AND SYMBOLS.
  - REFER TO SHEET E000 FOR LIGHTING SCHEDULE AND LIGHTING SEQUENCE OF OPERATIONS.
  - REFER TO ARCHITECTURAL DETAILS AND ELEVATIONS FOR EXACT MOUNTING HEIGHTS OF LIGHT FIXTURES.
  - EXISTING LIGHTING CONTROLS SERVING OUTDOOR FITNESS AREA ARE LOCATED IN STORAGE ROOM 103.

- KEYNOTES:** ( # )
- DISCONNECT AND REMOVE EXISTING TRIANGLE WALL SCONCE. MAINTAIN EXISTING BACKBOX AND CONDUIT SERVING FIXTURE FOR RE-USE.
  - FURNISH AND INSTALL NEW LIGHT FIXTURE AT EXISTING TRIANGLE WALL SCONCE LOCATION. EXTEND AND CONNECT LIGHT FIXTURE TO CIRCUIT INDICATED ON PLANS. CONNECT NEW LIGHT FIXTURE TO EXISTING LIGHTING CONTROL RELAY SERVING ZONE 3 LIGHTS.
  - EXTEND 2#10 W & 1#10 GND TO EXISTING LIGHTING CIRCUIT SERVING OUTDOOR FITNESS AREA. CONNECT NEW LIGHT FIXTURE TO EXISTING LIGHTING CONTROL RELAY SERVING ZONE 3 LIGHTS.
  - EXISTING LIGHT FIXTURE TO REMAIN BEING SERVED FROM ZONE 3 RELAY.
  - DISCONNECT AND REMOVE EXISTING TRIANGLE WALL SCONCE. MAINTAIN EXISTING BACKBOX, WIRE, CONDUIT AND CIRCUITING SERVING FIXTURE FOR RE-USE.
  - FURNISH AND INSTALL NEW LIGHT FIXTURE AT EXISTING TRIANGLE WALL SCONCE LOCATION. MAINTAIN EXISTING CIRCUIT AND LIGHTING CONTROLS.



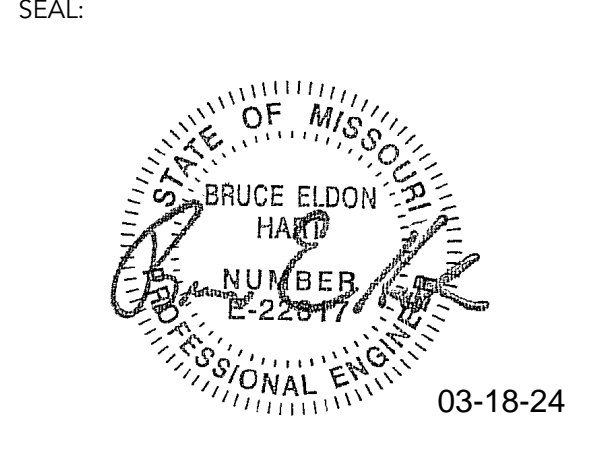
FOR THE CURATORS OF THE UNIVERSITY OF MISSOURI

**STUDENT RECREATION CENTER - EAST ELEVATION MASONRY REPAIR**

**ISSUED FOR BID**

1000 ROLLINS ST  
 COLUMBIA, MO 65203

DATE:	02/21/2024
PROJ. NO.:	CP231201
DESIGNED BY:	ZMB
DRAWN BY:	ZMB
CHECKED BY:	PLR
APPROVED BY:	PLR



**BRUCE HART - ENGINEER**  
 MO# E-22817

The Professional Engineer's seal affixed to this sheet applies only to the material and items shown on this sheet. All drawings, instruments, or other documents not exhibiting this seal shall not be considered prepared by this engineer, and this engineer expressly declines any and all responsibility for such plans, drawings, or documents not exhibiting this seal.

NO.	REVISION SUBMISSION	DATE
0	ISSUED FOR BID	02/21/2024
1	ADDENDUM #2	03/18/2024

**LEVEL 02 PLAN - ELECTRICAL**

**E201.1**

**LEVEL 02 PLAN - ELECTRICAL - EAST | B7**  
 SCALE: 1/16" = 1'-0"

3/14/2024 11:20:47 AM

DD  
CC  
BB  
AA  
Z  
Y  
X  
W  
V  
U  
T  
S  
R  
Q  
P  
N  
M  
L  
K  
J  
H  
G  
F  
E  
D  
C  
B  
A

DD  
CC  
BB  
AA  
Z  
Y  
X  
W  
V  
U  
T  
S  
R  
Q  
P  
N  
M  
L  
K  
J  
H  
G  
F  
E  
D  
C  
B  
A

3/14/2024 11:20:47 AM

EX. PANEL LP3																	
MOUNTING: SURFACE					SOLID NEUTRAL GROUND BUS					MAIN: 200 A MCB VOLTS: 480/277 Vye PHASE: 3 WIRE: 4 SCCR: 14 kA ISC UNKNOWN 0.00 kA							
ENCLOSURE: NEMA PB 1																	
FED FROM: --																	
LOCATION:																	
NOTES:																	
KEY	CT	LOAD DESCRIPTION	OC	W	A	B	C	W	OC	LOAD DESCRIPTION	CT	KEY					
--	1	EXISTING CIRCUIT	20 A	1	--	--	0	0	--	--	1	20 A	EXISTING CIRCUIT	2	--		
--	3	EXISTING CIRCUIT	20 A	1	--	--			--	--	1	20 A	EXISTING CIRCUIT	4	--		
--	5	EXISTING CIRCUIT	20 A	1	--	--			0	2.25	10	10	10	20 A	LTS: OUTDOOR FITNESS AREA	6	A
--	7	EXISTING CIRCUIT	20 A	1	--	--	0	0	--	--	1	20 A	EXISTING CIRCUIT	8	--		
--	9	EXISTING CIRCUIT	20 A	1	--	--			--	--	1	20 A	SPARE	10	--		
--	11	SPARE	20 A	1	--	--			0	0	--	1	20 A	SPARE	12	--	
--	13	SPARE	--	1	--	--			--	--	1	--	SPARE	14	--		
--	15	SPARE	--	1	--	--			--	--	1	--	SPARE	16	--		
--	17	SPARE	--	1	--	--			--	--	1	--	SPARE	18	--		
--	19	SPARE	--	1	--	--			--	--	1	--	SPARE	20	--		
--	21	SPARE	--	1	--	--			--	--	1	--	SPARE	22	--		
--	23	SPARE	--	1	--	--			--	--	1	--	SPARE	24	--		
--	25	SPARE	--	1	--	--			--	--	1	--	SPARE	26	--		
--	27	SPARE	--	1	--	--			--	--	1	--	SPARE	28	--		
--	29	SPARE	--	1	--	--			--	--	1	--	SPARE	30	--		
--	31	SPARE	--	1	--	--			--	--	1	--	SPARE	32	--		
--	33	SPARE	--	1	--	--			--	--	1	--	SPARE	34	--		
--	35	SPARE	--	1	--	--			--	--	1	--	SPARE	36	--		
--	37	SPARE	--	1	--	--			--	--	1	--	SPARE	38	--		
--	39	SPARE	--	1	--	--			--	--	1	--	SPARE	40	--		
--	41	SPARE	--	1	--	--			--	--	1	--	SPARE	42	--		
			Total Load:		0.00 kVA		0.00 kVA		2.25 kVA								
			Total Amps:		0.00		0.00		8.14								
LOAD SUMMARY																	
LOAD CLASSIFICATION			CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND		TOTALS*										
Lighting			2.255 kVA	100.00%	2.255 kVA												
							TOTAL CONNECTED LOAD:		2.25 kVA								
							TOTAL ESTIMATED DEMAND LOAD:		2.255 kVA								
							TOTAL CONNECTED AMPS:		2.71 A								
							TOTAL ESTIMATED DEMAND AMPS:		2.7 A								
*TOTAL DEMAND CALCULATIONS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HIAO LOADS. THIS CALC IS DONE AT EACH PANEL.																	
CIRCUIT KEY NOTES: A - ADD NEW LIGHTS TO THIS EXISTING CIRCUIT. EXISTING CIRCUIT SERVES ALL LIGHTS IN THE OUTDOOR FITNESS AREA.																	

LED LUMINAIRE SCHEDULE														
(DESC) DOOR:					DISTRIBUTION:					BEAMWIDTH:				
FA - FLAT ALUMINUM					II - ANSIES TYPE 2 DISTRIBUTION					NSP - VERY NARROW SPOT				
FS - FLAT STEEL					III - ANSIES TYPE 3 DISTRIBUTION					SP - SPOT				
RA - REGRESSED ALUMINUM					IV - ANSIES TYPE 4 DISTRIBUTION					MD - MEDIUM				
RS - REGRESSED STEEL					V - ANSIES TYPE 5 DISTRIBUTION					WD - WIDE				
FINISH:					CFSA - COLOR-FINISH SELECTION BY ARCHITECT					(L/L) LENS/LOUVER:				
PAP - PAINT AFTER FABRICATION					RE - RECESSED					K19 - KSH19 .156" ACRYLIC				
					RE - RECESSED					A - 125" ACRYLIC				
					SP - SUSPENDED					M - MATTE DIFFUSE CLEAR				
					SU - SURFACE					B - BAFFLE/LOUVER				
					UC - UNDER CABINET					C - CLEAR ALZAK				
					WL - WALL					MD - MEDIUM				
					O - OTHER (SEE DESCRIPTION)					F - FROSTED ACRYLIC				
										G - TEMPERED GLASS				
										K - KSH12 .125" ACRYLIC				
										SS - SEMI-SPECULAR CLEAR				
										O - OTHER (SEE DESCRIPTION)				
										[DESIGN SPECIFIC BLANKS]				
(MGT) MOUNTING:														
CL - CEILING SURFACE					RE - RECESSED					(WATT) PER:				
CV - COVE					SU - SURFACE					FIX - FIXTURE, FT - FOOT, LAMP				
FR - FLANGED RECESSED					UC - UNDER CABINET					(TYPE) LED:				
P - PERIMETER					WL - WALL					RGB - COLOR CHANGING LED				
PL - POLE					O - OTHER (SEE DESCRIPTION)					LED - LIGHT EMITTING DIODE				
										TLED - TUBULAR LED LAMP				
										OLED - ORGANIC LED				
										RGA - COLOR CHANGING + WHITE				
										RBLD - RETROFIT LED				
										WLED - WARM DIM LED				
(TYPE) DRIVER:														
0-10V - 0-10V DIMMING					EB - ELECTRONIC					HL - HIGH/LOW (100%/50%) STEP DIM				
DALI - DIGITAL ADDRESSABLE					ELV - ELECTRONIC LOW VOLTAGE					LINE - LINE VOLTAGE DIMMING				
DMX - DIGITAL MULTIPLEX					EM - EMERGENCY BATTERY					ML - MULTILEVEL SWITCHING				
										MV - MULTI-VOLTAGE ELECTRONIC				
										REM - REMOTE				
										O - OTHER (SEE DESCRIPTION)				
CATALOG NUMBER SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND CATALOG NUMBER ONLY. THE COMPLETE DESCRIPTION AND THE SPECIFICATION SHALL BE COORDINATED WITH THE CATALOG NUMBER TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE FIRST MANUFACTURER LISTED IS THE BASIS OF DESIGN.														
VERIFY AND COORDINATE ALL CEILING TYPES WITH LUMINAIRE MOUNTING AND TRIM REQUIREMENTS PRIOR TO THE RELEASE OF THE LUMINAIRE ORDER. CONFIRM ALL COLORS AND FINISHES OF ALL LUMINAIRE COMPONENTS WITH ARCHITECT AND INTERIOR DESIGNER PRIOR TO THE RELEASE OF THE LUMINAIRE ORDER. UNLESS INDICATED ON LIGHTING PLANS OR BELOW, REFER TO ARCHITECTURAL AND INTERIOR DESIGN ELEVATIONS, SECTIONS AND DETAILS FOR ALL SUSPENDED AND WALL MOUNTED LUMINAIRE MOUNTING HEIGHTS.														
REFER TO SPECIFICATION SECTIONS LED LIGHTING 26.51.19 FOR ADDITIONAL INFORMATION AND REQUIREMENTS. EXTERIOR CORRELATED COLOR TEMPERATURE 3500K, COLOR RENDERING INDEX (CRI) AT OR ABOVE 90, UNLESS NOTED OTHERWISE.														
ITEM														
DESCRIPTION	L/L	MTG	L	W	H	DIA.	ANSI WATTS	PER	TYPE	QTY	DELIVERED LUMENS (MIN)	VOLTS	TYPE	MANUFACTURER AND MODEL
H 7" x 6" WALL MOUNTED LUMINAIRE FOR LED SOURCE, CLEAR SAFETY GLASS LENS WITH WHITE CERAMIC COATING, SYMMETRIC DISTRIBUTION. FURNISH WITH NECESSARY MOUNTING HARDWARE FOR WALL MOUNTED, BLACK MATTE FINISH. IP65 RATED.	O	WL	7 1/8"	6 1/2"	6 5/8"		18 W	FIX	LED	1	2030 LUMENS	277 V	0-10V	BEGA B2249 SERIES
J SHIELDED SQUARE BOLLARD FOR LED SOURCE, CLEAR SAFETY GLASS LENS, ASYMMETRIC DISTRIBUTION, BLACK MATTE FINISH. IP65 RATED.	O	O	6 1/4"	6 1/4"	37 1/4"		12 W	FIX	LED	1	1650 LUMENS	277 V	0-10V	BEGA B84238 SERIES

LIGHTING SEQUENCE OF OPERATION														
NOTES:														
1. (L#) DENOTES THE LIGHTING SEQUENCE OF OPERATIONS FOR THIS SPACE.														
2. (R#) PUSH BUTTON REFERS TO SCENE QUANTITY. CONTROL STATION SHALL BE CAPABLE OF [RAISE/LOWER AND] SWITCHING ON/OFF FOR MULTIPLE SCENES AS INDICATED ON SHEETS AND THE LIGHTING SEQUENCE OF OPERATIONS (L#).														
COORDINATE QUANTITIES OF BUTTONS FOR CONTROL STATIONS WITH LIGHTING CONTROL MANUFACTURER.														
3. (Z#) DENOTES LIGHTING CONTROL ZONE. PROVIDE SEPARATE CONTROL OF EACH CONTROLLED ZONE. LUMINAIRES ASSOCIATED WITH THE SAME ZONE SHALL OPERATE TOGETHER WITHIN THE SAME PROGRAMMED SCENE.														
4. # = SWITCH DESIGNATION FOR LIGHTING CONTROL.														
5. VERIFY AND COORDINATE ALL TIME CLOCK SETTINGS WITH OWNER PRIOR TO FINAL PROGRAMMING.														
6. VERIFY AND COORDINATE ALL PUSH BUTTON WALL DEVICES AND QUANTITIES OF INDIVIDUAL BUTTONS WITH SCENES AND ZONES PER LOCATION.														
7. VERIFY AND COORDINATE ALL PUSH BUTTON QUANTITIES AND SCENE NAMES WITH OWNER PRIOR TO SUBMITTING ENGRAVING TEMPLATE TO MANUFACTURER.														
PLAN ID	LIGHTING SWITCHED													
(LD3)	Sequence: Zone 3 dimmed lights are controlled in this space. ON: The lights shall turn on manually to 100% via lighting control station or automatically no greater than 50% via Metasys building management system at 6pm each day of the week. Coordinate exact time with owner. ADJUST: The dimming luminaires are raised/lowered using a push button wall controller(s) or dim down to 10% via occupancy sensor, once the space has been unoccupied for 20 minutes. OFF: The lights turn off manually via lighting control station, or automatically via Metasys building management system at 8am every day of the week. Coordinate exact time with owner. ADDITIONAL CONTROL: Dimmable luminaires in this space are required by energy code shall continuously adjust to the presence of daylight to maintain a minimum of 10 footcandles. After the space reaches 20 footcandles the luminaires shall completely shut off. The daylight sensor shall not increase the light output above 10% unless the zone is occupied.													

INTERNATIONAL ARCHITECTS ATELIER  
912 BROADWAY BLVD, SUITE 300 | KANSAS CITY, MO 64105  
P: 816.471.6522 | F: 816.471.3755 | W: I-A-A.COM  
MISSOURI STATE CERTIFICATE OF AUTHORITY #000582

STRUCTURAL CONSULTANT  
BOB D CAMPBELL & CO.  
4338 BELLEVUE AVE.  
KANSAS CITY, MO 64111  
PH: 816.531.4144

MEP CONSULTANT  
IMEG CORP.  
1600 BALTIMORE  
KANSAS CITY, MO 64108  
PH: 816.842.837

FOR THE CURATORS OF  
THE UNIVERSITY OF MISSOURI

STUDENT  
RECREATION  
CENTER - EAST  
ELEVATION  
MASONRY  
REPAIR

ISSUED FOR BID

1000 ROLLINS ST  
COLUMBIA, MO 65203

DATE: 02/21/2024  
PROJ. NO.: CP231201

DESIGNED BY: ZMB  
DRAWN BY: ZMB  
CHECKED BY: PLR  
APPROVED BY: PLR

SEAL:

BRUCE ELDON  
HART  
REGISTERED PROFESSIONAL ENGINEER  
NUMBER: E-22817  
03-18-24

BRUCE HART - ENGINEER  
MOR: E-22817

The Professional Engineer's seal affixed to this sheet applies only to the material and items shown on this sheet. All drawings, instruments, or other documents not exhibiting this seal shall not be considered prepared by this engineer, and this engineer expressly declines any and all responsibility for such plans, drawings, or documents not exhibiting this seal.

NO.	REVISION SUBMISSION	DATE
0	ISSUED FOR BID	02/21/2024
1	ADDENDUM #2	03/18/2024

ELECTRICAL  
SCHEDULES

E600

© 2024 INTERNATIONAL ARCHITECTS ATELIER