

**COLLEGE OF DUPAGE  
REGULAR BOARD MEETING**

**BOARD APPROVAL**

---

1. SUBJECT

Student Resource Center (SRC) Door #2 Entrance Remodel

2. REASON FOR CONSIDERATION

A single purchase exceeding the statutory limit of \$25,000 must be approved by the Board of Trustees.

3. BACKGROUND INFORMATION

The SRC Door #2 Entrance Remodel Project removes an aging and deteriorating revolving door that is becoming increasingly difficult to service. The work includes an expanded vestibule that would better accommodate interior and exterior foot traffic at this entrance. The expanded vestibule will provide shelter for waiting commuters. The replacement of the revolving doors was a request of the Public Safety Department for a safe and secure entryway by incorporating the access control system to doors at this entrance.

A legal notice for an Invitation for Bids was published on May 3, 2018 in the Daily Herald; the invitation was also posted to the College of DuPage Purchasing website and distributed to in-district Chambers of Commerce. Eighty-seven (87) vendors were directly solicited. Forty-four (44) vendors downloaded the bid documents. A pre-bid meeting was held on May 14, 2018 at 11:00 a.m. in the College of DuPage Purchasing Department Conference Room (BIC 1B03A). A public opening was held on May 22, 2018 at 11:00 a.m. in the College of DuPage Purchasing Department Conference Room (BIC 1B03A). The following individuals attended: Jacoby Radford (COD Purchasing Manager/Recorder), Susan Castellanos (COD Buyer/Facilitator), Joanne Ivory (COD Associate Dean, Continuing Education/Agent of the Board), Ellen Roberts (COD Director, Business Affairs), Chris Wosachlo (COD Energy/Project Manager, Facilities Operations) and three (3) vendor representatives. Three (3) bids were received. No women/minority owned businesses submitted a bid.

The following is a recap of the bid tabulation:

Vendor	Total Base Bid
<b>Integral Construction, Inc.</b>	<b>\$304,320.00</b>
K.M. Holly Construction Inc.	\$394,910.00
D. Kersey Construction Company	\$450,025.00

**Lowest bid in bold**

Budget Status

GL Account	FY2018	FY2019 - Proposed		
	YTD Spend	Annual Budget	YTD Spend	Available Balance
03-90-39017-5804001	\$ -	\$ 305,000	\$ -	\$ 305,000
<i>Remove Rev/Door/Add SRC NE Ves: Building Remodeling Expense</i>				
			<b>FY2019 Request</b>	<b>\$ 304,320</b>

*\*FY2019 Budget not yet adopted. YTD Spend as of 06/05/2018.*

This purchase supports the Strategic Long Range Plan Goal #1 Accountability: Being transparent, answerable and responsible to all stakeholders, and Goal #8 Infrastructure: Maintaining, improving and developing structures systems and facilities necessary for the delivery of high quality education and meaningful cultural events.

This purchase complies with State Statute, Board Policy and Administrative Procedures.

**4. RECOMMENDATION**

That the Board of Trustees awards the SRC Door #2 Entrance Remodel to the lowest responsible bidder, Integral Construction, Inc., 320 Rocbaar Drive, Romeoville, IL 60446 for the lump sum bid amount of \$304,320.00.


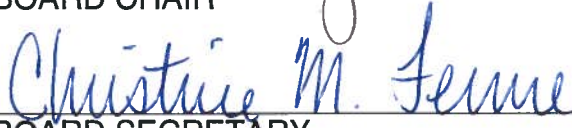
Staff Contact: Bruce Schmiedl – Director, Facilities Planning & Development

SIGNATURE PAGE FOR

**Student Resource Center (SRC) Door #2 Entrance Remodel**

ITEM(S) ON REQUEST

That the Board of Trustees awards the SRC Door #2 Entrance Remodel to the lowest responsible bidder, Integral Construction, Inc., 320 Rocbaar Drive, Romeoville, IL 60446 for the lump sum bid amount of \$304,320.00.

	6/21/18
BOARD CHAIR	DATE
	6/20/18
BOARD SECRETARY	DATE



PORCELAIN ENAMEL CANOPY  
GLAZING  
STOREFRONT SYSTEM



**OPTION 5  
EXTERIOR**

100% GLASS CANOPY  
100% GLASS STOREFRONT SYSTEM  
100% GLASS PANELS

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REGULATIVE



PORCELAIN ENAMEL CANOPY  
PORCELAIN ENAMEL PANEL  
STOREFRONT SYSTEM



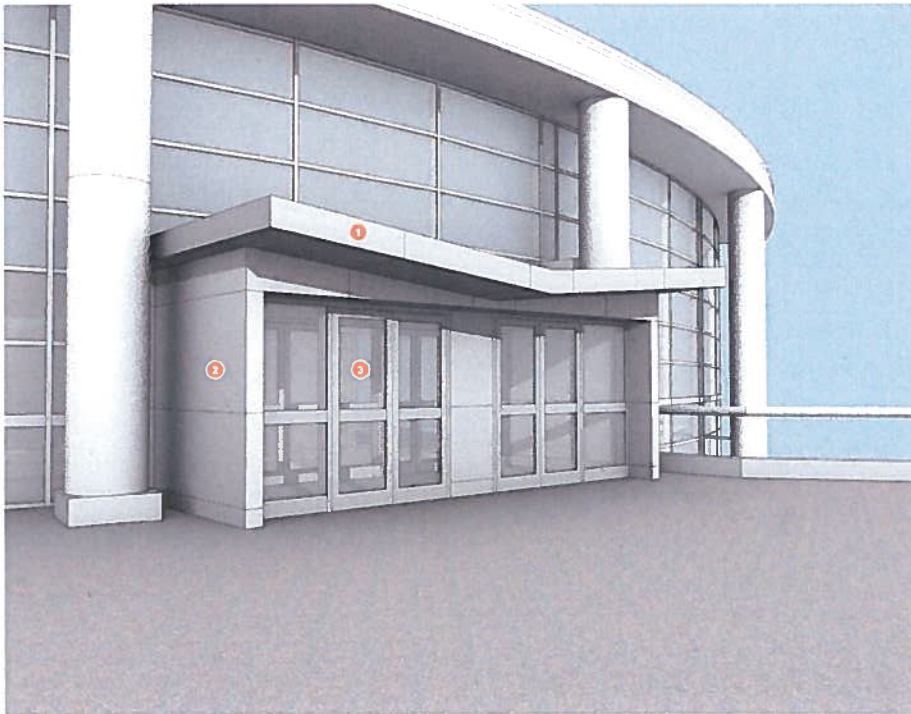
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EXTERIOR**

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100% GLASS STOREFRONT SYSTEM  
100% GLASS PANELS

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REGULATIVE



PORCELAIN ENAMEL CANOPY  
PORCELAIN ENAMEL PANEL  
STOREFRONT SYSTEM

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**OPTION 7  
EXTERIOR**

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PORCELAIN ENAMEL CANOPY  
PORCELAIN ENAMEL PANEL  
STOREFRONT SYSTEM

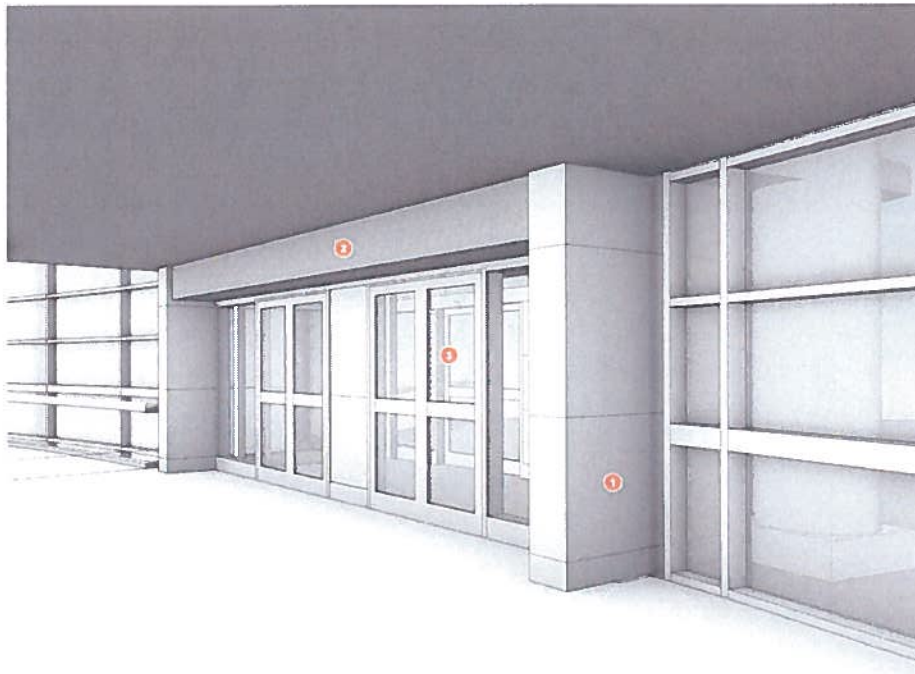
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**OPTION 8  
EXTERIOR**

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PORCELAIN ENAMEL WALL  
GYPSUM BOARD SOFFIT  
STOREFRONT SYSTEM

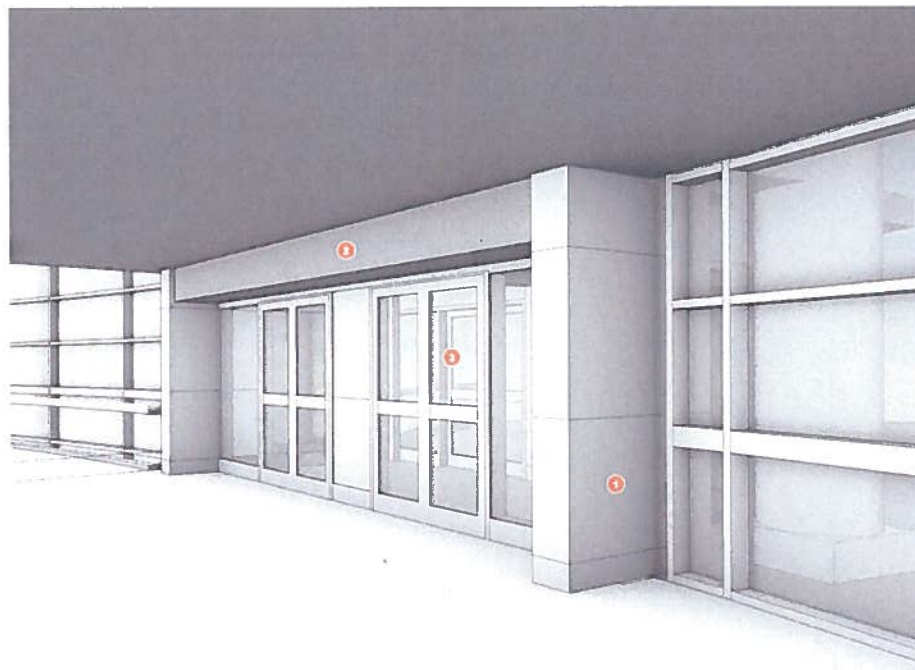
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**OPTION 5  
INTERIOR**

OPTION 5 INTERIOR  
OPTION 5 INTERIOR  
OPTION 5 INTERIOR

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PORCELAIN ENAMEL WALL  
GYPSUM BOARD SOFFIT  
STOREFRONT SYSTEM

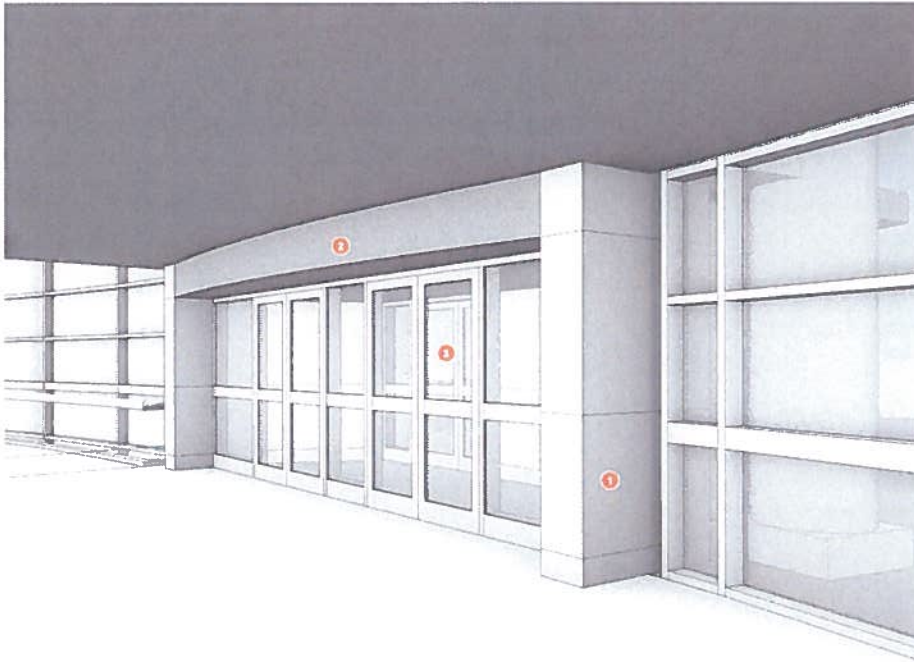
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**OPTION 6  
INTERIOR**

OPTION 6 INTERIOR  
OPTION 6 INTERIOR  
OPTION 6 INTERIOR

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PORCELAIN ENAMEL WALL  
GYPSUM BOARD SOFFIT  
STOREFRONT SYSTEM

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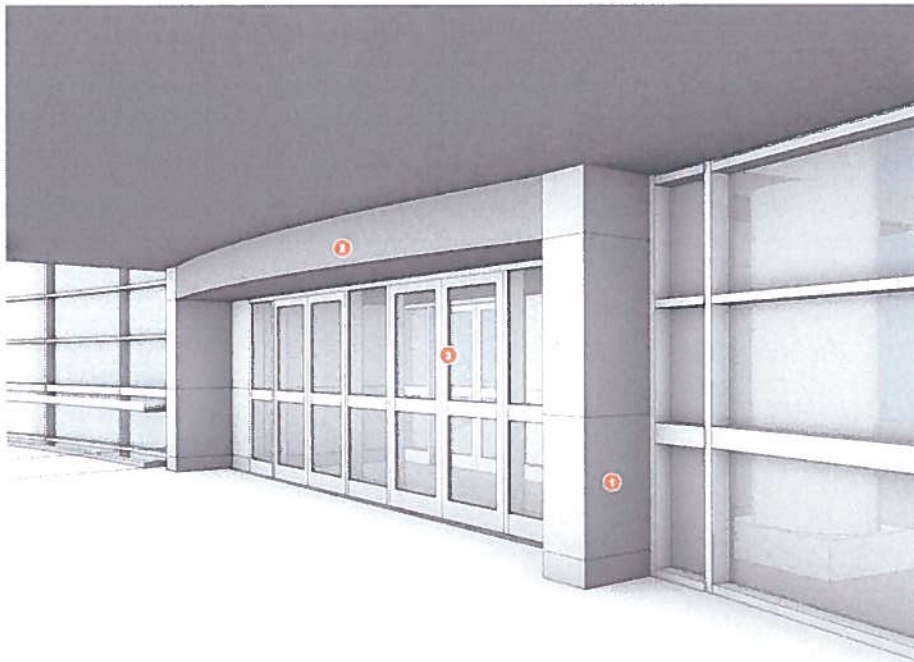
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INTERIOR**

OPTION 7 INTERIOR  
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responsive architecture



PORCELAIN ENAMEL WALL  
GYPSUM BOARD SOFFIT  
STOREFRONT SYSTEM

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**OPTION 8  
INTERIOR**

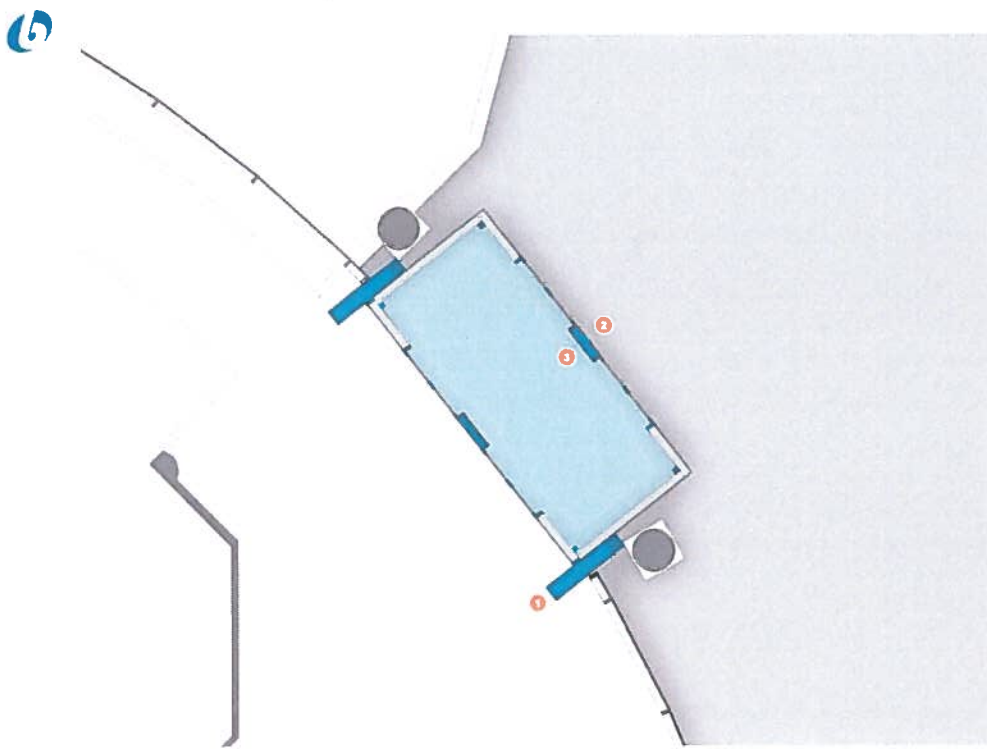
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responsive architecture

**Item 7kk**  
**June 21, 2018**



PORCELAIN ENAMEL WALL  
3' 0" CANOPY (ABOVE)  
STOREFRONT SYSTEM

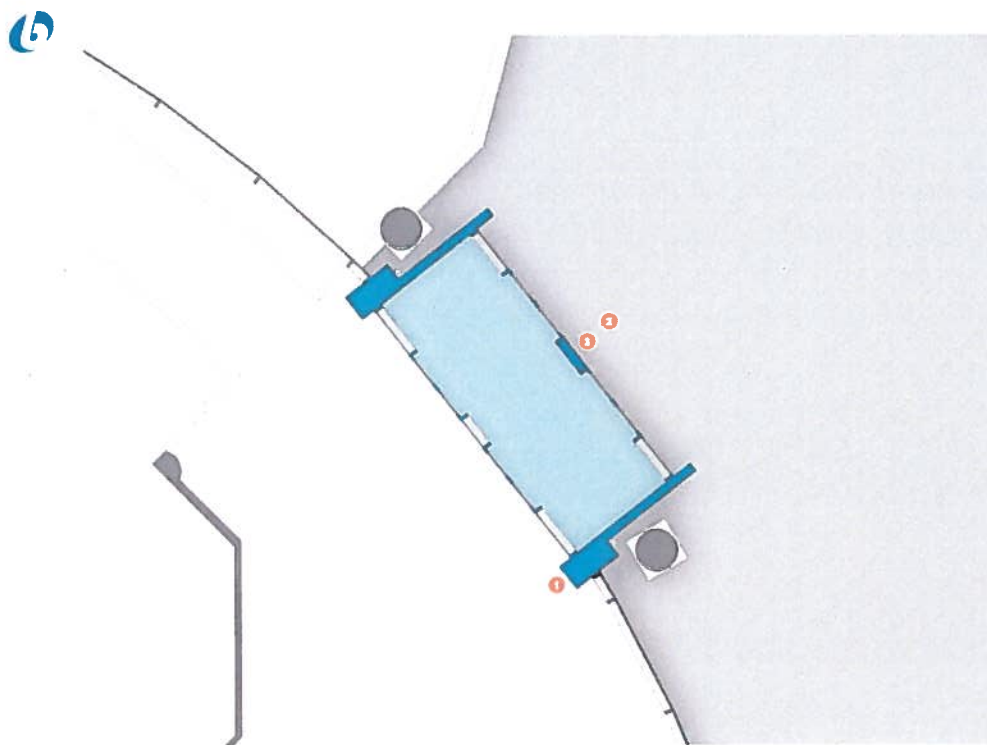
**OPTION 5 & 6  
PLAN**

REVISION: 04/2018  
REVISION: 05/2018  
REVISION: 06/2018

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RESPONSIVE



PORCELAIN ENAMEL WALL  
8' CANOPY (ABOVE)  
STOREFRONT SYSTEM

**OPTION 7  
PLAN**

REVISION: 04/2018  
REVISION: 05/2018  
REVISION: 06/2018

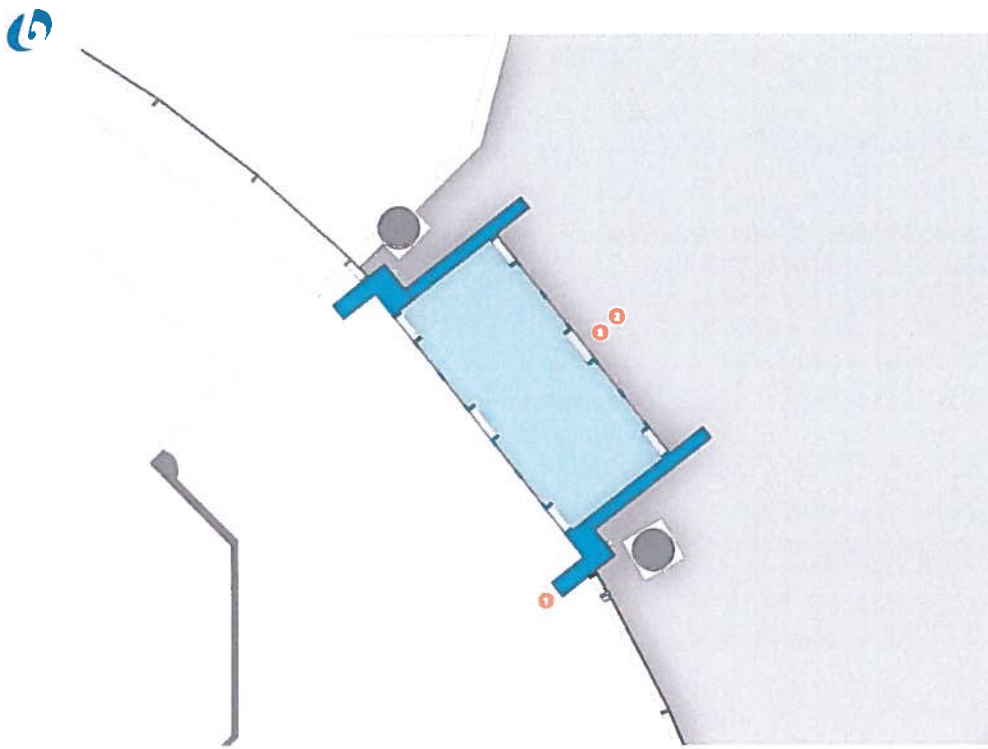
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RESPONSIVE



**Item 7kk**  
**June 21, 2018**



PORCELAIN ENAMEL WALL  
8' CANOPY (ABOVE)  
STOREFRONT SYSTEM

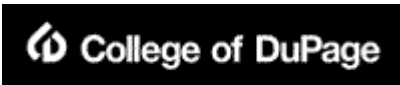
**OPTION 8  
PLAN**

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100% PERMIT SUBMITTED  
100% CONSTRUCTION

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100% CONSTRUCTION



**Purchasing Department**

425 Fawell Boulevard  
Glen Ellyn, Illinois 60137-6599  
PHONE (630) 942-2355  
FAX (630) 942-4322

**2018-B0055 Student Resource Center (SRC) Door #2 Entrance Remodel**

**ADDENDUM # 1**

**May 18, 2018**



This addendum is being issued to update the specifications and provide additional information.

This information becomes part of the Bid Documents upon receipt. Please review and incorporate into your Bid accordingly.

**For which Bids are scheduled to be received on May 22, 2018 no later than 11:00 a.m., Central Time.**

Bids will be received by the College of DuPage, District 502, at the office of the Purchasing Manager, Berg Instructional Center (BIC) Building, **Room 1B03**, 425 Fawell Blvd., Glen Ellyn, IL 60137.

**The signed Addendum acknowledgment MUST BE RETURNED with your Bid no later than the due date set forth for this Invitation to Bid.**

Below are clarifications to this bid:

**Section 1. General questions and responses:**

- Q1. Do you want us to remove the revolving doors off site or do you want to them back? If you want them, please let me know if you'll want us to put them at another location on site and where that location is.
- A1. **Remove and dispose of revolving doors by contractor.**
  
- Q2. Can you also provide a spec on the walk off mat and carpet you want to match?
- A2. **Walk off product identified in table. Existing interior carpet is believed to be Interface Huega Superflor tile. Contractor to verify in field and provide matching carpet tile per drawing.**

Q3. Are there any drawings for the subject project? And also, is it open bidding?  
**A3. The drawings are available in the bid document. The bid document can be found on the Purchasing Website for Current Bids/RFPs at <http://cod.edu/about/purchasing/requests/index.aspx>. Please review the bid document for bidding instruction**

Q4. The contact listed on drawing H100, namely Honeywell. Please see their response listed below. Can you supply the new contact and phone number, thank you. Do you have a contact name and number of whom I am supposed to contact for this? The Honeywell contact stated "it appears that this work will require the colleges other controls contractor Siemens to do the work."

**A4. Siemens, Carmen Grande, (847) 215-1050.**

## **Section 2. Clarification and Revisions:**

1. Refer to Attachment A in this addendum for revisions to the doors, frames, and hardware specification. A Narrative is included, which describes the revisions and the drawing sheet that refers to the door, frames and hardware.

## **Attachment A – Revised Specification Doors, Frame, and Hardware**

## **Addenda 1 Narrative**

### Sheet A100:

1. Clarification: Additional door operator pad added adjacent to one shown previously inside vestibule 2541 on architectural plan.. There are a total of (4) door operator pads. Door operator pad scope was accurately detailed on E101 already.
2. Clarification: Left leaf of door 2541A to be automatically operated. Left leaf of door 2541C to be automatically operated. Right leaf of door set 2541A to be card access controlled.

### Specification Section 08 41 13 Aluminum-Framed Entrances and Storefronts:

1. Section 2.4, A, 2 revised to read: Door Design: Wide stile; 5-inch nominal width. 6" mid-rail.
  - a. Explanation: clarification noting mid-rail as shown on drawings.

### Specification Section 08 71 00 Door Hardware

1. Section 1.3, C, 1, b - Revise: Format: Door hardware schedule must be submitted in DI vertical format. Use same door numbers as in the Contract Documents.
  - a. Explanation: Requirement for format of hardware schedule submittal.
2. Section 1.3, C, 2 - Keying Schedule removed.
3. Section 2.7, C - Add subsection 4. Change from construction core to permanent core to be coordinated with C.O.D. Project Manager.
4. Section 2.5, B, 10 - Revise "VE910" to VR910". Removed "provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set."
5. Section 2.7, D - Revise Address to "Lockshop – BIC 0555"
6. Section 2.9, 2 - Remove "Push to Go function to activate power operator"
7. Section 2.9, 4 - Remove "hard-wired motion sensors and/or"
8. Section 2.9, 5 - Remove in its entirety.
9. Section 2.13, A, 3 - Revised to read "Push Plates, Pulls, and Push Bars: (US32DMS) Micro Shield coated"
10. Section 3.7, B, Hardware Set #01 - Finish of Card Reader revised to Charcoal.
11. Section 3.7, B, Hardware Set #03 - Revise quantity of OH Stop to "2 EA".
12. Section 3.7, B, Hardware Set #03 - Add "1 EA ACTUATOR PACKAGE FOR ADA OPERATORS WITH INDEPENDENT CONTROL AS REQUIRED"
13. Section 3.7, B, Hardware Set #04 - Remove "1 EA ACTUATOR PACKAGE FOR ADA OPERATORS WITH INDEPENDENT CONTROL AS REQUIRED"



## 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. Mechanical door hardware for the following:
    - a. Swinging doors.
  - 2. Electrified door hardware.
  - 3. Access controls, including card reader, wiring and connections to existing security panel.
- B. Related Sections:
  - 1. Section 084113 "Aluminum-Framed Entrances and Storefronts" for entrance doors.
  - 2. Section 281300 "Access Control" for access control devices installed at door openings and provided as part of a security system.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Details of electrified door hardware, indicating the following:
  - 1. Wiring Diagrams: For power, signal, and control wiring and including the following:
    - a. Details of interface of electrified door hardware and building safety and security systems.
    - b. Schematic diagram of systems that interface with electrified door hardware.
    - c. Point-to-point wiring.
    - d. Risers.
    - e. Elevations doors controlled by electrified door hardware.
  - 2. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.
- C. Other Action Submittals:
  - 1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

- a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
  - b. Format: Door hardware schedule must be submitted in DHI vertical format. Use same door numbers as in the Contract Documents.**
  - c. Content: Include the following information:
    - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
    - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
    - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
    - 4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
    - 5) Fastenings and other pertinent information.
    - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
    - 7) Mounting locations for door hardware.
    - 8) List of related door devices specified in other Sections for each door and frame.
- ~~2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.~~

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Architectural Hardware Consultant.
- B. Product Certificates: For electrified door hardware, from the manufacturer.
- C. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- D. Warranty: Special warranty specified in this Section.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware schedule.
- B. Provide the following in accordance with Division 01 and include:
  1. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
  2. Catalog pages for each product.
  3. Parts list for each product.
  4. Final approved hardware schedule, edited to reflect conditions as-installed.
  5. Copies of floor plans with keying nomenclature
  6. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.



1.6 QUALITY ASSURANCE

- A. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
  - 1. Scheduling Responsibility: Preparation of door hardware schedules.
  - 2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.
- C. Source Limitations: Obtain each type of door hardware from a single manufacturer.
  - 1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.
  - 2. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.
- D. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- E. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- F. Accessibility Requirements: Comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design, ICC A117.1, and Illinois Accessibility Code for door hardware on doors in an accessible route.
  - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
  - 2. Comply with the following maximum opening-force requirements:
    - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
  - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
  - 4. Closers: Adjust door and gate closer sweep periods so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
  - 5.
- G. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  2. Inspect and discuss preparatory work performed by other trades.
  3. Inspect and discuss electrical roughing-in for electrified door hardware.
  4. Review sequence of operation for each type of electrified door hardware.
  5. Review required testing, inspecting, and certifying procedures.
- H. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.
1. Attendees: Electrified door hardware supplier, doors and frames supplier, electrified door hardware installer, electrical subcontractor, Owner, Owner's security consultant, Contractor.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
  - B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- 1.8 COORDINATION
- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
  - B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
  - C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
  - D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- 1.9 WARRANTY
- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
    1. Failures include, but are not limited to, the following:
      - a. Structural failures including excessive deflection, cracking, or breakage.
      - b. Faulty operation of doors and door hardware.
      - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
    2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

- a. Mechanical Closers: 30 years.
- b. Automatic Door Operators: 2 years.
- c. Mechanical Exit Devices: 3 years.
- d. Electrified Exit Devices: 1 year.
- e. Continuous Hinges: Lifetime warranty.
- f. Key Blanks: Lifetime.

#### 1.10 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

### PART 2 - PRODUCTS

#### 2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
  1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
  2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
  1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

#### 2.2 FASTENERS

- A. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
- B. Furnish screws for installation with each hardware item. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work, including prepared for paint surfaces to receive painted finish.
- C. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where

bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.

- D. Install hardware with fasteners provided by hardware manufacturer.
- E. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
  - 1. Where fasteners are exposed to view, match finish to adjacent door hardware.

## 2.3 CONTINUOUS HINGES

### A. Aluminum Geared

- 1. Manufacturers: Provide continuous hinges manufactured by Hager. No substitutions.
- 2. Requirements:
  - a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.25, Grade 2.
  - b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum, with 0.25-inch diameter Teflon coated stainless steel hinge pin.
  - c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
  - d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
  - e. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gauge to accommodate electric function of specified hardware.
  - f. Install hinges with fasteners supplied by manufacturer.
  - g. Provide hinges with symmetrical hole pattern.

## 2.4 ELECTRICAL POWER TRANSFER

### A. Manufacturers:

- 1. Von Duprin. No substitutions allowed.

- B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gauge of wires sufficient to accommodate electric function of specified hardware.
- C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

## 2.5 EXIT DEVICES

- A. Manufacturer and Product: Von Duprin 99 series. No substitutions acceptable.
- B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3-2014 Grade 1 and UL listed for Panic Exit or Fire Exit hardware.
2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
3. Quiet Operation: Incorporate fluid damper or other device that eliminates noise of exit device operation.
4. Touchpad: Extend minimum of one half of door width, but not the full length of exit device rail. Provide end-cap with two-point attachment to door. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. Provide compression springs in devices, latches, and outside trims or controls; tension springs prohibited.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrical requirements.
6. Provide exit devices with manufacturer's approved strikes.
7. Provide exit devices cut to door width and height. Locate exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
8. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
9. Removable Mullions: 2 inches x 3 inches steel tube. Where scheduled as keyed removable mullion that is removed by use of a keyed cylinder, which is self-locking when re-installed.
10. Provide **VR910** trim for exit devices. ~~provide heavy duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90 degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.~~
  - a. Lever Style: Match lever style of locksets.
  - b. Tactile Warning (Knurling): Where required by authority having jurisdiction.
11. Provide UL labeled fire exit hardware for fire rated openings.
12. Provide factory drilled weep holes for exit devices used in full exterior application.
13. Provide electrified options as scheduled in the hardware sets.

## 2.6 POWER SUPPLIES

- A. Manufacturers and Product: Von Duprin PS900 Series. No Substitutions acceptable.
- B. Requirements:
  1. Provide power supplies, recommended and approved by manufacturer of electrified locking component, for operation of electrified locks, electrified exit devices, magnetic locks, electric strikes, and other components requiring power supply.
  2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
  3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
  4. Required:
    - a. Provide power supply, where specified, with internal capability of charging sealed backup batteries 24 VDC, in addition to operating DC load.
    - b. Provide sealed batteries for battery back-up at each power supply where specified.
    - c. Provide keyed power supply cabinet.
  5. Provide power supply in an enclosure, complete, and requiring 120VAC to fused input.

6. Provide power supply with emergency release terminals, where specified, that allow release of all devices upon activation of fire alarm system complete with fire alarm input for initiating “no delay” exiting mode.

## 2.7 KEYING – C.O.D. (OWNER) LOCKSHOP TO PROVIDE PERMANENT KEYED CORES

- A. A. Factory key, master key, grand-master key, and great grand master key locks and cylinders into the existing established Medeco® KeyMark™ 7-pin SFIC (Ext. Face small format interchangeable core) system as directed by F.O.& M. – Lockshop.
- B. Unless otherwise specified, furnish two key blanks for each Medeco® KeyMark™ core, two original keys for each new keyset as directed by F.O. & M. - Lockshop. Original keys shall be factory stamped and embossed by Medeco®. Key blanks to be coined by Medeco® per existing contract and coining die.
- C. Construction core keying to be provided by the contractor for the security of the project, its materials and the surrounding areas affected by the project. The construction keying should allow the contractor to efficiently perform their contracted duties and the testing of all installed locking hardware.
  1. Furnish required amounts of construction keys, master keys and construction core removal keys as needed by the project.
  2. Use only the construction keys during construction. Furnish two each construction master keys and core removal keys to F.O. & M – Lockshop upon installation of the construction cores.
  3. Upon Substantial completion of the Work (as that date is established by the Architect) in the presence of the Architect or a designee, demonstrate the function of each lock and cylinder using the construction cores and keying. When approved, remove the construction cores and requires the permanent cores be installed.
  4. **Change from construction core to permanent core to be coordinated with C.O.D. Project Manager.**
- D. Identification and delivery address:

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**Lockshop – BIC 0555**

425 Fawell Blvd.

Glen Ellyn, IL 60137-6599

1. Factory stamped and embossed permanent keys will be shipped under separate cover from Medeco® direct to: F.O. & M. – Lockshop by registered mail or receipted personal delivery. Each type of key will be tagged or bagged for easy identification.
2. Factory marked (SL Stamp Lok – on face) Ext. Face cores will be shipped under separate cover from Medeco® direct to: Campus services – Lockshop by registered mail or receipted personal delivery. Core face stamping will be specified by F.O. & M. – Lockshop (as per in place standards and practices). Each Ext. Face core shall be individually tagged with a corresponding architectural reference that identifies its installation location. After Ext. Face core prep is completed at F.O. & M. Lockshop, Ext. Face cores will be available for installation at the appropriate time.
3. Factory generated list/schedule for the project will be shipped under separate cover from Medeco® direct to: F.O. & M. – Lockshop by registered mail or receipted personal delivery.

## 2.8 DOOR CLOSERS

- A. Manufacturers and Products:

1. 1. Scheduled Manufacturer and Product: LCN 4040XP series.
2. 2. Acceptable Manufacturers and Products: No Substitute.

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2 inch diameter with 3/4 inch diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.9 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. 1. Scheduled Manufacturer and Product: Record 8100.
2. 2. Acceptable Manufacturers and Products: No Substitute.

B. Requirements:

1. 1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.
  - a. Opening: Powered by DC motor working through reduction gears.
  - b. Closing: Spring force.
  - c. Manual, hydraulic, or chain drive closers: Not permitted.
  - d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
  - e. Cover: Aluminum.
2. Provide units with manual off/auto/hold-open switch, ~~push and go function to activate power operator,~~ vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories, mats, and sensors.
3. Provide drop plates, brackets, or adapters for arms as required to suit details.
4. Provide hard-wired ~~motion sensors and/or~~ actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.
5. ~~Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule~~

~~doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.~~

6. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to power open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, presence detector input, which prevents closed door from opening or door that is fully opened from closing, hold open toggle input, which allows remote activation for indefinite hold open and close second time input is activated, vestibule inputs, which allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

## 2.10 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

- A. A. Manufacturers:
  1. Scheduled Manufacturers: Glynn-Johnson.
  2. Acceptable Manufacturers: No Substitute.
- B. B. Requirements:
  1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
  2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
  3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
  4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

## 2.11 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. A. Manufacturers:
  1. Scheduled Manufacturer: Reese.
  2. Acceptable Manufacturers: National Guard, Zero, Pemko.
- B. B. Requirements:
  1. Provide thresholds by Pemko, Model 1715AK Pemkote or approved equal, weatherstripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
  2. Size of thresholds:
    - a. Saddle Thresholds: 1/2 inch high by jamb width by door width
    - b. Bumper Seal Thresholds: 1/2 inch high by 5 inches wide by door width
  3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

## 2.12 DOOR POSITION SWITCHES

- A. A. Manufacturers:
  1. Scheduled Manufacturer: Schlage.



2. Acceptable Manufacturers: GE-Interlogix, Sargent.

B. B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches between switch and magnetic locking device.

2.13 2.13 FINSHES

A. A. Finish: BHMA 626/652 (US26D); except:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Continuous Hinges: BHMA 630 (US32D)
3. **Push Plates, Pulls, and Push Bars: (US32DMS) Micro Shield coated**
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

2.14 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
  - 1. Replace construction cores with permanent cores as indicated in keying section.
  - 2. Furnish permanent cores to Owner for installation.
- E. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- F. Wiring: Coordinate with Division 26, ELECTRICAL sections for:
  - 1. Conduit, junction boxes and wire pulls.
  - 2. Connections to and from power supplies to electrified hardware.
  - 3. Connections to fire/smoke alarm system and smoke evacuation system.
- G. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect prior to installation.
  - 1. Configuration: Provide one power supply for each door opening with electrified door hardware.
- H. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- I. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- K. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- L. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.3 FIELD QUALITY CONTROL

- A. Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
  - 1. Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

- A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.
- B. Hardware Sets

HARDWARE SET # 01  
FOR USE ON DOOR #(S): 2541A

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2 EA	CONT. HINGE	780-112HD EPT	689	HAG
2 EA	POWER TRANSFER	EPT10	689	VON
1 EA	ELEC PANIC			
	HARDWARE	LX-QEL-XP-9949-LBL-NL-OP	626	VON
1 EA	ELEC PANIC			
	HARDWARE	LX-QEL-XP-9949-LBL-EO-OP	626	VON
1 EA	SFIC RIM HOUSING	80-129	626	SCH
1 EA	PERMANENT CORE SFIC	33K700007 - KEYMARK EXTENDED FACE 7 PIN C.O.D. LOCKSHOP PROVIDED	626	MED
1 EA	DOOR PULL	VR910 DT	630	IVE
1 EA	DOOR PULL	VR910 NL	630	IVE
2 EA	OH STOP FOR ADA OPERATOR	100S	630	GLY
1 EA	SURFACE CLOSER	4040XP EDA	689	LCN
1 EA	AUTO OPERATOR	8100	689	REC
1 EA	FLUSH CEILNG MTG PLT	4040-18G	689	LCN
1 EA	ACTUATOR PKG WALL MT	8310-3857T HARDWIRED AND INTERFACED WITH DEVICE (LX) SWITCH	630	LCN
1 EA	WEATHER RING	8310-801	PLA	LCN
2 EA	DOOR SWEEP	18062WNB	AL	PEM
1 EA	THRESHOLD	1715AK PEMKOTE FINISH	AL	PEM
2 EA	DOOR CONTACT	679-05HM/WD AS REQ.	BLK	SCE
1 EA	POWER SUPPLY	PS904 900-4RL AND #900-BB BOARD WITH BATTERIES	LGR	VON
1 EA	CARD READER	MULLION MOUNT; COORD. W/ COD.	<b>CHARCOAL</b>	HID

\*WEATHER SEALS BY ALUMINUM DOOR MANUFACTURER.

\*CARD ACCESS SYSTEM, READER, WIRING AND CONNECTIONS ARE WITHIN PROJECT SCOPE.

HARDWARE SET # 02

FOR USE ON DOOR #(S): 2541B

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2 EA	CONT. HINGE	780-112HD EPT	689	HAG
2 EA	POWER TRANSFER	EPT10	689	VON
2 EA	ELEC PANIC	QEL-XP-9949-LBL-EO-OP	626	VON
	HARDWARE			
2 EA	DOOR PULL	VR910 DT	630	IVE
2 EA	OH STOP	100S	630	GLY
2 EA	SURFACE CLOSER	4040XP EDA	689	LCN
2 EA	FLUSH CEILNG MTG PLT	4040-18G	689	LCN
2 EA	DOOR SWEEP	18062WNB	AL	PEM
1 EA	THRESHOLD	1715AK PEMKOTE FINISH	AL	PEM
2 EA	DOOR CONTACT	679-05HM/WD AS REQ.	BLK	SCE

\*WEATHER SEALS BY ALUMINUM DOOR MANUFACTURER.

HARDWARE SET # 03

FOR USE ON DOOR #(S): 2541C

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2 EA	CONT. HINGE	780-112HD	689	HAG
2 EA	DUMMY PUSH BAR	330	626	VON
2 EA	DOOR PULL	VR910 DT	630	IVE
<b>2 EA</b>	OH STOP	100S	630	GLY
1 EA	SURFACE CLOSER	4040XP EDA	689	LCN
1 EA	AUTO OPERATOR	8100	689	REC
1 EA	FLUSH CEILING MTG PLT	4040-18G	689	LCN
<b>1 EA</b>	<b>ACTUATOR PACKAGE FOR ADA OPERATORS WITH INDEPENDENT CONTROL AS REQUIRED</b>			

HARDWARE SET # 04

FOR USE ON DOOR #(S): 2541D

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2 EA	CONT. HINGE	780-112HD	689	HAG
2 EA	DUMMY PUSH BAR	330	626	VON
2 EA	DOOR PULL	VR910 DT	630	IVE
2 EA	OH STOP	100S	630	GLY
2 EA	SURFACE CLOSER	4040XP EDA	689	LCN
2 EA	FLUSH CEILNG MTG PLT	4040-18G	689	LCN
<del>1 EA</del>	<del>ACTUATOR PACKAGE FOR ADA OPERATORS WITH INDEPENDENT CONTROL AS REQUIRED</del>			

END OF SECTION 08 71 00

## 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. Exterior and interior manual-swing entrance doors and door-frame units.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
  - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  - 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.
  - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water penetration through fixed glazing and framing areas.
    - e. Failure of operating components.
  - 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- B. Structural Loads:
  1. Wind Loads: As indicated on Drawings.
- C. Deflection of Framing Members: At design wind pressure, as follows:
  1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
- D. Structural: Test according to ASTM E 330 as follows:
  1. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  2. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
  1. Fixed Framing and Glass Area:
    - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
  2. Entrance Doors:
    - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft at a static-air-pressure differential of 1.57 lbf/sq. ft..



- F. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
  - 1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
- G. Energy Performance: Certify and label energy performance according to NFRC as follows:
  - 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.69 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
- H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 MANUFACTURERS

- A. Subject to compliance with requirements, provide Kawneer Toughline stile and rail 500 heavy duty or equal.
- B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

## 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Glazing System: Retained mechanically with gaskets on four sides.
  - 2. Glazing Plane: Front.
  - 3. Finish: Kynar 500 or equal – Bright White to match existing curtain wall.
  - 4. Fabrication Method: Field-fabricated stick system.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Materials:
  - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. Sheet and Plate: ASTM B 209.
    - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
    - d. Structural Profiles: ASTM B 308/B 308M.
  - 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

- a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
- b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
- c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
  1. Door Construction: 2- to 2-1/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
    - a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
  2. Door Design: Wide stile; 5-inch nominal width, 6" mid-rail.
  3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
    - a. Provide nonremovable glazing stops on outside of door.

## 2.5 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.
- D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

## 2.6 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  2. Reinforce members as required to receive fastener threads.
  3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  1. Profiles that are sharp, straight, and free of defects or deformations.
  2. Accurately fitted joints with ends coped or mitered.
  3. Physical and thermal isolation of glazing from framing members.
  4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
  1. At exterior doors, provide compression weather stripping at fixed stops.
  2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
  1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
  2. At exterior doors, provide weather sweeps applied to door bottoms.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.8 ALUMINUM FINISHES

- A. Kynar 500 or equal; Bright White to match existing

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

#### 3.3 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.
  - 3. Fit joints to produce hairline joints free of burrs and distortion.
  - 4. Rigidly secure nonmovement joints.
  - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
  - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
  - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
  - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Section 088000 "Glazing."
- G. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

- H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
  - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
  - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

### 3.4 FIELD QUALITY CONTROL

- A. Field Quality-Control Testing: Perform the following test on exterior aluminum-framed entrances and storefront.
  - 1. Water-Spray Test: Before installation of interior finishes has begun, aluminum framed entrances and storefront must be tested according to AAMA 501.2 and shall not evidence water penetration.
- B. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.5 MAINTENANCE SERVICE

- A. Entrance Door Hardware:
  - 1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.

END OF SECTION 08 41 13

**2018-B0055 Student Resource Center (SRC) Door #2 Entrance Remodel**

**ADDENDUM # 1**

**May 18, 2018**

.....

This signed Addendum is required to be returned with your Bid no later than the due date set forth for this Invitation to Bid. If you have already submitted your Bid, please submit this signed form via email to [purchasing@cod.edu](mailto:purchasing@cod.edu).

You can submit this completed addendum to the Purchasing Office by one of the means below:

***All issued addenda must be signed and returned to the College as per the instructions in the addenda or bid will not be accepted.***

ACKNOWLEDGMENT

You can submit this completed addendum to the Purchasing Office by one of the means below:

1. If you have not yet submitted your bid please sign this addendum and include with your sealed bid.
2. If you have already submitted your bid, please sign and return to the Purchasing office via email at [purchasing@cod.edu](mailto:purchasing@cod.edu) no later than the scheduled bid deadline. We will make sure it accompanies your bid.

You also have the option of withdrawing your bid, if necessary.

ACKNOWLEDGEMENT:

I HAVE RECEIVED THIS ADDENDUM # \_\_\_\_\_

**Company Name:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Authorized Signature:** \_\_\_\_\_

BIDDER: \_\_\_\_\_



COMMUNITY COLLEGE DISTRICT NO. 502

**BID NUMBER: 2018-B0055**

**STUDENT RESOURCE CENTER (SRC) DOOR #2 ENTRANCE REMODEL**

**BIDS DUE: TUESDAY, MAY 22, 2018 AT 11:00 A.M. CENTRAL TIME**  
In the event of College closure due to inclement weather, bid deadline will be extended to the next business day at the same time.

**RETURN BIDS TO: COLLEGE OF DUPAGE  
PURCHASING DEPARTMENT  
BIC BUILDING, ROOM 1B03  
425 FAWELL BLVD.  
GLEN ELLYN, ILLINOIS 60137**

**Issue Date:**

**May 3, 2018**

**ISSUED BY THE COLLEGE OF DUPAGE PURCHASING DEPARTMENT**

**Purchasing Department**

425 Fawell Boulevard  
Glen Ellyn, Illinois 60137-6599  
<http://www.cod.edu>

PHONE (630) 942-2217

May 3, 2018

**INVITATION TO BID**

Sealed bids for **Student Resource Center (SRC) Door #2 Entrance Remodel** will be received by the College of DuPage, District 502, at the office of the Purchasing Manager, Berg Instructional Center (BIC) Building, Room 1B03, 425 Fawell Blvd., Glen Ellyn, IL 60137, until **11:00 a.m. Central Time, Tuesday, May 22, 2018**, at which time they will be publicly opened. In the event of College closure due to inclement weather, bid deadline will be extended to the next business day at the same time.

A pre-bid meeting has been scheduled for **Monday, May 14, 2018 at 11:00 a.m.** in the Purchasing Office, BIC 1B03 at 425 Fawell Blvd., Glen Ellyn, IL. 60137. A site visit will immediately follow. The pre-bid conference is not mandatory, but highly recommended.

Any bid received after the date and time stated above will be returned unopened. College of DuPage shall not be responsible for bids that are not received at the specific office location indicated above by the stated deadline. Failure by a delivery service company or person to meet the deadline will not excuse the Respondent from the deadline requirement. It is solely, the bidder's responsibility, to ensure that adequate time is allowed for timely and accurate delivery.

Prices offered shall be F.O.B. Destination, College of DuPage, 425 Fawell Blvd., Glen Ellyn, IL 60137. Prices must be firm. No bids will be accepted on the basis of a price prevailing at the time of shipment.

The award(s) of the contract will be made to the lowest responsible and qualified bidder whose bid complies with all the requirements prescribed. Brand or trade names in bid specifications are used for identification purpose only.

Respondents may download the Bid in addition and any future addenda from the College's Purchasing website at the following URL address: <http://cod.edu/about/purchasing/requests/index.aspx>.

No bid shall be withdrawn for a period of ninety (90) days after the bid opening date without the consent of the College.



**LEGAL NOTICE**

**BID NOTICE**

**No. 2018-B0055**

The College of DuPage is accepting sealed bids for **Student Resource Center (SRC) Door #2 Entrance Remodel**. Bid documents may be downloaded from the Purchasing Website at [www.cod.edu/about/purchasing/requests](http://www.cod.edu/about/purchasing/requests) by clicking on the link for this bid and following the instructions.

Bids are due to the College of DuPage Purchasing Department in the Berg Instructional Center (BIC) Building, Room 1B03, 425 Fawell Blvd., Glen Ellyn, IL 60137 up to and no later than **11:00 a.m. Central Time, Tuesday, May 22, 2018**, at which time they will publicly opened.

**A Bid Security in the form of a bid bond, cashier's check or certified check in the amount of 10% of the total base bid is required for this project.**

A pre-bid conference and site visit is scheduled for **Monday, May 14, 2018 at 11:00 a.m.** in the Purchasing Office, BIC 1B03 at 425 Fawell Blvd, Glen Ellyn IL 60137. A site visit will immediately follow. The pre-bid conference is not mandatory, but highly recommended.

The College of DuPage is committed to the economic development of disadvantaged business enterprises; qualified Minority, Women, and Persons with Disabilities Owned Businesses are highly encouraged to participate

College of DuPage Board of Trustees Reserves the right to reject any and all responses. This invitation is issued in the name of the Board of Trustees of College of DuPage, Community College District 502, Glen Ellyn, Illinois.

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## BID SUBMISSION CHECKLIST

### Things to Remember When Submitting a Response to an Invitation to Bid for the College of DuPage

1.  **Read the *entire* document.** In your review, note critical items such as: blackout period, required goods and services, submittal dates, submission requirements, etc.
2.  **Note the contact information provided.** The Purchasing Office Buyer at [purchasing@cod.edu](mailto:purchasing@cod.edu) is the single point of contact for this Invitation to Bid and is the only person with whom you are allowed to communicate regarding this bid. This person is an excellent source of information for any questions you may have.
3.  **Take advantage of the “question and answer” period.** Submit your questions to the Purchasing Department by the date in the Invitation to Bid and view the answers given in the formal addenda issued for the Invitation to Bid. All addenda issued for an Invitation to Bid will be emailed to each company that downloaded the bid documents and will include all questions asked and answered concerning the Invitation to Bid. Please ensure when downloading the bid documents, you use a valid email address.
4.  **Do not alter, add to, or delete and part of the Bid documents without prior approval.** Please refer to the section titled *Exceptions* for instruction on how to request a deviation to the original Invitation to Bid.
5.  **Ensure all Addenda are signed.** Before submitting your response, check the College Purchasing website at <http://www.cod.edu/about/purchasing/requests/index.aspx> to see whether any addenda were issued for this Bid request. If so, you must submit a signed copy of the addenda along with your bid response.
6.  **Review and read the bid document again to make sure you have addressed all requirements.**
  - \*Your original response and the requested electronic copy (flash drive) must be identical and be complete.
  - \*Bids will not be accepted if Sections 6, 7, and 8 are not completed. (Please note there are two (2) signature lines in Section 8 that must be signed.)
  - \*If your company is a Certified Women-Owned, Minority-owned, or Persons with Disability-owned business, please include a copy of any and all certifications.
7.  **Submit your response on time.** Note the date and time listed on the front page of the Invitation to Bid and be sure to submit all required items on time. Late responses will not be accepted and will be returned, unopened. Ensure the box (s) containing your proposal is appropriately labeled. Please allow adequate time for delivery to the Purchasing Department.
8.  **Important dates to know:**
  - Bid Publication Date – 5/3/18
  - Pre-Bid Meeting – 5/14/18 at 11:00 a.m. Central Time
  - Questions Due – 5/15/18 by 12:00 p.m. Central Time
  - Bids Due – 5/22/18 at 11:00 a.m. Central Time
  - Target Board Approval Date – 6/21/18

## 1.0 GENERAL INFORMATION

### 1.1 DEFINITIONS

- A. **BIDDER** shall mean the individual or business entity submitting a Bid to supply any or all of the services or goods required by the Bid Documents.
- B. **BID** shall mean the Bid Documents as completed by the Bidder which constitutes the Bidder's offer.
- C. **CONTRACT** shall mean the agreement between the College and Contractor as set forth in the Bid Documents and as awarded by the College of DuPage Board of Trustees.
- D. **BID DOCUMENTS** shall mean collectively the Instructions to Bidders, General Conditions, Special Conditions, Specifications, Attachments, and Addenda, if any, Bid, Site Inspection Certificate, Contractor Certifications and Forms for Minority Participation. The above documents shall be considered as one integrated document setting forth the obligations of the parties.
- E. **CONTRACTOR** shall mean the individual or business entity submitting a Bid and to whom the College of DuPage Board of Trustees awards the Contract.
- F. **COLLEGE** shall mean the College of DuPage, Community College District No. 502, a body politic and corporate of the State of Illinois.
- G. **DIRECTOR** shall mean the person or persons authorized by the College to act in connection with this Contract. Such authorization shall not include any power to change the scope of the Contract or to obligate the College to pay additional sums beyond the amount of the Contract awarded by the College of DuPage Board of Trustees.
- H. **PURCHASING MANAGER** shall mean the Purchasing Manager of the College of DuPage.
- I. **SPECIFICATIONS** shall mean the description of the required services, Contract Goods, equipment, personnel, volume and use statistics and all requirements for the scope of work set forth in the Bid Documents.

### 1.2 BIDS TO CONFORM TO REQUIREMENTS OF LEGAL ADVERTISING

The College will not entertain or consider any Bid responses: (i) received after the exact time specified in the legal advertisements; (ii) not accompanied by the required bid deposit/bond, if required; or (iii) in any other way failing to comply fully with the conditions stated in the legal advertisement.

### 1.3 COMPLIANCE

Submissions under this Invitation to Bid shall be for items at least equal to or better than the quality and performance characteristics stated herein. The burden of proof that product and services meet specifications shall be documented by the bidder and be provided as part of the submitted bid. Failure to provide complete documentation of the product compliance with specifications required may result in bid rejection.

### 1.4 COMPLIANCE WITH LAWS - PUBLIC CONTRACTS

This Contract is a competitively bid public contract of the College of DuPage subject to laws and ordinances governing public contracts. The Bidder shall at all times observe and comply with all laws, ordinances, regulations and codes of the Federal, State and other local government agencies which may in any manner affect the preparation of the Bid or the performance of the Contract. If the Bidder observes that any of the Bid Documents are at variance therewith, it shall promptly notify the Purchasing Manager in writing and necessary changes shall be effected by appropriate modification.

### 1.5 REGULATIONS

The Contractor or Subcontractor, warrants that they are familiar with and they shall comply with all Federal, State, and Local Laws, statutes, ordinances, rules and regulations and the orders and decrees of any courts or administrative bodies or tribunals in any manner affecting the performance of the Contract, including, without limitation, Workmen's Compensation Laws, minimum salary and wage statutes and regulations, laws with respect to permits and licenses and fees in connection therewith, laws regarding maximum working hours and regulations with respect to use of explosives. No plea of misunderstanding or ignorance thereof will be considered. Whenever required, the Contractor, or Subcontractor, shall furnish the college with satisfactory proof of compliance with said Federal, State and Local Laws, statutes, ordinances, rules, regulations, orders, and decrees.

## **1.6 BID MODIFICATIONS**

Unless indicated, it is understood that bids are in strict accordance with specification requirements. Bids shall be deemed final, conclusive, and irrevocable. No bid shall be subject to correction or amendment for any error or miscalculation. Bid prices shall include cost of materials as specified, any applicable discounts and shipping. Installation costs shall be included only when indicated on page one. Installation shall include, but is not limited to, all assembly required, setting in place, and mounting all materials at various campus locations.

## **1.7 PRICES FIRM**

All prices quoted in the Bid shall be firm and will not be subject to increase during the term of the Contract awarded to the Contractor, except as otherwise provided in the Bid Documents.

## **1.8 AWARD OF CONTRACT**

The award of the contract will be made within ninety (90) calendar days after the opening of bids to the lowest responsible and qualified bidder whose bid complies with all the requirements prescribed. The successful bidder will be notified by electronic mail that their bid has been accepted and that they have been awarded the contract. Notification will also be posted on the College's Purchasing website at <http://www.cod.edu/about/purchasing/>. Failure to execute performance as per accepted bid may result in legal action by the College of DuPage to recover damages.

If a contract is not awarded within ninety (90) days after the opening of bids, a bidder may file a written request with the Purchasing Manager on the withdrawal of their bid and the Purchasing Manager will permit such withdrawal.

The bid security (if required) of all except the three (3) low bidders will be returned promptly after the bids have been checked, tabulated, and the relation of the bids established. Bid security of the three (3) lowest bidders, if required in legal notice, will be returned as soon as the contract and the bond of the successful bidder have been promptly executed and approved. If contracts cannot be awarded promptly, the College may permit the three (3) lowest bidders to substitute bid bonds for bank cashier's checks, bank drafts or certified checks submitted with their bids. Bid bonds executed by corporate surety companies shall be satisfactory to the Owner, but such substitution shall not be made until a period of fifteen (15) days has elapsed after the date of opening of bids and bond forms furnished by the College shall be used.

## **1.9 CONSIDERATION OF BIDS**

The College reserves the right to reject or accept any or all Bid responses, to extend the bidding period, to waive technicalities in the documents and/or to direct that the project be abandoned or rebid prior to award of the Contract.

## **1.10 COMPETENCY OF BIDDER**

No Bid will be accepted from or Contract awarded to a Bidder that is in arrears or is in default to the College upon any debt or Contract, or that is a defaulter, as surety or otherwise upon any obligation to said College, or has failed to perform faithfully any previous contract with the College.

### **1.11 BIDDER WARRANTIES**

The submission of a Bid shall constitute a warranty that: (i) Bidder has carefully and thoroughly reviewed the Bid Documents and has found them complete and free from ambiguities and sufficient to describe the Contract work; (ii) Bidder and all workmen and/or employees it intends to use in the performance of this Contract are skilled and experienced in the type of work or services called for by the Bid Documents; and (iii) neither the Bidder nor any of its employees, agents, suppliers or subcontractors have relied on any verbal representations from the College, or any of the College's employees, agents, or consultants, in preparing the Bid.

### **1.12 PAYMENT TERMS**

All invoices must be provided to the College for services rendered directly to the College. Undisputed invoices will be paid within sixty (60) days of receipt of properly submitted invoices to the Contractor, in accordance with the Local Government Prompt Payment Act.

### **1.13 PAYMENT REMITTANCE**

All College vendors are required to receive payment from the College via an Automated Clearing House (ACH) transfer. Instructions to register for ACH payments will be sent, upon request, to successful bidders. Failure to comply with the ACH requirements may result in termination of the contract or purchase order. College ACH transfers typically occur the third week of each month. Invoices must be received at least 3 weeks prior to each ACH payment release. You are strongly encouraged to set up your account upon notice of award to avoid a delay payment.

### **1.14 CASH BILLING DISCOUNTS**

Cash billing or percentage discounts for payment will not be considered in evaluating Bids.

### **1.15 LOCAL BUSINESS PREFERENCE**

When two (2) or more responsible bidders submit the same low bid, the contract award will be determined by drawing lots in a public meeting unless one bidder is a local bidder within the District boundaries and one is a non-local bidder, in which event the local bidder will be awarded the contract.

### **1.16 EQUAL EMPLOYMENT OPPORTUNITY**

In the hiring of employees for the performance of work under the Contract and any subcontract thereunder, no Contractor or Subcontractor shall, by reason of race, color, sex, religion, national origin, ancestry, age, marital status, disability, unfavorable military discharge or sexual orientation discriminate against any citizen of the United States, in the employment of Labor or workers, who are qualified and available to perform work to which the employment is related. Neither shall any Contractor or Subcontractor, or any person on behalf of either, discriminate against or intimidate any employee hired for the performance of work under this Contract on account of race, color, sex, religion, national origin, ancestry, age, marital status, disability, unfavorable military discharge or sexual orientation.

### **1.17 TAX EXEMPTION**

College of DuPage District #502 is exempt from Federal, State and Municipal taxes. Exemption certificates will be furnished upon request.

### **1.18 HOLD HARMLESS CLAUSE**

The Respondent agrees to indemnify, hold harmless and defend College of DuPage, its agents, servants, and employees, and each of them against, and hold it and them harmless from, any and all lawsuits, claims, demands, liabilities, losses and expenses, including court costs and attorney's fees, for or on account of any injury to any person, or any death at any time resulting from such injury, or any damage to property, which may arise or which may be alleged to have arisen out of or in connection with the work covered by this contract.

## 1.19 CONTRACTORS LIABILITY INSURANCE

The Contractor shall not commence work under this contract until all insurance required herein is obtained and approved by the Owner. Nor shall the Contractor allow any subcontractor to commence work until all similar insurance required of the subcontractor has been so obtained.

The Contractor shall furnish the College of DuPage with a Certificate of Insurance, with College of DuPage, its trustees, officers, agents, employees, and any other parties designated by COD named as an additional insured for Commercial General and Automobile Liability, showing the minimum coverage indicated below. Insurance companies must have a Best Rating of at least A VI and otherwise be acceptable to the College. Workers' compensation insurance shall include a waiver of subrogation in favor of the College of DuPage. The College will also be shown as the certificate holder. Further, the Certificate of Insurance shall state that coverage provided is primary to any other coverage available to College of DuPage. An endorsement page showing coverage must accompany the certificate of insurance. The foregoing certificate shall contain a provision that coverage afforded under the policies will not be cancelled or non-renewed until at least sixty (60) days prior written notice has been given to College of DuPage.

### TYPE OF INSURANCE

### MINIMUM INSURANCE COVERAGE

Combined Single Limit Per Occurrence/Aggregate

#### **Commercial General Liability** including:

- |   |                           |
|---|---------------------------|
| 1. Premises – Operations                      | \$1,000,000 / \$2,000,000 |
| 2. Explosion, Underground and Collapse Hazard |                           |
| 3. Products/Completed Operations              |                           |
| 4. Contractual Insurance                      |                           |
| 5. Broad Form Property Damage                 |                           |
| 6. Independent Contractors                    |                           |
| 7. Bodily Injury                              |                           |

#### **Automobile Liability**

Owned, Non-owned, or Rented	\$1,000,000 / \$2,000,000
-----------------------------	---------------------------

<b>Workers' Compensation and Employers' Liability</b>	As Required by Applicable Laws
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<b>Professional Liability</b>	If Performance Specifications are Required by the Contract
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## 1.20 PREVAILING WAGE ACT

When applicable, and as a condition of receiving payment, Contractor must pay its employees prevailing wages in the locality in which the work is to be performed as establish for Public Works (construction and maintenance of a public work) prevailing wage and other requirements under Contract for Public Workers 820 ILCS 130/4. When required by the College Contractor shall provide a copy of the certified payroll on request. Contractor is responsible for contacting the Illinois Department of Labor to ensure understanding of prevailing wage requirements.

The prevailing rates of wages are determined by the Illinois Department of Labor and are available on the Department's official website: <http://www.illinois.gov/idol/Laws- Rules/CONMED/Pages/prevaling-wage-rates.aspx>. The College of DuPage has adopted the resolution regarding the prevailing wage rates for DuPage County in accordance with Illinois Prevailing Wage Act and are available the College's website: [http://www.cod.edu/about/purchasing/illinois\\_prevaling\\_wage\\_act.aspx](http://www.cod.edu/about/purchasing/illinois_prevaling_wage_act.aspx).

## 1.21 BUSINESS ENTERPRISE PROGRAM

The College of DuPage encourages the participation of qualified minorities, females, and persons with disabilities owned businesses in public contracts. It is the practice of the College to ensure full and equitable economic opportunities to persons and businesses that compete for business with the College of DuPage, including minorities, females, and persons with disabilities owned business enterprises. The College is committed to the economic development of disadvantaged business enterprises and the

award of contracts to businesses owned by minorities, females, and persons with disabilities for services to the extent provided by the Business Enterprise for Minorities, Females and Persons with Disabilities Act ("Act"), 30 ILCS 575.

**END OF SECTION**



## 2.0 INSTRUCTIONS TO BIDDERS

### 2.1 OUTSIDE DOCUMENT DISCLAIMER

The College of DuPage cannot warrant, represent, or guarantee the accuracy or completeness of documents which have not been obtained directly from the College. If you have obtained these documents from a third party source, the College is not responsible for any loss or damage including, but not limited to, time, money, or goodwill arising from errors, inaccuracies or omissions in any third party bid documents.

To obtain official documents, please visit: <https://www.cod.edu/about/purchasing/requests/index.aspx> . Click on the link for this project, and follow the prompts to enter your information onto our vendor list and download the original documents. This will ensure your contact information is registered on our vendor list, and we can send you any addenda that may be issued. This website is the only official website for prospective bidders to obtain digital copies of bid documents. It is the responsibility of each prospective bidder to verify the completeness of their printed bid documents before submitting a bid and accompanying executed addenda acknowledgement, and other required forms.

### 2.2 BLACKOUT PERIOD

Under no circumstances are respondents to contact or discuss this Invitation to Bid, or any of the information contained herein or about this project in general, with any College of DuPage trustee, employee, vendor, contractor or subcontractor, other than using the methods outlined in this bid. Respondents are strictly forbidden from visiting the College's locations or approaching any College trustee, employee, vendor, contractor or subcontractor for any information related to this Invitation to Bid or this project without the direct knowledge and authorization in writing in advance from the Purchasing Manager or Buyer. Violation of these provisions may subject the respondent to immediate disqualification.

### Initial your understanding of this requirement

### 2.3 REQUESTS FOR INFORMATION/CLARIFICATION

If any firm submitting a bid for this project is in doubt as to the true meaning of the specifications or other documents or any part thereof, bidder shall request clarification from the Purchasing Department. Questions must be submitted in writing and be directed via email to the Purchasing Department at [purchasing@cod.edu](mailto:purchasing@cod.edu) no later than **Wednesday, May 15, 2018 at 12:00 p.m. Central Time**. Questions for which answers are provided will be communicated to all registered recipients of bid documents via addendum. All issued addenda must be signed and returned to the College as per the instructions in the addenda or bid will not be accepted.

### 2.4 PRE-BID MEETING

The College will hold a Pre-Bid Meeting at the College of DuPage, Glen Ellyn Campus, 425 Fawell Blvd, Berg Instructional Center, Room 1B03A, Glen Ellyn, IL at **11:00 a.m. Central Time on Monday, May 14, 2018**. All parties interested in responding to the BID are urged to attend in person. The College will clarify the objectives of the BID and answer questions during the Pre-Bid Meeting.

### 2.5 BID DEADLINE AND SUBMISSION

To be assured of consideration, Bids must be received by the College of DuPage in the College's in Purchasing Department, BIC-1B03, no later than **11:00 a.m. Central Time on Tuesday, May 22, 2018**. Failure by a delivery service company or person to meet the deadline will not excuse the Bidder from the deadline requirement. It is solely the Bidder's responsibility to ensure that adequate time is allowed for timely, accurate delivery and that the Bid is received as required.

All Bidders shall submit:

One (1) *sealed* original copy of the Bid and one flash drive containing all completed documents

Bids must be in a sealed envelope and delivered to:

Purchasing Manager  
College of DuPage  
BIC Building - Room 1B03  
425 Fawell Blvd.  
Glen Ellyn, Illinois 60137

**ATTN: Bid No. 2018-B0055**

Bids must be received by the date and hour of the Bid Opening as shown in the legal advertisement. The sealed envelope submitted by the Bidder shall carry the following information on the face of the envelope: Bidder's name, address, Bid Notice Number, advertised date of Bid Opening and the hour designated for Bid Opening as shown in the legal advertisement. Unless otherwise stated, all blank spaces on the bid forms shall be fully completed. Bidder bears all responsibility for error or omissions in the submission of the Bid.

## **2.6 EXCEPTIONS**

If any Respondent intends to take any deviations or exceptions from the Specifications or other bid Documents, Respondent shall submit to the Purchasing Manager/Buyer a written request for a deviation or exception at least 5 business days prior to the date and time of advertised bid opening date. If the Project Manager considers such deviation or exception acceptable, the Purchasing Manager/Buyer shall issue an Addendum setting forth such deviation or exception from the Specifications or other which shall be applicable to all Respondents submitting a response.

If no Addendum is issued by the Purchasing Manager/Buyer, then such deviation or exception shall be deemed rejected.

The College may reject any response containing deviations or exceptions not previously accepted through a written Addendum. A copy of such Addendum will be e-mailed or delivered to each Respondent receiving a set of such bid Documents. Respondent shall acknowledge receipt of each Addendum issued in the space provided on the bid form or via a signed addendum. Failure to acknowledge receipt of addenda may result in disqualification of the Bid. All written requests for deviations or exceptions shall be sent to [purchasing@cod.edu](mailto:purchasing@cod.edu).

## **Initial understanding of this requirement:**

## **2.7 ERROR IN BID**

Where a bidder claims to have made a mistake, such mistake must be called to the attention of the Purchasing Manager within twenty-four (24) hours after the opening of bids. Within forty-eight (48) hours of the bid opening, bidder shall submit to the College's designated contracting officer original documentary evidence and a detailed explanation of how the mistake was made. Failure to conform to this requirement precludes the bidder from withdrawing its bid based upon a bid mistake. If such notice, proof and explanations have been tendered, and the contracting officer is convinced that a bona fide mistake has been made, the contracting officer may recommend to the Board of Trustees that the bidder be allowed to withdraw its bid and recommend that the bid be awarded to the next lowest responsible, responsive bidder. If the Board determines by majority vote, that the bidder has made a bona fide error, no award will be made upon such bid and the bid security will be returned.

## **2.8 WITHDRAWAL OF BIDS**

Bidders may withdraw their Bids at any time prior to the time specified in the legal advertisement as the date and hour set for the Bid Opening. However, no Bidder shall withdraw, cancel or modify its Bid response for a period of ninety (90) calendar days after said advertised Bid Opening.

## **2.9 NOTICES**

All communications and notices between the College and Bidders regarding the Bid Documents shall be in writing and hand delivered or delivered via United States mail, postage prepaid, or via email. Notices to the Bidders shall be addressed to the name and address or email address provided by the Bidders; notices

to the Purchasing Manager shall be addressed to Purchasing Department, College of DuPage, BIC Building - Room 1B03, 425 Fawell Blvd., Glen Ellyn, Illinois 60137, or [purchasing@cod.edu](mailto:purchasing@cod.edu).

## **2.10 BID DEPOSIT**

When required in the legal advertisement, the Bid shall be accompanied by cashier's check, certified check or surety bond in the amount shown in the legal advertisement or as may be prescribed in these Bid Documents. A certified or cashier's check shall be drawn on a responsible bank doing business in the United States and shall be made payable to the order of the College of DuPage. The Surety issuing the bond must have a general rating of "A", and shall be a Class V or higher in the financial size category as defined by Best's Key Rating Guide - Property and Casualty. Failure to submit the bid deposit shall constitute an informal Bid and such Bid shall be rejected.

The Bidder hereby agrees that the bid deposit shall be forfeited to the College as liquidated damages and not as penalty in the event Bidder fails to comply with the terms of this invitation to bid, or otherwise fails or refuses to honor the Bid upon award of the Contract by the College.

The bid deposit of all bidders will be returned, with the exception of the winning Contractor, after the College has awarded the Contract. The bid deposit of the Contractor will be returned after the Contract has been awarded and the Contractor has submitted all insurance documentation and the Performance and Payment Bond, as required by the Bid Documents.

**\*This project requires a bid deposit in the amount of 10% of the total base bid.**

## **2.11 PERFORMANCE AND PAYMENT BOND**

The successful Bidder shall furnish a Performance and Payment Bond in the full amount of the Contract on the College Bid Form, a specimen of which is provided herein. The Surety issuing the Performance and Payment Bond must have a general rating of "A" and shall be a Class V or higher in the financial size category as defined by Best's Key Rating Guide-Property and Casualty.

In the event that the Bidder fails to furnish the Performance and Payment Bond within fourteen (14) calendar days after service of the Notice of Award, the College may elect to retain Bidder's bid deposit as liquidated damages and not as a penalty and the Contract may be terminated. The parties agree that the sum of the bid deposit is a fair estimate of the amount of damages that the College will sustain due to the Bidder's failure to furnish the Performance and Payment Bond and the termination of the Contract.

**END OF SECTION**

### **3.0 BID SPECIFICATIONS**

#### **3.1 SCOPE OF WORK**

Scope of work shall include but not limited to:

The contractor and /or his sub-subcontractor (s) shall provide all labor, material, equipment and supervision necessary, incidental or reasonably inferred to complete all items for this scope of work and related work in accordance with this Exhibit "A" specifications and Exhibit "B" conceptual drawings.

It is understood that the drawings and specification are documents which indicate the general scope of the project and as such, the drawings and specifications do not necessarily indicate or describe all "Work" required for the full performance and completion of the work. Contractor/subcontractor is to furnish and install all items required for the proper completion of his work without adjustment to the Contract and / or his subcontractor's price.

This project includes installation of new site work, storefront system and vestibule. The contractor is responsible for providing all required new equipment and related parts, including all freight, labor, equipment, materials and supplies, coordination of all work, construction management, and supervision required for a complete turnkey installation for the Owner. This includes all purchasing, delivery, and installation of the new designed entrance system and related parts, equipment, tools, and materials, removal and disposal of the old storefront system, project management and coordination, general, electrical and mechanical construction.

All work shall be completed in a professional manner by a knowledgeable contractor who is familiar with this type of work and installation.

1. The work consists of providing all materials and labor to fully execute the project per plans and specifications. Also provide any related parts, labor, materials, lifts, tools, equipment, and supervision required for the removal, replacement and disposal of the complete entry system.
2. This contractor is responsible for any fencing, handrails, temporary enclosures, and scaffolding required for accessibility and/or safety measure during the construction phase.
3. The contractor is responsible for the performance and overseeing of all work required as outlined within the contract documents. This includes, but is not limited to mechanical construction, electrical construction, site work, general construction, and all other work required for this project.
4. This contractor is responsible to verify all site conditions, existing equipment supports and field measurements in connection with the work, notifying the College Project Manager in writing of any discrepancies prior to the fabrication or commencement of installation of any work.
5. This contractor will have attended site walk through to understand the scope of work and acknowledges the work needed to complete the installation of work.
6. This contractor shall coordinate with onsite manager for all work to be completed.
7. This contractor shall keep the site area clear of any debris during the installation of their work.
8. A punch list walk through will be completed with the Colleges Project Manager after the contractor indicated he is substantially complete. The contractor will have 10 business days to complete his punch list.
9. All materials shall be new and in manufacture's original, unopened containers.

### **3.2 SUPPLEMENTAL GENERAL CONDITIONS**

1. All Work is to be performed during normal project working hours. Days / Hours of operation are as follows: Monday through Friday, 7:00 am –3:30 pm. Request for Overtime or Weekend or Holiday work hours is to be reviewed / approved by College of DuPage project manager.
2. This contractor shall also provide on separate cover all suppliers and subcontractors with contact information and approximate values before the first pay application. Subcontractor and supplier lien waivers will be required for each payment application.
3. This contractor shall perform all work, per local union agreements, or per Illinois Prevailing wage. This contractor shall provide appropriate labor forces necessary for performing its work and clean-up of its work.
4. This contractor shall prohibit any of their employees to work on campus who have been convicted of violent crimes or have outstanding criminal warrants.
5. This contractor shall comply with all parking regulations and shall park their vehicles in authorized areas only. This contractor shall advise the College Project Manager if certain parking areas are to be blocked off to perform their work 72 hrs. Prior to installation.
6. College of DuPage students, faculty, and staff are not to be disturbed or in any way disrupted in their responsibilities. Contraction personnel are to refrain from any unsavory or unwanted comments toward students, faculty, staff and visitors to campus.
7. College of DuPage is a non-smoking campus. The use of tobacco products is prohibited on campus.

### **3.3 CLOSE-OUT & WARRANTY REQUIREMENTS**

Provide (3) Copies of Manufacturer's Warranty Documentation, O&M Manuals, and Parts List for all components new SRC Door #1 entrance system.

**END OF SECTION**

**4.0 BID FORM**

**SRC Door #2 Entrance Remodel**

***Schedule of Prices***

Bidder to furnish all labor, materials, equipment and services as required to satisfactorily complete all work described herein as required for the work and completion of the project.

<b>Item</b>	<b>Item Description</b>	<b>Qty</b>	<b>Unit of Measure</b>	<b>Total Price</b>
1	All materials and labor to fully execute project per plans and specifications	1	Ea.	
2	Performance Bond Cost	1	Ea.	
<b><u>TOTAL BID PRICE</u></b>				
Bidder received exhibits "A and B"				Yes / No

Submitted by: \_\_\_\_\_ (printed)

Submitted by: \_\_\_\_\_ (signed)

**END OF SECTION**

## 5.0 BUSINESS ENTERPRISE PROGRAM

### STATE OF ILLINOIS BUSINESS ENTERPRISE PROGRAM MINORITIES, FEMALES, PERSONS WITH DISABILITY PARTICIPATION AND UTILIZATION PLAN

The Business Enterprise for Minorities, Females and Persons with Disabilities Act (BEP) establishes a goal for community colleges contracting with businesses that have been certified as owned and controlled by persons who are minorities (MBE), female (FBE/ also referred to as WBE), or persons with disabilities (PDBE) (collectively, BEP certified vendor(s)). 30 ILCS 575

**Contract Goal to be Achieved by Vendor:** This solicitation includes a specific **BEP** participation goal of 20% based on the availability of BEP certified vendors to perform or provide the anticipated services and/or supplies required by this solicitation.

**The BEP participation goal is applicable to all bids or offers.** In addition to the award criteria established for this solicitation, the College will award this contract to a Vendor that meets the goal or demonstrates good faith efforts to meet the goal. This goal is applicable to change orders and allowances within the scope of work provided by the BEP certified vendors. If Vendor is an MBE and FBE certified vendor, the entire goal is met and no subcontracting with a BEP certified vendors is required; however, **Vendor must submit a Utilization Plan indicating that the goal will be met by self-performance.**

Following are guidelines for Vendor's completion of the Utilization Plan. The Utilization Plan must demonstrate that Vendor has either: (1) met the entire contract goal; or (2) made good faith efforts towards meeting the goal.

At the time of bid or offer, Vendor, or Vendor's proposed Subcontractor, must be certified with the Illinois Department of Central Management Services as a BEP certified vendor.

Failure to complete a Utilization Plan or provide Good Faith Effort documentation shall render the bid or offer non-responsive; and subject to rejection and/or disqualification in the College's sole discretion.

1. If applicable where there is more than one prime vendor, the Utilization Plan should include an executed Joint Venture Agreement specifying the terms and conditions of the relationship between the parties and their relationship and responsibilities to the contract. The Joint Venture Agreement must clearly evidence that the BEP certified vendor will be responsible for a clearly defined portion of the work and that its responsibilities, risks, profits and contributions of capital, and personnel are proportionate to its ownership percentage. It must include specific details related to the parties' contributions of capital, personnel, and equipment and share of the costs of insurance and other items; the scopes to be performed by the BEP certified vendor under its supervision; and the commitment of management, supervisory personnel, and operative personnel employed by the BEP certified vendor to be dedicated to the performance of the contract. Established Joint Venture Agreements will only be credited toward BEP goal achievements for specific work performed by the BEP certified vendor. **Each party to the Joint Venture Agreement must execute the bid or offer prior to submission of the bid or offer to the College.**
2. An agreement between a vendor and a BEP certified vendor in which a BEP certified vendor promises not to provide subcontracting or pricing quotations to other vendors is prohibited. The College may

request additional information to demonstrate compliance. Vendor agrees to cooperate promptly with the College in submitting to interviews, allowing entry to places of business, providing further documentation, and to soliciting the cooperation of a proposed BEP certified vendor. Failure to cooperate by Vendor and BEP certified vendor may render the bidder or offeror non-responsive or not responsible. **The contract will not be awarded to Vendor unless Vendor's Utilization Plan is approved by the College.**

3. **BEP Certified Vendor Locator References:** Vendor may consult CMS' BEP Vendor Directory at [www.sell2.illinois.gov/cms/business](http://www.sell2.illinois.gov/cms/business), as well as the directories of other certifying agencies, but firms **must be certified with CMS as BEP certified vendors at the time of bid or offer.**
4. **Vendor Assurance:** Vendor shall not discriminate on the basis of race, color, national origin, sexual orientation or sex in the performance of this contract. Failure by Vendor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the College deems appropriate. This assurance must be included in each subcontract that Vendor signs with a subcontractor or supplier.
5. **Calculating BEP Certified Vendor Participation:** The Utilization Plan documents work anticipated to be performed, or goods/equipment provided by all BEP certified vendors and paid for upon satisfactory completion/delivery. Only the value of payments made for the work actually performed by BEP certified vendors, by subcontractors or suppliers to such vendors, is counted toward the contract goal. Applicable guidelines for counting payments attributable to contract goals are summarized below:
  - 5.1 The value of the work actually performed or goods/equipment provided by the BEP certified vendor shall be counted towards the goal. The entire amount of that portion of the contract that is performed by the BEP certified vendor, including supplies purchased or equipment leased by the BEP certified vendor shall be counted, except supplies purchased and equipment rented from the Prime Vendor submitting this bid or offer.
  - 5.2 A vendor shall count the portion of the total dollar value of the BEP contract equal to the distinct, clearly defined portion of the work of the contract that the BEP certified vendor performs toward the goal. A vendor shall also count the dollar value of work subcontracted to other BEP certified vendor. Work performed by the non- BEP certified party shall not be counted toward the goal. **Work that a BEP certified vendor subcontracts to a non-BEP certified vendor will not count towards the goal.**
  - 5.3 A Vendor shall count toward the goal 100% of its expenditures for materials and supplies required under the contract and obtained from a BEP certified vendor manufacturer, BEP certified regular dealer, or BEP certified supplier. A Vendor shall count toward the goal the following expenditures to BEP certified vendors that are not manufacturers, regular dealers, or suppliers:
    - 5.3.1 The fees or commissions charged for providing a bona fide service, such as professional, technical, consultant or managerial services and assistance in the procurement of essential personnel, facilities, equipment, materials or supplies required for performance of the contract, provided that the fee or commission is determined by College to be reasonable and not excessive as compared with fees customarily allowed for similar services.





or offer submission. Copies of subcontract documents and/or Letters of Intent shall be due upon request.

7. **Contract Compliance:** Compliance with this section is an essential part of the contract. The following administrative procedures and remedies govern Vendor's compliance with the contractual obligations established by the Utilization Plan. **After approval of the Plan and award of the contract, the Utilization Plan becomes part of the contract.** If Vendor did not succeed in obtaining BEP certified vendor participation to achieve the goal and the Utilization Plan was approved and contract awarded based upon a determination of good faith, the total dollar value of BEP certified vendor work calculated in the approved Utilization Plan as a percentage of the awarded contract value shall become the contract goal.
  - 7.1. The Utilization Plan may not be amended after contract execution without the College's prior written approval.
  - 7.2. **Vendor may not make changes to its contractual BEP certified vendor commitments or substitute BEP certified vendors without the prior written approval of the College.** Unauthorized changes or substitutions, including performing the work designated for a BEP certified vendor with Vendor's own forces, shall be a violation of the utilization plan and a breach of the contract, and shall be cause to terminate the contract, and/or seek other contract remedies or sanctions.
  - 7.3. If it becomes necessary to substitute a BEP certified vendor or otherwise change the Utilization Plan, Vendor must notify the College in writing of the request to substitute a BEP certified vendor or otherwise change the Utilization Plan. The request must state specific reasons for the substitution or change. The College shall notify the Council or its delegate of the request to substitute a BEP certified vendor or change the Utilization Plan. The College reserves the right to approve or deny a request for substitution or other change in the Utilization Plan.
  - 7.4. Where Vendor has established the basis for the substitution to the College's satisfaction, it must make good faith efforts to meet the contract goal by substituting a BEP certified vendor. Documentation of a replacement BEP certified vendor, or of good faith efforts to replace the BEP certified vendor, must meet the requirements of the initial Utilization Plan. If the goal cannot be reached and good faith efforts have been made, Vendor may substitute with a non- BEP certified vendor or Vendor may perform the work.
  - 7.5. If a Vendor plans to hire a subcontractor for any scope of work that was not previously disclosed in the Utilization Plan, Vendor must obtain the approval of the College to modify the Utilization Plan and must make good faith efforts to ensure that BEP certified vendors have a fair opportunity to submit a bid or offer on the new scope of work.
  - 7.6. A new BEP certified vendor agreement must be executed and submitted to the College within five business days of Vendor's receipt of the College's approval for the substitution or other change.
  - 7.7. Vendor shall maintain a record of all relevant data with respect to the utilization of BEP certified vendors, including but without limitation, payroll records, invoices, canceled checks and books of account for a period of at least three years after the completion of the contract. Full access to these records shall be granted by Vendor upon 48 hours written demand by the College to any duly authorized representative thereof, or to any

municipal, state or federal authorities. The College shall have the right to obtain from Vendor any additional data reasonably related or necessary to verify any representations by Vendor. After the performance of the final item of work or delivery of material by the BEP certified vendor and final payment to the BEP certified vendor by Vendor, but not later than 30 calendar days after such payment, Vendor shall submit a statement confirming the final payment and the total payments made to the BEP certified vendor under the contract.

- 7.8.** The College will periodically review Vendor's compliance with these provisions and the terms of its contract. Without limitation, Vendor's failure to comply with these provisions or its contractual commitments as contained in the Utilization Plan, failure to cooperate in providing information regarding its compliance with these provisions or its Utilization Plan, or provision of false or misleading information or statements concerning compliance, certification status or eligibility of the BEP certified vendor, good faith efforts or any other material fact or representation shall constitute a material breach of this contract and entitle the College to declare a default, terminate the contract, or exercise those remedies provided for in the contract or at law or in equity.
- 7.9.** The College reserves the right to withhold payment to Vendor to enforce these provisions and Vendor's contractual commitments. Final payment shall not be made pursuant to the contract until Vendor submits sufficient documentation demonstrating compliance with its Utilization Plan.

## UTILIZATION PLAN

**The Utilization Plan and Letter of Intent must be sealed and submitted with Proposal.**

\_\_\_\_\_ (Vendor) submits the following Utilization Plan as part  
Respondent Name

of our bid or offer in accordance with the requirements of the BEP Program Status and Participation section of the solicitation for **Student Resource Center (SRC) Door #2 Entrance Remodel, Bid Number 2018-B0055**. We understand that all subcontractors must be certified with the CMS BEP Program at the time of submission of all bids and offers. **We understand that compliance with this section is an essential part of this contract and that the Utilization Plan will become a part of the contract, if awarded.**

Vendor submits the following statement:

- Vendor is a BEP certified firm and plans to fully meet the goal through self-performance.
- Vendor has identified BEP certified subcontractor(s) to fully meet the established goal and submits the attached executed Letter(s) of Intent; or
- Vendor has made good faith efforts towards meeting the entire goal as indicated on the attached Utilization Plan, or a portion of the goal, and hereby requests a waiver (complete checklist below).

Vendor's person responsible for compliance with this BEP goal:

Name: \_\_\_\_\_ Title: \_\_\_\_\_

Telephone: \_\_\_\_\_ Email: \_\_\_\_\_

## DEMONSTRATION OF GOOD FAITH EFFORTS TO ACHIEVE GOAL AND REQUEST FOR WAIVER

If the BEP participation goal was not achieved, the vendor must provide documented evidence of good faith efforts to achieve the goal.

Below is a checklist of actions that will be used to evaluate a Vendor's Demonstration of Good Faith Efforts and Request for Waiver. **Please check the actions which you completed.** If any other efforts were made to obtain BEP participation in addition to the items listed below, attach a detailed description of such efforts. The College reserves the right to review and audit the results of the vendor's efforts as described below.

- Utilize the Sell2Illinois website: [www2.illinois.gov/cms/business](http://www2.illinois.gov/cms/business) to identify BEP certified vendors within the respective commodity/service codes denoted above and at a minimum email all listed vendors and solicit quotes from all vendors who express an interest via follow-up emails or telephone calls.
- Solicit through all reasonable and available means (e.g., attendance at a vendor conference, advertising and/or written notices) the interest of BEP certified vendors that have the capability to perform the work of the contract. Vendor must solicit this interest within sufficient time to allow the BEP certified vendors to respond to the solicitation. Vendor must determine with certainty if the BEP certified vendors are interested by taking appropriate steps to follow up initial solicitations and encourage them to submit a bid or proposal. Vendor must provide interested BEP certified vendors with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding promptly to the solicitation.
- Select portions of the work to be performed by BEP certified vendors in order to increase the likelihood that the goal will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate BEP certified vendor participation, even when Vendor might otherwise prefer to perform these work items with its own forces.
- Make a portion of the work available to BEP certified vendors and selecting those portions of the work or material needs consistent with their availability, so as to facilitate BEP certified vendor participation.
- Negotiate in good faith with interested BEP certified vendors. Evidence of such negotiation must include the names, addresses, email addresses, and telephone numbers of BEP certified vendors that were considered and an explanation as to why an agreement could not be reached.
- Thoroughly investigate the capabilities of BEP certified vendors and not reject them as unqualified without sound reasons.
- Make efforts to assist interested BEP certified vendors in obtaining lines of credit or insurance as required by the College.
- Make efforts to assist interested BEP certified vendors in obtaining necessary equipment, supplies, materials, or related assistance or services.

**6.0 CERTIFICATIONS **\*\*Required\*\*****

**IMPORTANT:** All bidders are required to complete and sign this form. Completed form must be returned with bid no later than the advertised bid deadline. Failure to return this completed form may result in disqualification of bid.

THE UNDERSIGNED IS CAUTIONED TO CAREFULLY READ THESE CERTIFICATIONS PRIOR TO SIGNING THE SIGNATURE PAGE. SIGNING THE SIGNATURE PAGE SHALL CONSTITUTE A WARRANTY BY THE UNDERSIGNED THAT ALL THE STATEMENTS, CERTIFICATIONS AND INFORMATION SET FORTH WITHIN THESE CERTIFICATIONS ARE TRUE, COMPLETE AND CORRECT AS OF THE DATE THE SIGNATURE PAGE IS SIGNED. THE UNDERSIGNED IS NOTIFIED THAT IF THE COLLEGE LEARNS THAT ANY OF THE FOLLOWING CERTIFICATIONS WERE FALSELY MADE, THAT ANY CONTRACT ENTERED INTO WITH THE UNDERSIGNED SHALL BE SUBJECT TO TERMINATION.

- A. Prevailing Wage Act. To the extent required by law, Contractor shall not pay less than the prevailing wage as established pursuant to an Act Regulating the Wages of Laborers, Mechanics, and Other Workman employed under Contract for Public Workers 820 ILCS 130/1 *et seq.* Our company certifies that it is eligible for bidding on public contracts and has complied with section 11a of the Prevailing Wage Act, 820 ILCS 130.01-12. **Yes** \_\_\_\_\_ **No** \_\_\_\_\_
- B. Human Rights Act. To the extent required by law, Contractor shall abide by the Illinois Human Rights Act, 775 ILCS 10/0.01 *et seq.*
- C. Drug Free Workplace. To the extent required by law, Contractor shall abide with the requirements of the Drug Free Workplace Act 30 ILCS 580.1 *et seq.*
- D. Sexual Harassment Policy. Contractor represents by the signing of this agreement that it has a written sexual harassment policy that is in accordance with 775 ILCS 5/2-105 (A) (4).
- E. Non-debarment. By executing this agreement Contractor certifies that it has not been debarred from public contracts in the State of Illinois for violating either 33E-3 or 33E-4 of the Public Contracts Act, 720 ILCS 5/33E-1 *et seq.*
- F. Fair Employment Practice: Company is in compliance with all State and Federal laws regarding Fair Employment Practice as well as all rules and regulations. **Yes** \_\_\_\_\_ **No** \_\_\_\_\_
- G. Our company has an Equal Employment Opportunity and Affirmative Action Program which complies with Executive Order 11246, the Vietnam Era Veterans' Readjustment Assistance Act of 1974, and the Rehabilitation Act of 1973.  
**Yes** \_\_\_\_\_ **No** \_\_\_\_\_
- H. Our company certifies that it is eligible for bidding on public contracts and is not in violation of either paragraph 33E-3 or 33-E-4 of Public Act 86-150, 720ILCS 5 with regards to bid rigging/bid rotating.  
**Yes** \_\_\_\_\_ **No** \_\_\_\_\_
- I. When required by law, the bidder and all bidder's subcontractors must participate in applicable apprenticeship and training programs approved by and registered with the United States Department of Labor's Bureau of Apprenticeship and Training as required by Illinois Public Act 093-0642.

**ADVICE**

- A. MINORITY/WOMAN-OWNED, DISADVANTAGED BUSINESS? YES \_\_\_\_\_ NO \_\_\_\_\_. If yes, please attach copy of certification and advise certification number and expiration date below:

Name of Certifying Entity: \_\_\_\_\_

Certification #: \_\_\_\_\_ Expiration Date: \_\_\_\_\_

- B. STATE NEGOTIATED COOPERATIVE AGREEMENT: YES \_\_\_\_\_ NO \_\_\_\_\_ Contract No. \_\_\_\_\_

Signature

Respondent/Company Official: \_\_\_\_\_ Date: \_\_\_\_\_

**7.0 SIGNATURE PAGE \*\*Required\*\***

**IMPORTANT:** All bidders are required to complete and sign this form. Completed form must be returned with the bid no later than the advertised bid deadline. Failure to return this completed form may result in disqualification of bid.

Check One:

- SOLE PROPRIETOR**     **PARTNERSHIP** (and/or JOINT VENTURE)     **LIMITED LIABILITY COMPANY**
- CORPORATION**

The undersigned acknowledges receipt of a full set of Bid Documents and Addenda Numbers \_\_\_\_\_ (None unless indicated here). **All issued addenda must be signed and returned to the College as per the instructions in the addenda or bid will not be accepted.**

The undersigned makes the foregoing Bid subject to all of the terms and conditions of the Bid Documents. The undersigned certifies that all of the foregoing statements of the Vendor Certifications are true and correct. The undersigned warrants that all of the facts and information submitted by the undersigned in connection with this Bid are true and correct. Upon award and execution of this Contract by the College of DuPage Board of Trustees, the undersigned agrees that execution of this Bid shall stand as the undersigned's execution of this Contract.

BUSINESS NAME: \_\_\_\_\_

BUSINESS ADDRESS: \_\_\_\_\_

BUSINESS TELEPHONE: \_\_\_\_\_ FAX NUMBER: \_\_\_\_\_

EMAIL ADDRESS: \_\_\_\_\_

CELLULAR TELEPHONE NUMBER: \_\_\_\_\_

FEIN/SSN: \_\_\_\_\_

**AUTHORIZED SIGNATURE:** \_\_\_\_\_

PRINT NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

DATE: \_\_\_\_\_

Subscribed to and sworn before me this

\_\_\_\_\_ Day of \_\_\_\_\_, 2018.

My commission expires: \_\_\_\_\_

X \_\_\_\_\_

Notary Public Signature

Notary Seal

**\* Attach hereto a partnership resolution or other document authorizing the individual signing this Signature Page to so sign on behalf of the Partnership.**

**\*\* If the LLC is not registered in the State of Illinois, a copy of a current Certificate of Good Standing from the state of incorporation must be submitted with this Signature Page.**

**\*\*\* Attach either a certified copy of the by-laws, articles, resolution or other authorization demonstrating such persons to sign the Signature Page on behalf of the LLC.**

**\*\*\* If the corporation is not registered in the State of Illinois, a copy of the Certificate of Good Standing from the state of incorporation must be submitted with this Signature Page.**

**\*\*\*\*\* In the event that this Signature Page is signed by any persons other than the President and Secretary, attach either a certified copy of the corporate by-laws, a resolution or other authorization by the corporation, authorizing such persons to sign the Signature Page on behalf of the corporation.**

**8.0 CONFLICT OF INTEREST DISCLOSURE AND NON-COLLUSION FORM **\*\*Required\*\*****

**IMPORTANT:** All bidders are required to complete and sign this form. Completed form must be returned with bid no later than the advertised bid deadline. Failure to return this completed form may result in disqualification of bid.

BID #: \_\_\_\_\_ DATE: \_\_\_\_\_

**CONFLICT OF INTEREST DISCLOSURE**

College of DuPage (COD) reserves the right, at its sole discretion, to reject any and all bids, revise the submission timeline as described in the solicitation, and to discontinue at any time the submission process as described in the solicitation. College of DuPage is requiring that any and all relationships with the College, its Administrators, Trustees, Committee members, COD Foundation Trustees, or any other Employee of the College be disclosed in writing as a part of any bid submitted. Contact with any employee of the College of DuPage during the pre-award period, except as noted in the solicitation, is strictly forbidden and is considered sufficient grounds for dismissal from the Bid/RFP process.

**VENDOR CONFLICT OF INTEREST DISCLOSURE**

Define the relationship with any College of DuPage Administrator, Trustee, Employee, COD Foundation Board member, Committee member, or their immediate family member, with which your company or any of its owners, officers, Trustees, employees, or their immediate family, does business or is likely to do business with, or for which there is an opportunity to influence a related College decision; include the name and relationship to any immediate family member.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Vendor certifies that there is no known conflict of interest with any COD Administrator, Employee, Trustee, Committee member, or COD Foundation Trustee, or their immediate family.

Vendor Printed Name: \_\_\_\_\_ Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**NON-COLLUSION STATEMENT**

The undersigned affirms that he/she is duly authorized to execute this contract and that this company, corporation, firm, partnership or individual has not prepared this bid in collusion with any other bidder, and that the contents of this bid as to prices, terms or conditions of said bid have not been Communicated by the undersigned nor by any employee or agent to any other person engaged in this type of business prior to the official opening of this bid.

Company Name: \_\_\_\_\_ Owners/Principal(s)  
Name(s)/Title(s): \_\_\_\_\_

Vendor Address: \_\_\_\_\_ City, State, Zip: \_\_\_\_\_

Phone Number: \_\_\_\_\_ Fax Number: \_\_\_\_\_

Email Address: \_\_\_\_\_

Signature

Bidder/Company Official: \_\_\_\_\_ Date: \_\_\_\_\_



**EXHIBIT A - SPECIFICATIONS**



**College of DuPage**  
**SRC Door Replacement**  
Project No. 15044-17-10

**100% Construction Documents**

April 18, 2018

**College of DuPage**  
Health and Science Center  
425 Fawell Blvd.  
Glen Ellyn, IL 60137

BY:  
**Bailey Edward Design**  
35 E Wacker Drive, Suite 2800  
Chicago, IL 60601-2314  
t 312.440.2300  
f 312.440.2303



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### **SPECIFIERS:**

General: Chris Hainer, Bailey Edward (312) 789-4003, [chainer@baileyedward.com](mailto:chainer@baileyedward.com)  
Mechanical: Matt Montalbano, Bailey Edward (847) 660-7626, [mmontalbano@baileyedward.com](mailto:mmontalbano@baileyedward.com)  
Electrical: Patrick Krause, Bailey Edward (847) 660-7628, [pkrause@baileyedward.com](mailto:pkrause@baileyedward.com)

END OF TABLE OF CONTENTS

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and drawing conventions.

- B. Related Requirements:

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

1.3 PROJECT INFORMATION

- A. Project Identification: SRC Entry #2 Vestibule.

1. Project Location: 425 Fawell Boulevard, Glen Ellyn, IL 60137.

- B. Owner: College of Dupage.

1. Owner's Representative: Chris Wosachlo, Project Manager.

- C. Architect: Bailey Edward, 35 East Wacker Dr. Suite 2800, Chicago, IL 60601.

- D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Structural Engineering: SP Engineering, 134 N LaSalle Dr., Chicago, IL 60602.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

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

1. Project involves the demolition and replacement of an existing entrance, including storefront two doors and two revolving doors and porcelain enamel clad surround. New work includes a new porcelain enamel clad vestibule with overhang sheltering two sets of two double doors. Existing utilities will need to be extended into the vestibule for lighting, heating, fire protection and security.

B. Type of Contract:

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

1.5 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

- a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
- b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- c. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.7 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.



- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7 a.m. to 6 p.m., Monday through Friday, unless otherwise indicated.
  - 1. Weekend Hours: Coordinate with the Owner.
  - 2. Early Morning Hours: Coordinate with the Owner.
  - 3. Hours for Utility Shutdowns: Coordinate with the Owner.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
  - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
  - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Nonsmoking Building: College of Dupage is a smoke free campus. Smoking on campus property is not permitted.
- E. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

## 1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
  - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  - 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
  - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

College of DuPage  
SRC Door Replacement

DIVISION 01 – GENERAL REQUIREMENTS  
01 10 00 - Summary

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.

### 1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use CSI Form 13.1A.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    - e. Samples, where applicable or requested.
    - f. Certificates and qualification data, where applicable or requested.

- g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    - h. Research reports evidencing compliance with building code in effect for Project.
    - i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
    - j. Cost information, including a proposal of change, if any, in the Contract Sum.
    - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
    - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
  - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

## 1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
  1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - b. Substitution request is fully documented and properly submitted.
  - c. Requested substitution will not adversely affect Contractor's construction schedule.
  - d. Requested substitution is compatible with other portions of the Work.
  - e. Requested substitution has been coordinated with other portions of the Work.
  - f. Requested substitution provides specified warranty.
  - g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Substitution request is fully documented and properly submitted.
    - e. Requested substitution will not adversely affect Contractor's construction schedule.
    - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - g. Requested substitution is compatible with other portions of the Work.
    - h. Requested substitution has been coordinated with other portions of the Work.
    - i. Requested substitution provides specified warranty.
    - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- C. Restrictions: Substitutions will not be considered by shop drawing, informal request or when acceptance will require substantial revision of the contract documents.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. Requests for Information (RFIs).
  - 4. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within **15** days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
  - 1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

## 1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's construction schedule.
  - 2. Preparation of the schedule of values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Project closeout activities.
  - 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

## 1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
  - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.

- e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
  - f. Indicate required installation sequences.
  - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Supplement plan drawings with section drawings where required to adequately represent the Work.
  2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
  3. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, and similar items.
  4. Mechanical and Plumbing Work: Show the following:
    - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  5. Electrical Work: Show the following:
    - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
    - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    - c. Location of pull boxes and junction boxes, dimensioned from column center lines.
  6. Fire-Protection System: Show the following:
    - a. Locations of mains piping, branch lines, pipe drops, and sprinkler heads.
  7. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Contractor shall make changes as directed and resubmit.

#### 1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.



4. Name of Contractor.
  5. Name of Architect.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716 or form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow **seven** working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. **Include the following**
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within **three** days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

## 1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
  1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees prior to meeting.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within threedays of the meeting.
  4. Accommodate participants that will be teleconferencing via phone.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than **15** days after execution of the Agreement.
  1. Conduct the conference to review responsibilities and personnel assignments.
  2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Lines of communications.
    - f. Procedures for processing field decisions and Change Orders.
    - g. Procedures for RFIs.
    - h. Procedures for testing and inspecting.
    - i. Procedures for processing Applications for Payment.
    - j. Distribution of the Contract Documents.
    - k. Submittal procedures.
    - l. Preparation of record documents.
    - m. Use of the premises.
    - n. Work restrictions.
    - o. Working hours.
    - p. Owner's occupancy requirements.
    - q. Responsibility for temporary facilities and controls.
    - r. Procedures for moisture and mold control.
    - s. Procedures for disruptions and shutdowns.
    - t. Construction waste management and recycling.
    - u. Parking availability.
    - v. Office, work, and storage areas.
    - w. Equipment deliveries and priorities.
    - x. First aid.
    - y. Security.

- z. Progress cleaning.
  - 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Possible conflicts.
    - i. Compatibility requirements.
    - j. Time schedules.
    - k. Weather limitations.
    - l. Manufacturer's written instructions.
    - m. Warranty requirements.
    - n. Compatibility of materials.
    - o. Acceptability of substrates.
    - p. Temporary facilities and controls.
    - q. Space and access limitations.
    - r. Regulations of authorities having jurisdiction.
    - s. Testing and inspecting requirements.
    - t. Installation procedures.
    - u. Coordination with other work.
    - v. Required performance results.
    - w. Protection of adjacent work.
    - x. Protection of construction and personnel.
  - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at weekly intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
  - 2. Attendees: In addition to representatives of and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

- a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - 1) Review schedule for next period.
  - b. Review present and future needs of each entity present, including the following:
    - 1) Interface requirements.
    - 2) Sequence of operations.
    - 3) Resolution of BIM component conflicts.
    - 4) Status of submittals.
    - 5) Deliveries.
    - 6) Off-site fabrication.
    - 7) Access.
    - 8) Site utilization.
    - 9) Temporary facilities and controls.
    - 10) Progress cleaning.
    - 11) Status of RFIs.
    - 12) Status of proposal requests.
    - 13) Pending changes.
    - 14) Status of Change Orders.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Contractor's construction schedule.
  - 2. Daily construction reports.
  - 3. Field conditions
  - 4. Contractor's construction schedule.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
  - 2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

### 1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

F. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

#### 1.4 INFORMATIONAL SUBMITTALS

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

1. PDF electronic file.

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

C. Daily Construction Reports: Submit at monthly intervals.

D. Special Reports: Submit at time of unusual event.

#### 1.5 COORDINATION

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

1. Secure time commitments for performing critical elements of the Work from entities involved.

2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

### PART 2 - PRODUCTS

#### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.

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

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

1. Activity Duration: Define activities so no activity is longer than 10 days, unless specifically allowed by Architect.

2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.

a. Metal paneling

- b. storefront system
  - 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  - 4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
  - 5. Punch List and Final Completion: Include not more than 15 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
- 1. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Seasonal variations.
  - 2. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Temporary enclosure and space conditioning.
    - c. Permanent space enclosure.
    - d. Completion of mechanical installation.
    - e. Completion of electrical installation.
    - f. Substantial Completion.
- D. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
- 1. Unresolved issues.
  - 2. Unanswered Requests for Information.
  - 3. Rejected or unreturned submittals.
  - 4. Pending modifications affecting the Work and Contract Time.
- 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)
- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice to Proceed. Base schedule on the startup construction schedule and additional information received since the start of Project.
  - B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

## 2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
  2. Approximate count of personnel at Project site.
  3. Equipment at Project site.
  4. Material deliveries.
  5. High and low temperatures and general weather conditions, including presence of rain or snow.
  6. Accidents.
  7. Meetings and significant decisions.
  8. Unusual events (see special reports).
  9. Stoppages, delays, shortages, and losses.
  10. Orders and requests of authorities having jurisdiction.
  11. Change Orders received and implemented.
  12. Change Directives received and implemented.
  13. Services connected and disconnected.
  14. Equipment or system tests and startups.
  15. Substantial Completions authorized.

## 2.4 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.



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

END OF SECTION 01 32 00

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
  - 1. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.

### 1.3 DEFINITIONS

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

### 1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect or Owner and additional time for handling and reviewing submittals required by those corrections.
  - 1. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal category: Action; informational.
    - d. Description of the Work covered.
    - e. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently.
  3. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Resubmittal Review: Allow 10 days for review of each resubmittal.
- C. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Transmittal Form for Electronic Submittals: Use PDF containing the following information:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name of Contractor.
    - e. Name of firm or entity that prepared submittal.
    - f. Names of subcontractor, manufacturer, and supplier.
    - g. Category and type of submittal.
    - h. Submittal purpose and description.
    - i. Specification Section number and title.
    - j. Drawing number and detail references, as appropriate.
    - k. Location(s) where product is to be installed, as appropriate.
    - l. Related physical samples submitted directly.
    - m. Transmittal number.
    - n. Other necessary identification.
- D. Options: Identify options requiring selection by Architect.
- E. Deviations and Additional Information: Highlight, encircle, or otherwise specifically identify deviations from Contract Documents on submittals and provide explanation for deviation.
- F. Resubmittals: Highlight, encircle, or otherwise specifically identify revisions from previous submittal.
1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- G. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- H. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  2. Samples, Color Charts, Finishes: Where samples, color or finish charts are being submitted, submit physical copy to Architect and Owner for selection. Digital copies or pictures of samples, color charts or finish charts will not be reviewed.
  3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before or concurrent with Samples.
  6. Submit Product Data in the following format:
    - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  2. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
    - f. Location of item in construction if more than one similar item is used.
  3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
  - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets;
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Location within room or space.
  4. Submit product schedule in the following format:
    - a. PDF electronic file.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- J. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- T. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- U. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

- V. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- W. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

### PART 3 - EXECUTION

#### 3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

#### 3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- D. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01 33 00



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

### 1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

#### 1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.

7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

#### 1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

#### 1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  1. Date of issue.
  2. Project title and number.
  3. Name, address, and telephone number of testing agency.
  4. Dates and locations of samples and tests or inspections.
  5. Names of individuals making tests and inspections.
  6. Description of the Work and test and inspection method.
  7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
  1. Name, address, and telephone number of technical representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.

- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, and telephone number of factory-authorized service representative making report.
  - 2. Statement that equipment complies with requirements.
  - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - 4. Statement whether conditions, products, and installation will affect warranty.
  - 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar in material, design, and extent to those indicated for this Project.
- F. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- G. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
  - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.

4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
  - a. Allow seven days for initial review and each re-review of each mockup.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed unless otherwise indicated.

#### 1.9 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
  1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
  - 1. Access to the Work.
  - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
  - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  - 4. Facilities for storage and field curing of test samples.
  - 5. Delivery of samples to testing agencies.
  - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
  
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
  
- B. Protect construction exposed by or for quality-control service activities.
  
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

### 1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

#### 1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
  - 1. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
  - 2. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).
- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
  - 1. EPA - Environmental Protection Agency; [www.epa.gov](http://www.epa.gov).
  - 2. OSHA - Occupational Safety & Health Administration; [www.osha.gov](http://www.osha.gov).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00



## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

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

### 1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
  - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
  - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
  - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- C. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their

operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

#### 1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

#### 1.6 PROJECT CONDITIONS

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

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- B. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

#### 2.2 TEMPORARY FACILITIES

- A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
  1. Store combustible materials apart from building.

#### 2.3 EQUIPMENT

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

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  - 1. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

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

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
  1. Maintain support facilities until the Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- C. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  1. Temporary Signs: Provide signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  2. Maintain and touchup signs so they are legible at all times.
- D. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- E. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- C. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

- F. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
- G. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
  - 1. Prohibit smoking in construction areas.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

### 3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
  - 1. Protect porous materials from water damage.
  - 2. Protect stored and installed material from flowing or standing water.
  - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
  - 4. Remove standing water from decks.
  - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
  - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  - 2. Keep interior spaces reasonably clean and protected from water damage.
  - 3. Periodically collect and remove waste containing cellulose or other organic matter.
  - 4. Discard or replace water-damaged material.
  - 5. Do not install material that is wet.
  - 6. Discard, replace, or clean stored or installed material that begins to grow mold.
  - 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

### 3.6 OPERATION, TERMINATION, AND REMOVAL

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

END OF SECTION 01 50 00

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for requests for substitutions.
  - 2. Section 014200 "References" for applicable industry standards for products specified.

### 1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

### 1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
  - a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
  - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

### 1.5 QUALITY ASSURANCE

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

### 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
  1. Store products to allow for inspection and measurement of quantity or counting of units.
  2. Store materials in a manner that will not endanger Project structure.
  3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  6. Protect stored products from damage and liquids from freezing.
  7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

## 1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  - 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  - 4. Where products are accompanied by the term "as selected," Architect will make selection.
  - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
  - 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
  - 1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.



2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  3. Products:
    - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements.
    - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
  4. Manufacturers:
    - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
    - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
  5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
- E. Match Existing: Where Specifications or drawings include the phrase "match existing" or similar phrase, select a product that complies with the requirements and matches the material, color, finish, and profile of the existing element on site.

## 2.2 COMPARABLE PRODUCTS

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

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

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Requirements:
  - 1. Section 017300 "Execution" for progress cleaning of Project site.

1.3 ACTION SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

1.6 SUBSTANTIAL COMPLETION PROCEDURES

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

- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
  5. Submit test/adjust/balance records.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
  2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  3. Complete startup and testing of systems and equipment.
  4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  5. Advise Owner of changeover in heat and other utilities.
  6. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  7. Complete final cleaning requirements, including touchup painting.
  8. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
  2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment.
  2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect or Owner for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty. All warranties shall commence no earlier than substantial completion and last for 24 months. Special warranties may last longer than 24 months.
- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
  2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
  - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    - j. Clean glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish glass, taking care not to scratch surfaces.
    - k. Remove labels that are not permanent.
    - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    - m. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Remove dust, dirt and fingerprints completely.

- n. Leave Project clean and ready for occupancy.

### 3.2 REPAIR OF THE WORK

- A. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
  - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
  - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
    - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
  - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
  - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use to comply with requirements for new fixtures.

END OF SECTION 01 77 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
1. Record Drawings.
  2. Record Specifications.
  3. Record Product Data.
  4. Miscellaneous record submittals.
- B. Related Requirements:
1. Section 017300 "Execution" for final property survey.
  2. Section 017700 "Closeout Procedures" for general closeout procedures.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
1. Number of Copies: Submit one set of marked-up record prints.
  2. Number of Copies: Submit copies of record Drawings as follows:
    - a. Initial Submittal:
      - 1) Submit PDF electronic files of scanned record prints and one of file prints.
      - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    - b. Final Submittal:
      - 1) Submit PDF electronic files of scanned record prints and three sets of prints.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.



- E. Reports: Submit written report indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
  - 2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Change Directive.
    - k. Details not on the original Contract Drawings.
    - l. Field records for variable and concealed conditions.
    - m. Record information on the Work that is shown only schematically.
  - 3. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
  - 1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  - 2. Format: Annotated PDF electronic file.
  - 3. Identification: As follows:
    - a. Project name.

- b. Date.
- c. Designation "PROJECT RECORD DRAWINGS."
- d. Name of Architect.
- e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  - 3. Note related Change Orders and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  - 3. Note related Change Orders and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file.
  - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

## 2.4 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.
- 2. Demolition and removal of selected site elements.
- 3. Salvage of existing items to be reused or recycled.

- B. Related Requirements:

- 1. Section 011000 "Summary" for restrictions on use of the premises and Owner-occupancy requirements.
- 2. Section 017300 "Execution" for cutting and patching procedures.

### 1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled. Protect throughout construction.
- E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

### 1.4 MATERIALS OWNERSHIP

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

1.5 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- B. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.

1.6 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
  - 1. Before selective demolition, Owner will remove all furniture or equipment.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.7 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

#### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

#### 3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  - 4. Secure area of work to prevent people from entering area of work or passing through area of work to bypass building security.

- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  - 1. Strengthen or add new supports when required during progress of selective demolition.

### 3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  - 4. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  - 5. Dispose of demolished items and materials promptly.
- B. Removed and Salvaged Items:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to Owner's storage area designated by Owner.
- C. Removed and Reinstalled Items:
  - 1. Clean and repair items to functional condition adequate for intended reuse.
  - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  - 3. Protect items from damage during transport and storage.
  - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

### 3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.

- B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- C. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings. Do not use methods requiring solvent-based adhesive strippers.

### 3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
  - 1. Do not allow demolished materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.

### 3.7 CLEANING

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

END OF SECTION 02 41 19

## 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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - 1. Location of construction joints is subject to approval of the Architect.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, testing agency.
- B. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.



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

C. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

F. Field quality-control reports.

#### 1.6 QUALITY ASSURANCE

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

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

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

#### 1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 and as follows:
  - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301.
  - 2. ACI 117.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  - 1. Plywood, metal, or other approved panel materials.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- E. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
  - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

## 2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed bars, ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- D. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- E. Epoxy-Coated Welded-Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, plain steel.

## 2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated.
- C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

## 2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
  1. Portland Cement: ASTM C 150/C 150M, Type I/II, gray.
  2. Fly Ash: ASTM C 618, Class F or C.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
  1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
  2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Lightweight Aggregate: ASTM C 330/C 330M, 1/2-inch nominal maximum aggregate size.
- E. Air-Entraining Admixture: ASTM C 260/C 260M.
- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
- G. Water: ASTM C 94/C 94M and potable.

## 2.6 WATERSTOPS

- A. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
  - B. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.
  - C. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer-modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.
- ### VAPOR RETARDERS
- D. Sheet Vapor Retarder: 15 mil, ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Stego Industries or approved equal

## 2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

## 2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
  1. Types I and II, nonload bearing and Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

## 2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
  4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
  1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

## 2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.
  1. Use water-reducing admixture in concrete, as required, for placement and workability.
  2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
- D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

## 2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings and Foundation Walls: Normal-weight concrete.
  1. Minimum Compressive Strength: As indicated at 28 days.
  2. Maximum W/C Ratio: 0.45.
  3. Slump Limit: 4 inches, plus or minus 1 inch.
  4. Air Content: 5 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
- B. Slabs-on-Grade: Normal-weight concrete.
  1. Minimum Compressive Strength: As indicated at 28 days.
  2. Maximum W/C Ratio: 0.45.
  3. Slump Limit: 4 inches.
  4. Air Content: 5 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
  5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.12 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 , to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
  - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
  - 2. Class C, 1/2 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.

- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
  - 1. Leave formwork for structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

### 3.4 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
  - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

### 3.5 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder according to manufacturer's written instructions.



### 3.6 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
  - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
  - 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

### 3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  - 3. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
  - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
  - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
  - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface.
  - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

### 3.8 WATERSTOP INSTALLATION

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

### 3.9 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

### 3.10 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  1. Apply to concrete surfaces not exposed to public view.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
  1. Apply float finish to surfaces to receive trowel finish.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring or carpet.
  2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
    - a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
  3. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.-long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

- D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
  - 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.12 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

### 3.13 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

- c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at

- inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete has cured at least 14 days, correct high areas by grinding.
  3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.16 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- B. Inspections:
  1. Steel reinforcement placement.

2. Steel reinforcement welding.
  3. Headed bolts and studs.
  4. Verification of use of required design mixture.
  5. Concrete placement, including conveying and depositing.
  6. Curing procedures and maintenance of curing temperature.
  7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
  2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31/C 31M.
    - a. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
  8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
  9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
  10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
  11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION 03 30 00



## 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. Structural steel.
  - 2. Grout.

### 1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

### 1.4 COORDINATION

- A. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

### 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication of structural-steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment Drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
  - 5. Identify demand critical welds.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator, and testing agency.
- B. Welding certificates.
- C. Mill test reports for structural steel, including chemical and physical properties.
- D. Survey of existing conditions.
- E. Source quality-control reports.
- F. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC 303.
  - 2. AISC 360.
  - 3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
  - 1. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 2. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand loads indicated and comply with other information and restrictions indicated.
- B. Moment Connections: Type FR, fully restrained.

### 2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

### 2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
  - 1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
  - 1. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.
- C. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
  - 1. Configuration: Straight.
  - 2. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.

### 2.4 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.5 GROUT

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

2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
  - 1. Camber structural-steel members where indicated.
  - 2. Fabricate beams with rolling camber up.
  - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
  - 4. Mark and match-mark materials for field assembly.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- D. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."
- E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces.
  - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Pretensioned.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

## 2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  - 2. Surfaces to be field welded.
  - 3. Surfaces of high-strength bolted, slip-critical connections.
  - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  - 5. Galvanized surfaces.
  - 6. Surfaces enclosed in interior construction.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 2, "Hand Tool Cleaning."
  - 2. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

## 2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
  - 3. Ultrasonic Inspection: ASTM E 164.
  - 4. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
  - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
- E. Prepare test and inspection reports.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
  - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

#### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of baseplate.
  - 3. Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- D. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Pretensioned.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  - 2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

### 3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
  - 1. Verify structural-steel materials and inspect steel frame joint details.
  - 2. Verify weld materials and inspect welds.
  - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.

### 3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 05 12 00

## 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. Roof deck.
- B. Related Requirements:
  - 1. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
  - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - 1. Power-actuated mechanical fasteners.
- D. Evaluation Reports: For steel deck, from ICC-ES.
- E. Field quality-control reports.

### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.



- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

#### 2.2 ROOF DECK

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Canam Steel Corporation.
  - 2. Cordeck.
  - 3. Nucor Corp.
- B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
  - 1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 zinc coating.
  - 2. Deck Profile: As indicated.
  - 3.
  - 4. Profile Depth: As indicated.
  - 5. Design Uncoated-Steel Thickness: As indicated.
  - 6. Span Condition: As indicated.
  - 7. Side Laps: Overlapped.

#### 2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- J. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- K. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch-wide flanges and level recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- L. Galvanizing Repair Paint: ASTM A 780.
- M. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

### 3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
  - 1. Weld Diameter: As indicated, nominal.
  - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated, with a maximum of 18 inches apart.
  - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches, and as follows:
  - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
  - 2. Fasten with a minimum of 1-1/2-inch-long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
  - 1. End Joints: Lapped 2 inches minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.
  - 1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.

- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

#### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Remove and replace work that does not comply with specified requirements.
- D. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

#### 3.5 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

## 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. Exterior non-load-bearing wall framing.
  - 2. Roof rafter framing.
  - 3. Ceiling joist framing.
  - 4. Soffit framing.
- B. Related Requirements:
  - 1. Section 092216 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. Shop Drawings:
  - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
  - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.
  - 1. Steel sheet.
  - 2. Expansion anchors.

3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified Illinois Licensed Structural Engineer to design all components of cold formed metal framing to be provided under this section.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
  1. Design Loads: As indicated.
  2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height.
    - b. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft.
    - c. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height.
    - d. Roof Rafter Framing: Vertical deflection of 1/120 of the horizontally projected span for live loads.

- e. Ceiling Joist Framing: Vertical deflection of 1/240 of the span for live loads and 1/240 for total loads of the span.
  3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F
  4. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Design Standards:
1. Roof Systems: AISI S210.
  2. Wall Studs: AISI S211.
  3. Headers: AISI S212.
  4. Lateral Design: AISI S213.
- D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

## 2.2 COLD-FORMED STEEL FRAMING, GENERAL

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
1. Coating: G60.

## 2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0329 inch.
  2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: Matching steel studs.
  2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
1. Minimum Base-Metal Thickness: 0.0428 inch.
  2. Flange Width: 1 inch plus the design gap for one-story structures.

- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

## 2.4 ROOF-RAFTER FRAMING

- A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
  1. Minimum Base-Metal Thickness: 0.0329 inch.
  2. Flange Width: 1-5/8 inches, minimum.

## 2.5 CEILING JOIST FRAMING

- A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, punched with standard holes, with stiffened flanges, and as follows:
  1. Minimum Base-Metal Thickness: 0.0329 inch.
  2. Flange Width: 1-5/8 inches, minimum.

## 2.6 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
  1. Minimum Base-Metal Thickness: 0.0329 inch.
  2. Flange Width: 1-5/8 inches, minimum.

## 2.7 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  1. Supplementary framing.
  2. Bracing, bridging, and solid blocking.
  3. Web stiffeners.
  4. Anchor clips.
  5. End clips.
  6. Foundation clips.
  7. Gusset plates.
  8. Stud kickers and knee braces.
  9. Joist hangers and end closures.
  10. Hole reinforcing plates.
  11. Backer plates.



## 2.8 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
  - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

## 2.9 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

## 2.10 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.

2. Cut framing members by sawing or shearing; do not torch cut.
  3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
  4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

#### 3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
    - 1. Cut framing members by sawing or shearing; do not torch cut.
    - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
      - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
  - E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
  - F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
  - G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
  - H. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
  - I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
  - J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
    - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- 3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION
- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
  - B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
    - 1. Stud Spacing: 16 inches.
  - C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
    - 1. Install single deep-leg deflection tracks and anchor to building structure.
    - 2. Connect vertical deflection clips to bypassing studs and anchor to building structure.

3. Connect drift clips to cold-formed metal framing and anchor to building structure.
- D. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
  1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
  2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- E. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Extruded polystyrene foam-plastic board.
  - 2. Glass-fiber blanket.
- B. Related Requirements:
  - 1. Section 072119 "Foamed-in-Place Insulation" for spray-applied polyurethane foam insulation.
  - 2. Section 075323 "Ethylene-Propylene-Diene-Monomer (EPDM) Roofing" for insulation specified as part of roofing construction.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
  - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
  - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

## PART 2 - PRODUCTS

### 2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.
- B. Extruded Polystyrene Board, Type IV <Insert drawing designation>: ASTM C 578, Type IV, 25-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
  - 1. Manufacturers:
    - a. Dow Chemical Company
    - b. Owens Corning
  - 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
  - 3. For use below grade:
    - a. Closed cell polystyrene as above, but manufactured to contain borates to provide resistance to subterranean termites.
    - b. Basis of Design: Foam Control Type 9 EPS with Perform Guard/AFM Corp.

### 2.2 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
  - 1. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

### 3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.

- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

### 3.3 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

### 3.4 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
  - 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application.
  - 2. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
  - 3. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
- C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.
- D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
  - 1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

### 3.5 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

## 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. Closed-cell spray polyurethane foam.
- B. Related Requirements:
  - 1. Section 072100 "Thermal Insulation" for foam-plastic board insulation.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For spray-applied polyurethane foam-plastic insulation, from ICC-ES.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

## PART 2 - PRODUCTS

### 2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM

- A. Closed-Cell Spray Polyurethane Foam: ASTM C 1029, Type II, minimum density of 1.5 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F.
  - 1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - a. Flame-Spread Index: 25 or less.



- b. Smoke-Developed Index: 450 or less.
- 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

## 2.2 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

### 3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.
- D. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.
- E. Cavity Walls: Install into cavities to fully fill void, unless specific thickness is indicated on Drawings.
- F. Miscellaneous Voids: Apply according to manufacturer's written instructions.

### 3.3 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 07 21 19

## PART 1 - GENERAL

### 1.1 PERFORMANCE REQUIREMENTS

- A. Air and Vapor Leakage of the Barrier Material:
  - 1. Air permeance not to exceed 0.004 cubic feet per minute per square foot under a pressure differential of 0.3 in. water (1.57 pounds per square foot) when tested according to ASTM E 2178.
  - 2. Vapor permeance 0.1 perms or less when tested according to ASTM E 96.
  
- B. Air and Vapor Leakage of the Assembly:
  - 1. Air and vapor barrier assembly that has an air leakage not to exceed 0.040 cubic feet per square foot per minute under a pressure differential of 0.3 in water (1.57 pounds per square foot). When tested in accordance with ASTM E 2357 and as follows:
    - a. Provide an assembly capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope and transfer the load to the structure without damage or displacement.
    - b. Provide an assembly that does not displace adjacent materials under full load.
    - c. Provide an assembly joined in an airtight and flexible manner to the air barrier material of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations and creep, and anticipated seismic movement.
    - d. Provide connections to prevent air leakage and vapor migration at all adjacent construction.

### 1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each product proposed for use in the system, manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.
  - 1. Submit letter from primary materials manufacturer indicating approval of products not manufactured by primary manufacturer.
  - 2. Include statement that materials are compatible with adjacent construction.
  - 3. Submit reports indicating that field adhesion test on all materials to which sealants are adhered have been performed and the changes made, if required, to other approved materials, in order to achieve successful adhesion.
  
- B. Shop Drawings: Submit shop drawings showing locations and extent of air and vapor barrier assemblies and details of each condition and intersections with adjacent construction of other envelope assemblies and materials utilizing shop drawings for them, membrane counter-flashings, and details showing the following:
  - 1. How gaps in the construction will be bridged, including inside and outside corners.
  - 2. How materials that cover the air and vapor barrier are stripped-in to maintain air-tight condition.
  - 3. How miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed.
    - a. Include statement that materials are compatible with adjacent construction.
    - b. Include recommended values for field adhesion test on each substrate.
  
- C. Quality Assurance Program: Submit evidence of current accreditation and certification under the Air Barrier Association of America's (ABAA) Quality Assurance Program. Submit certification number of installers.

- D. Compatibility: Submit letter from manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent construction and that cleaning materials used during installation are chemically compatible with adjacent materials construction.
- E. Submit three (3) fully executed copies of the installer's warranty.

### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Currently accredited by the Air Barrier Association of America (ABAA) whose applicators are certified in accordance with the ABAA Quality Assurance Program.
- B. Manufacturer: Obtain primary materials from a single manufacturer regularly engaged in manufacturing air and vapor barrier membrane as specified. Obtain secondary materials from a source acceptable to the primary materials manufacturer.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, date of manufacture, and directions for storage.
- B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air and vapor barrier membrane manufacturer. Protect stored materials from direct sunlight.
- C. Handle materials in accordance with manufacturer's recommendations.

### 1.5 PROJECT CONDITIONS

- A. Temperature: Install air and vapor barrier within range of ambient and substrate temperatures recommended by air and vapor barrier manufacturer. Do not apply air and vapor barrier to a damp or wet substrate.
- B. Field Conditions: Do not install air and vapor barrier in snow, rain, fog, or mist. Do not install air and vapor barrier when the temperature of substrate surfaces and surrounding air temperature are below those recommended by the manufacturer.

### 1.6 WARRANTY

- A. Installation Warranty: Provide installer's 2 year warranty from date of Substantial Completion, including all components of the air and vapor barrier assembly, against failures including loss of air tight seal, loss of watertight seal, loss of adhesion, loss of cohesion and failure to cure properly.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Fluid-applied Air and Vapor Barrier: Fluid-applied proprietary materials as specified. Use regular or low-temperature formulation depending on site conditions, within temperature ranges specified by manufacturer. Provide related

accessories including primer, seam take, mastic, fluid and sealant recommended by manufacturer. Subject to compliance with requirements, provide one of the following:

1. Carlisle Coatings and Waterproofing:
  - a. Fluid-Applied Air and Vapor Barrier Membrane: Barriseal, 40 mils thick (dry).
  - b. Water-Based Primer: CCW-AWP Water-Based Primer.
  - c. Solvent-Based Primer: CCW-702 Solvent Based Primer.
  - d. Solvent-Based Aerosol Primer: CAV-GRIP.
  - e. Mastic: CCW-704 Solvent-Based Rubberized Asphalt mastic.
  - f. Sealants: CCW-703 Vertical Grade Liqueal membrane or CCW-201 two component polyurethane sealant.
  - g. Counterflashing for masonry Through-Wall Flashings: CCW-705.
  - h. Website: [www.carlisle-ccw.com](http://www.carlisle-ccw.com).
2. Grace Construction Products:
  - i. Fluid-Applied Air and Vapor barrier: Perm-A-Barrier Liquid, 60 mils thick (wet).
  - j. Water-based Primer: Perm-A-Barrier WB Primer.
  - k. Solvent-Based Primer: Bituthene Primer B2 and Bituthene Primer B2 LVC.
  - l. Through-Wall Flashings or Shelf Angle Flashings: Perm-A-Barrier Wall Flashing.
  - m. Mastics, Adhesives and Tapes: As recommended by Grace Construction Products.
  - n. Transition Strip: Perm-A-Barrier Detail Membrane and Perm-A-Barrier Wall Flashing.
  - o. Transition Strip: Bituthene Primer B02.
  - p. Termination Mastic: Bituthene Liquid membrane and as recommended by Grace Construction Products.
  - q. Window Flashing and Detail Membrane: Perm-A-Barrier Detail Membrane and Perm-A-Barrier Wall Flashing.
  - r. Website: [www.na.graceconstruction.com](http://www.na.graceconstruction.com).
2. Henry:
  - a. Fluid-Applied Air and Vapor Barrier for Cold Climates: Air Block 06, 3/32 inch thick (93 mils) (wet).
  - b. Fluid-Applied Air and Vapor Barrier for Cold Climates (Also Used as Insulation Adhesive): Air Bloc 21 and Air Bloc 21FR fire-resistive type, 1/8 inch thick (120 mils) (wet).
  - c. Fluid-Applied Air and Vapor Barrier for Hot and Humid Climates, Low VOC: Air Bloc 32, 75 to 120 mils thick (wet).
  - d. Transition Membrane: Blueskin SA and Blueskin SA LT for low temperature applications.
  - e. Water-Based Primer for Transition Membrane: Aquatec Primer.
  - f. Solvent-Based Primer for transition Membrane: Blueskin Adhesive.
  - g. Solvent-Based Aerosol Primer for Transition Membrane: Blueskin Spray Prep.
  - h. Counterflashing for Masonry Through-Wall Flashing: Blueskin TWF.
  - i. Mastics, Adhesives and Tapes: Henry 570-05 Polybitume.
  - j. Website: [www.henry.com](http://www.henry.com).
3. Tremco, Inc
  - a. Fluid-Applied Air and Vapor Barrier Membrane: ExoAir 120SP (spray- applied and ExoAir 120R (roller-grade), 60 mils (wet) (25 square feet per gallon for sheathing panels and 20 square feet per gallon for unparged masonry walls).
  - b. Water-based Primer: ExoAir WB Primer.
  - c. Solvent-Based Primer: ExoAir Primer or GM Primer or ExoAir 10 Primer as recommended.
  - d. Counterflashing for Masonry Trough-Wall Flashings: ExoAir TWF.
  - e. Mastics, Adhesives and Tapes: As recommended by manufacturer.
  - f. Website: [www.tremcosealants.com](http://www.tremcosealants.com)

4. W.R. Meadows, Inc.:
  - a. Fluid-Applied Air and Vapor Barrier: Air-Shield LM and Air-Shield LM All Season (for cold temperature applications), 60 mils 9wet0, 45 mils (dry).
  - b. Detailing Strips: Air-Shield Self-Adhering Air Barrier.
  - c. Water-Based Primer: Mel-Prime WB.
  - d. Solvent-Based Primer: Mel-Prime VOC and Mel-Prime NE.
  - e. Counterflashing for Masonry Through-Wall Flashings: Air-Shield Through-Wall Flashing.
  - f. Mastics, Adhesives and Tapes: Pointing Mastic.
  - g. Website: [www.wrmeadows.com](http://www.wrmeadows.com)
5. Protective Coatings Technology Inc.:
  - a. Fluid-Applied Air and Vapor Barrier Membrane: Poly-Wall AirLok or AirLok Flex as recommended by manufacturer, 8-12 mils (dry) (50-80 square feet per gallon inversely related to texture and porosity of wall surface.)
  - b. Water-Based Primer: As recommended by manufacturer.
  - c. Solvent-Based Primer: Poly-Wall AirLok or AirLok Flex as recommended.
  - d. Counterflashing for Masonry Trough-Wall Flashings: Poly-Wall CrackGuard.
  - e. Mastics, Adhesives and tapes; As recommended by manufacturer.
  - f. Website: [www.poly-wall.com](http://www.poly-wall.com).

## 2.2 AUXILIARY MATERIALS

- A. Primer: As recommended for substrate by air-barrier material manufacturer.
- B. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.
- C. Transition Membranes:
  1. Counterflashing Strip: Modified bituminous 40-mil (1.0 mm) thick, self-adhering sheet consisting of 32 mils (0.8 mm) of rubberized asphalt laminated to an 8-mil (0.2 mm) thick, cross-laminated polyethylene film with release liner backing.
  2. Elastomeric Flashing Sheet: Neoprene, ASTM D 2000 Designation 2BC415 to 3BC620, 50 to 65 mil (1.3 mm to 1.6 mm) thick with non-corrosive termination bars and fasteners unless recommended otherwise by membrane manufacturer. Adhesive and lap sealant as recommended by manufacturer.
  3. Cured Silicone Flashing/Performed Silicon-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
    - a. Products: Subject to compliance with requirements. Available products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Dow Corning Corporation; 123 Silicone Seal.
      - 2) Momentive Performance Materials Inc.; US11000 UltraSpan.
      - 3) Pecora Corporation; Sil-Span.
      - 4) Tremco Incorporated, an RPM company; Spectrem Simple Seal.
  4. Transition Membrane between Air and Vapor barrier membrane and Roofing: Comply with both air and vapor barrier manufacturer's recommendations and roofing material manufacturer's recommendations.
- D. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions under which air and vapor barrier assemblies will be applied, with Installer present, for compliance with requirements.
  - 1. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
  - 2. Do not proceed with installation until after minimum concrete curing period recommended by air and vapor barrier manufacturer.
  - 3. Ensure that the following conditions are met:
    - a. Surfaces are sound, dry, even and free of oil, grease, dirt, excess mortar or other contaminants.
    - b. Masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.
  - 4. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263 and take suitable measures until substrate passes moisture test.
  - 5. Verify sealants used in sheathing are compatible with membrane proposed for use.
  - 6. Notify Architect in writing of anticipated problems using air and vapor barrier over substrate prior to proceeding.

### 3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrate according to manufacturer's written instructions. Ensure clean, dust-free, and dry substrate for air and vapor barrier application, mask off adjoining surfaces to prevent overspray and spillage.
- B. Prime substrate for application of sheet membrane transition strips as recommended by manufacturer and as follows:
  - 1. Prime masonry, substrates with conditioning primer.
  - 2. Prime glass-fiber surfaced gypsum sheathing an adequate number of coats to achieve required bond, with adequate drying time between coats.
  - 3. Prime wood, metal, and painted substrates with primer.
  - 4. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air and vapor barrier and at protrusions.
- C. Prime substrate for application of fluid-applied air and vapor barrier if recommended by manufacturer based on project conditions.

### 3.3 INSTALLATION

- A. Air and Vapor Barrier Installation: Install transition strip materials and fluid-applied air and vapor barrier to provide continuity throughout the building envelope. Install materials in accordance with manufacturer's recommendations and as follows, unless manufacturer recommends other procedures in writing based on project conditions or particular requirements of their recommended materials:
  - 1. Apply primer for transition strips at a rate recommended by manufacturer. Allow primer to dry completely before transition strip application. Apply as many coats as necessary for proper adhesion.
  - 2. Apply primer for fluid-applied air and vapor barrier as recommended by fluid-applied air and vapor barrier manufacturer. Based on manufacturer's recommendation, no primer may be required for the fluid-applied materials.
  - 3. Apply fluid-applied air and vapor barrier using equipment and methods recommended by manufacturer, to achieve a dry film thickness as recommended by the manufacturer.

4. Apply fluid-applied air and vapor barrier and transition strips to shed water naturally without interception by a sheet edge, unless that edge is sealed with permanently flexible termination mastic.
5. Position subsequent sheets of transition strips applied above so that membrane overlaps the membrane sheet below by a minimum of 2 inches (50 mm), unless greater overlap is recommended by manufacturer. Roll into place with roller.
6. Overlap horizontally adjacent pieces of transition strips a minimum of 2 inches (50 mm), unless greater overlap is recommended by manufacturer. Roll seams with roller.
7. Seal around all penetrations with termination mastic, extruded silicone sealant, membrane counterflashing or other procedure in accordance with manufacturer's recommendations.
8. Connect air and vapor barrier in exterior wall assembly continuously to all adjacent construction and seal penetrations.
9. At changes in substrate plane, provide transition material (bead of sealant, mastic, and extruded silicone sealant, membrane counterflashing or other material recommended by manufacturer) under membrane to eliminate all sharp 90 degree inside corners and to make a smooth transition for one plane to another.
10. Provide mechanically fastened non-corrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate or as recommended by the manufacturer.
11. At through-wall flashings, provide an additional 6 inch wide strip of manufacturer's recommended membrane counterflashing to seal top of through-wall flashing to membrane or as recommended by manufacturer. Seal exposed top edge of strip with bead of mastic or as recommended by manufacturer.
12. At deflection and control joints provide backup for the membrane to accommodate anticipated movement.
13. At expansion of seismic joints provide transition to the joint assemblies.
14. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer.
15. At end of each working day, seal top edge of membrane to substrate with termination mastic.
16. Do not allow materials to come in contact with chemically incompatible materials.
17. Do not expose membrane to sunlight longer than as recommended by the manufacturer.
18. Inspect installation prior to enclosing assembly and repair punctures, damaged areas and inadequately lapped seams with a patch of membrane palled as recommended by manufacturer.

### 3.4 PROTECTING AND CLEANING

- A. Protect air vapor barrier assemblies from damage during application and remainder of construction period, according to manufacturer's written instructions.
  1. Coordinate with installation of materials which cover air and vapor membrane, to ensure exposure period does not exceed that recommended by the air and vapor barrier manufacturer.
  2. Do not allow materials to come in contact with chemically incompatible materials.
  3. Do not expose membrane to sunlight longer than as recommended by the manufacturer.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer.

END OF SECTION 07 26 00

## 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. Porcelain enamel metal wall panels
  2. All sealants in joints between metal panel components and between panels and adjoining construction, except between wall panels and door and window framing.
  3. All necessary connection hardware for attachment of the above installations.

### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  1. Meet with Owner, Architect, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
  2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
  4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
  5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
  6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
  7. Review temporary protection requirements for metal panel assembly during and after installation.
  8. Review of procedures for repair of metal panels damaged after installation.
  9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:



1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
  2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.
1. Include Samples of trim and accessories involving color selection.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer.
  - B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
  - C. Field quality-control reports.
  - D. Sample Warranties: For special warranties.
- 1.6 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For metal panels to include in maintenance manuals.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer. Supplier and installer must be able to demonstrate a minimum of 10 year's experience and must have successfully completed at least 5 projects in architectural porcelain enamel. Supplier must be able to demonstrate that all fabrication is executed by a single provider.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
  - B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
  - C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
  - D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
  - a. Structural failures including rupturing, cracking, or puncturing.
  - b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
  - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
  - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
  - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - d. Failure to maintain standards listed in Porcelain Enamel Institute Standard PEI:S100.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Provide architectural porcelain enamel metal panel wall system as specified and as shown on the drawings. Provide materials by the following manufacturers or approved equal.
1. PG Bell
  2. Cherokee Porcelain
  3. Polyvision Corporation
  4. Nemiroff Group, Inc.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
  - 1. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 1.57 lbf/sq. ft.
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
  - 1. Test-Pressure Difference: 2.86 lbf/sq. ft..
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

## 2.3 CONCEALED-FASTENER METAL WALL PANELS

- A. General: Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Reveal-Joint, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and a flat pan between panel edges; with narrow reveal joint between panels.
  - 1. Porcelain Enameled steel: Porcelain Enameled face steel with core and steel back sheet.
    - a. Face Sheet: low metalloids and copper content, ASTM A424 Type 1. Steel shall be stretcher leveled. Thickness steel shall be 18 ga.
    - b. Core: 0.5 inch water resistant gypsum board or comparable exterior grade product.
    - c. Back Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 coating designation
    - d. Enamelling: Ground coat and cover coat frit shall be suitably selected material to achieve the finish and coverage of the panels, to standards required in this specification. Frits selected shall be acid resistant type in order to achieve an A or AA acid resistance. Porcelain enamel coating to be applied following fabrication of panels. Welds shall be clean, sound and solid, free from defects and ground smooth. All necessary penetrations shall be drilled or cut before application of porcelain enamel.
      - 1) Ground coat thickness: 0.005 in.
      - 2) Cover coat: 0.009 in.
      - 3) Final finish shall be satisfactory color and texture to match the sample approved by architect with 1 NBS unit. Porcelain enamel surfaces shall be fired simultaneously with the finish coat.
    - e. Adhesives: Adhesives used to bond the core to the metal face shall be a high performance neoprene based cement. Adhesives shall be water resistant and heat resistant up to 2120F

- f. Dimensions: Panels shall be formed to shapes and sized in accordance with approved drawings. The tolerance for length and width shall be 0.08in. The tolerance for squareness shall not exceed 0.24 in on diagonals of panel.
- g. Fully laminated panels up to 20sf shall meet the following flatness criteria:
  - 1) Convex: 0.24 in when measured perpendicular to the nominal plane of the panel face.
  - 2) Concave: 0.12 in from actual plane of face.

## 2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
  - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
  - 2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

## 2.5 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
  - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

## 2.6 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
  2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

### 3.3 METAL PANEL INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels.
  2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
  3. Install screw fasteners in predrilled holes.
  4. Locate and space fastenings in uniform vertical and horizontal alignment.
  5. Install flashing and trim as metal panel work proceeds.
  6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
  8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.

2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
- E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
  2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- C. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- D. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- E. Prepare test and inspection reports.

### 3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 13.13



## 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. Adhered ethylene-propylene-diene-monomer (EPDM) roofing system.
  - 2. Vapor retarder.
  - 3. Roof insulation.

### 1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

### 1.4 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.
  - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
  - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
  - 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
  - 5. Review structural loading limitations of roof deck during and after roofing.
  - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
  - 7. Review governing regulations and requirements for insurance and certificates if applicable.
  - 8. Review temporary protection requirements for roofing system during and after installation.
  - 9. Review roof observation and repair procedures after roofing installation.

### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
  - 1. Base flashings and membrane terminations.
  - 2. Tapered insulation, including slopes.
  - 3. Roof plan showing orientation of steel roof deck and orientation of roofing and fastening spacings and patterns for mechanically fastened roofing.
  - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
  - 1. Submit evidence of complying with performance requirements.
- C. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
- E. Field quality-control reports.
- F. Sample Warranties: For manufacturer's special warranties.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

#### 1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
  - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

#### 1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

#### 1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
  - 1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, and other components of roofing system.
  - 2. Warranty Period: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain components including roofing insulation and fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
  - 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
  - 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures: based on typical industry standard of care.
- D. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- E. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.
- F. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

### 2.3 EPDM ROOFING

- A. EPDM: ASTM D 4637, Type II, scrim or fabric internally reinforced, uniform, flexible EPDM sheet.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Carlisle SynTec Incorporated
    - b. GAF
    - c. Johns Manville
  - 2. Thickness: 60 mils, nominal.
  - 3. Exposed Face Color: White.

### 2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
  - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: 60-mil-thick EPDM, partially cured or cured, according to application.
- C. Protection Sheet: Epichlorohydrin or neoprene nonreinforced flexible sheet, 55- to 60-mil-thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.
- D. Bonding Adhesive: Manufacturer's standard.

- E. Modified Asphaltic Fabric-Backed Membrane Adhesive: Roofing system manufacturer's standard modified asphalt, asbestos-free, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.
- F. Water-Based, Fabric-Backed Membrane Adhesive: Roofing system manufacturer's standard water-based, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.
- G. Low-Rise, Urethane, Fabric-Backed Membrane Adhesive: Roof system manufacturer's standard spray-applied, low-rise, two-component urethane adhesive formulated for compatibility and use with fabric-backed membrane roofing.
- H. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 3-inch-wide minimum, butyl splice tape with release film.
- I. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.
- J. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
- K. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- L. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening membrane to substrate, and acceptable to roofing system manufacturer.
- M. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.
  - 1. Provide white flashing accessories for white EPDM membrane roofing.
    - a. USG Corporation.
- N. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate panel to roof deck.

## 2.5 VAPOR RETARDER

- A. Self-Adhering-Sheet Vapor Retarder: Polyethylene film laminated to layer of butyl rubber adhesive, minimum 30-mil-total thickness; maximum permeance rating of 0.1 perm; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.

## 2.6 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by EPDM roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Global-approved roof insulation.
- B. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.6-lb/cu. ft. minimum density, square edged.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Dow Chemical Company
  - b. Kingspan Insulation Limited
  - c. Owens Corning
- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches unless otherwise indicated.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

## 2.7 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
  1. Modified asphaltic, asbestos-free, cold-applied adhesive.
- D. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.
  1. CertainTeed Corporation
  2. National Gypsum Company
  3. USG Corporation

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
  1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
  2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
  3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

### 3.3 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

### 3.4 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
  - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
  - 1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
  - 2. Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
  - 1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

### 3.5 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.
- B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.
- E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeters.
- F. Apply roofing with side laps shingled with slope of roof deck where possible.
- G. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.
- H. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
- I. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal membrane roofing in place with clamping ring.

### 3.6 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

### 3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.
- B. Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.



1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.
  2. Flood each area for 48 hours.
  3. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- D. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

### 3.8 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

### 3.9 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS \_\_\_\_\_ of \_\_\_\_\_, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
1. Owner: College of Dupage.
  2. Address: 425 Fawell Blvd, Glenn Ellyn, IL 60137.
  3. Building Name/Type: SRC.
  4. Area of Work: Entry #2 vestibule.
  5. Acceptance Date: \_\_\_\_\_.
  6. Warranty Period: 15 years.
  7. Expiration Date: \_\_\_\_\_.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
  - a. lightning;
  - b. peak gust wind speed exceeding 70mph;
  - c. fire;
  - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
  - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
  - f. vapor condensation on bottom of roofing; and
  - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_.

1. Authorized Signature: \_\_\_\_\_.
2. Name: \_\_\_\_\_.
3. Title: \_\_\_\_\_.

END OF SECTION 07 53 23

## 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. Copings.
  - 2. Roof-edge specialties.
  - 3. Reglets and counterflashings.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof specialties.
  - 1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
  - 2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
  - 3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
  - 4. Detail termination points and assemblies, including fixed points.
  - 5. Include details of special conditions.
- C. Samples: For each type of roof specialty and for each color and texture specified.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Certificates: For each type of roof specialty.
- C. Product Test Reports: For copings and roof-edge flashings, for tests performed by a qualified testing agency.
- D. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are SPRI ES-1 tested to specified design pressure.
- B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.
- B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.
- B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

- A. Roofing-System Warranty: Roof specialties are included in warranty provisions.
- B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

### 2.2 ROOF-EDGE SPECIALTIES

- A. Canted Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed galvanized-steel sheet cant, 0.028 inch thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.
  - 1. Metallic-Coated Steel Sheet Fascia Covers: Zinc-coated (galvanized) steel, nominal 0.028-inch thickness.
    - a. Surface: Smooth, flat finish.
    - b. Finish: Two-coat fluoropolymer.
    - c. Color: As selected by Architect from manufacturer's full range.
  - 2. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
  - 3. Receiver: Galvanized-steel sheet, nominal 0.040-inch thickness.

### 2.3 REGLETS AND COUNTERFLASHINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Berridge Manufacturing
  - 2. Castle Metal Products
  - 3. Fry Reglet Corporation
- B. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
  - 1. Stainless Steel: 0.019 inch thick.
  - 2. Corners: Factory mitered and continuously welded.
  - 3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
- C. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
  - 1. Stainless Steel: 0.019 inch thick.

D. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

E. Stainless-Steel Finish: No. 2B (bright, cold rolled, unpolished).

2.4 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
1. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- B. Elastomeric Sealant: ASTM C 920, elastomeric [polyurethane] [silicone] polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- E. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.
  - 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
  - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
  - 3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
  - 4. Torch cutting of roof specialties is not permitted.
  - 5. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Coat concealed side of stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
  - 2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
  - 1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
  - 2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

- E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.
- F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

### 3.3 REGLET AND COUNTERFLASHING INSTALLATION

- A. General: Coordinate installation of reglets and counterflashings with installation of base flashings.
- B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.
- C. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant. Fit counterflashings tightly to base flashings.

### 3.4 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
- D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 71 00



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. Silicone joint sealants.
  - 2. Urethane joint sealants.
  - 3. Polysulfide joint sealants.
  - 4. Latex joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

#### 1.7 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: 5 years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: 20 years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
  1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  2. Disintegration of joint substrates from causes exceeding design specifications.
  3. Mechanical damage caused by individuals, tools, or other outside agents.
  4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

### PART 2 - PRODUCTS

#### 2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

#### 2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
  1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. BASF Building Systems, Omniseal 50
- b. Dow Corning; 795
- c. Sika Corporation; SikaSil-C995

### 2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.
  1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Tremco; Dymeric 240 and Dymeric 240 FC
    - b. Pecora Corporation; Dynatrol II
    - c. Polymeric Systems; PSI-270

### 2.4 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
  1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. BASF Building Systems, Sonolac.
    - b. Pecora Corporation; AC-20+
    - c. Tremco; Tremflex 834

### 2.5 SOLVENT-RELEASED-CURING JOINT SEALANT

- A. Acrylic-Based Joint Sealant: ASTM C 1311.
  1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Schnee-Morehead, Inc.; Acryl-R Acrylic Sealant..
    - b. Tremco Incorporated; Mono 555.
- B. Butyl-Rubber-Based Joint Sealant: ASTM C 1311.
  1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Bostik, Inc.; Chem-Calk 300.
    - b. Corporation; BC-158.
    - c. Tremco Incorporated; Tremco Butyl Sealant.
- C. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.

- b. Glass.
  - c. Porcelain enamel.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
- 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
- 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

### 3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
    - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  2. Inspect tested joints and report on the following:
    - a. Whether sealants filled joint cavities and are free of voids.
    - b. Whether sealant dimensions and configurations comply with specified requirements.
    - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
  3. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
  4. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### 3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### 3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces; JS-1.

1. Joint Locations:
    - a. Isolation and contraction joints in cast-in-place concrete slabs.
    - b. Joints between plant-precaster architectural concrete paving units.
    - c. Joints between different materials listed above.
    - d. Other joints as indicated on Drawings.
  2. Joint Sealant: Urethane, M, P, 50, T, NT >.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.
1. Joint Locations:
    - a. Joints in pedestrian plazas.
    - b. Other joints as indicated on Drawings.
  2. Joint Sealant: Urethane, immersible, S, P, 25, T, NT, I.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
    - a. Construction joints in cast-in-place concrete.
    - b. Joints between metal panels.
    - c. Perimeter joints between materials listed above and frames of doors and windows.
    - d. Control and expansion joints in ceilings.
    - e. Other joints as indicated on Drawings.
  2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
    - a. Isolation joints in cast-in-place concrete slabs.
  2. Joint Sealant: Urethane, S, P, 25, T, NT.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
1. Joint Locations:
    - a. Control joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
    - c. Other joints as indicated on Drawings.
  2. Joint Sealant: Acrylic latex.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- F. Joint-Sealant Application: Concealed mastics.
  - 1. Joint Locations:
    - a. Aluminum thresholds.
    - b. Sill plates.
    - c. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Butyl-rubber based.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 92 00



## 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. Exterior and interior manual-swing entrance doors and door-frame units.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
  - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  - 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.
  - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water penetration through fixed glazing and framing areas.
    - e. Failure of operating components.
  - 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- B. Structural Loads:
  1. Wind Loads: As indicated on Drawings.
- C. Deflection of Framing Members: At design wind pressure, as follows:
  1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
- D. Structural: Test according to ASTM E 330 as follows:
  1. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  2. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
  1. Fixed Framing and Glass Area:
    - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
  2. Entrance Doors:
    - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft at a static-air-pressure differential of 1.57 lbf/sq. ft..

- F. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
  - 1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
- G. Energy Performance: Certify and label energy performance according to NFRC as follows:
  - 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.69 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
- H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 MANUFACTURERS

- A. Subject to compliance with requirements, provide Kawneer Toughline stile and rail 500 heavy duty or equal.
- B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

## 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Glazing System: Retained mechanically with gaskets on four sides.
  - 2. Glazing Plane: Front.
  - 3. Finish: Kynar 500 or equal – Bright White to match existing curtain wall.
  - 4. Fabrication Method: Field-fabricated stick system.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Materials:
  - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. Sheet and Plate: ASTM B 209.
    - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
    - d. Structural Profiles: ASTM B 308/B 308M.
  - 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

- a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
- b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
- c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
  - 1. Door Construction: 2- to 2-1/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
    - a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
  - 2. Door Design: Wide stile; 5-inch nominal width.
  - 3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
    - a. Provide nonremovable glazing stops on outside of door.

## 2.5 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.
- D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

## 2.6 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  - 2. Reinforce members as required to receive fastener threads.
  - 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  1. Profiles that are sharp, straight, and free of defects or deformations.
  2. Accurately fitted joints with ends coped or mitered.
  3. Physical and thermal isolation of glazing from framing members.
  4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
  1. At exterior doors, provide compression weather stripping at fixed stops.
  2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
  1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
  2. At exterior doors, provide weather sweeps applied to door bottoms.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.8 ALUMINUM FINISHES

- A. Kynar 500 or equal; Bright White to match existing

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.
  - 3. Fit joints to produce hairline joints free of burrs and distortion.
  - 4. Rigidly secure nonmovement joints.
  - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
  - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
  - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
  - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Section 088000 "Glazing."
- G. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

- H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
  - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
  - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

### 3.4 FIELD QUALITY CONTROL

- A. Field Quality-Control Testing: Perform the following test on exterior aluminum-framed entrances and storefront.
  - 1. Water-Spray Test: Before installation of interior finishes has begun, aluminum framed entrances and storefront must be tested according to AAMA 501.2 and shall not evidence water penetration.
- B. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.5 MAINTENANCE SERVICE

- A. Entrance Door Hardware:
  - 1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.

END OF SECTION 08 41 13



## 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. Mechanical door hardware for the following:
    - a. Swinging doors.
  - 2. Electrified door hardware.
  - 3. Access controls, including card reader, wiring and connections to existing security panel.
- B. Related Sections:
  - 1. Section 084113 "Aluminum-Framed Entrances and Storefronts" for entrance doors.
  - 2. Section 281300 "Access Control" for access control devices installed at door openings and provided as part of a security system.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Details of electrified door hardware, indicating the following:
  - 1. Wiring Diagrams: For power, signal, and control wiring and including the following:
    - a. Details of interface of electrified door hardware and building safety and security systems.
    - b. Schematic diagram of systems that interface with electrified door hardware.
    - c. Point-to-point wiring.
    - d. Risers.
    - e. Elevations doors controlled by electrified door hardware.
  - 2. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.
- C. Other Action Submittals:
  - 1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

- a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
  - b. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
  - c. Content: Include the following information:
    - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
    - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
    - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
    - 4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
    - 5) Fastenings and other pertinent information.
    - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
    - 7) Mounting locations for door hardware.
    - 8) List of related door devices specified in other Sections for each door and frame.
2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Architectural Hardware Consultant.
- B. Product Certificates: For electrified door hardware, from the manufacturer.
- C. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- D. Warranty: Special warranty specified in this Section.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.
- B. Provide the following in accordance with Division 01 and include:
  1. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
  2. Catalog pages for each product.
  3. Parts list for each product.
  4. Final approved hardware schedule, edited to reflect conditions as-installed.
  5. Final keying schedule

6. Copies of floor plans with keying nomenclature
7. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

## 1.6 QUALITY ASSURANCE

- A. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
  1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
  2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.
- C. Source Limitations: Obtain each type of door hardware from a single manufacturer.
  1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.
  2. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.
- D. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- E. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- F. Accessibility Requirements: Comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design, ICC A117.1, and Illinois Accessibility Code for door hardware on doors in an accessible route.
  1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
  2. Comply with the following maximum opening-force requirements:
    - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
  3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
  4. Closers: Adjust door and gate closer sweep periods so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.

- G. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
  - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
  - 2. Preliminary key system schematic diagram.
  - 3. Requirements for key control system.
  - 4. Requirements for access control.
  - 5. Address for delivery of keys.
- H. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Inspect and discuss preparatory work performed by other trades.
  - 3. Inspect and discuss electrical roughing-in for electrified door hardware.
  - 4. Review sequence of operation for each type of electrified door hardware.
  - 5. Review required testing, inspecting, and certifying procedures.
- I. Electrified Hardware Coordination Conference: Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.
  - 1. Attendees: Electrified door hardware supplier, doors and frames supplier, electrified door hardware installer, electrical subcontractor, Owner, Owner's security consultant, Contractor.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

#### 1.8 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Structural failures including excessive deflection, cracking, or breakage.
    - b. Faulty operation of doors and door hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
  2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
    - a. Mechanical Closers: 30 years.
    - b. Automatic Door Operators: 2 years.
    - c. Mechanical Exit Devices: 3 years.
    - d. Electrified Exit Devices: 1 year.
    - e. Continuous Hinges: Lifetime warranty.
    - f. Key Blanks: Lifetime.

1.10 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
  2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

## 2.2 FASTENERS

- A. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
- B. Furnish screws for installation with each hardware item. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work, including prepared for paint surfaces to receive painted finish.
- C. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
- D. Install hardware with fasteners provided by hardware manufacturer.
- E. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
  1. Where fasteners are exposed to view, match finish to adjacent door hardware.

## 2.3 CONTINUOUS HINGES

- A. Aluminum Geared
  1. Manufacturers: Provide continuous hinges manufactured by Hager. No substitutions.
  2. Requirements:
    - a. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.25, Grade 2.
    - b. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum, with 0.25-inch diameter Teflon coated stainless steel hinge pin.
    - c. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
    - d. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
    - e. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with sufficient number and wire gauge to accommodate electric function of specified hardware.
    - f. Install hinges with fasteners supplied by manufacturer.
    - g. Provide hinges with symmetrical hole pattern.

## 2.4 ELECTRICAL POWER TRANSFER

- A. Manufacturers:
  - 1. Von Duprin. No substitutions allowed.
- B. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.
- C. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

## 2.5 EXIT DEVICES

- A. Manufacturer and Product: Von Duprin 99 series. No substitutions acceptable.
- B. Requirements:
  - 1. Provide exit devices tested to ANSI/BHMA A156.3-2014 Grade 1 and UL listed for Panic Exit or Fire Exit hardware.
  - 2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
  - 3. Quiet Operation: Incorporate fluid damper or other device that eliminates noise of exit device operation.
  - 4. Touchpad: Extend minimum of one half of door width, but not the full length of exit device rail. Provide end-cap with two-point attachment to door. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. Provide compression springs in devices, latches, and outside trims or controls; tension springs prohibited.
  - 5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrical requirements.
  - 6. Provide exit devices with manufacturer's approved strikes.
  - 7. Provide exit devices cut to door width and height. Locate exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
  - 8. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
  - 9. Removable Mullions: 2 inches x 3 inches steel tube. Where scheduled as keyed removable mullion that is removed by use of a keyed cylinder, which is self-locking when re-installed.
  - 10. Provide VE910 trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
    - a. Lever Style: Match lever style of locksets.
    - b. Tactile Warning (Knurling): Where required by authority having jurisdiction.
  - 11. Provide UL labeled fire exit hardware for fire rated openings.
  - 12. Provide factory drilled weep holes for exit devices used in full exterior application.
  - 13. Provide electrified options as scheduled in the hardware sets.

## 2.6 POWER SUPPLIES

- A. Manufacturers and Product: Von Duprin PS900 Series. No Substitutions acceptable.

B. Requirements:

1. Provide power supplies, recommended and approved by manufacturer of electrified locking component, for operation of electrified locks, electrified exit devices, magnetic locks, electric strikes, and other components requiring power supply.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Required:
  - a. Provide power supply, where specified, with internal capability of charging sealed backup batteries 24 VDC, in addition to operating DC load.
  - b. Provide sealed batteries for battery back-up at each power supply where specified.
  - c. Provide keyed power supply cabinet.
5. Provide power supply in an enclosure, complete, and requiring 120VAC to fused input.
6. Provide power supply with emergency release terminals, where specified, that allow release of all devices upon activation of fire alarm system complete with fire alarm input for initiating "no delay" exiting mode.

2.7 KEYING – C.O.D. (OWNER) LOCKSHOP TO PROVIDE PERMANENT KEYED CORES

- A. A. Factory key, master key, grand-master key, and great grand master key locks and cylinders into the existing established Medeco® KeyMark™ 7-pin SFIC (Ext. Face small format interchangeable core) system as directed by F.O. & M. – Lockshop.
- B. Unless otherwise specified, furnish two key blanks for each Medeco® KeyMark™ core, two original keys for each new keyset as directed by F.O. & M. - Lockshop. Original keys shall be factory stamped and embossed by Medeco®. Key blanks to be coined by Medeco® per existing contract and coining die.
- C. Construction core keying to be provided by the contractor for the security of the project, its materials and the surrounding areas affected by the project. The construction keying should allow the contractor to efficiently perform their contracted duties and the testing of all installed locking hardware.
  1. Furnish required amounts of construction keys, master keys and construction core removal keys as needed by the project.
  2. Use only the construction keys during construction. Furnish two each construction master keys and core removal keys to F.O. & M – Lockshop upon installation of the construction cores.
  3. Upon Substantial completion of the Work (as that date is established by the Architect) in the presence of the Architect or a designee, demonstrate the function of each lock and cylinder using the construction cores and keying. When approved, remove the construction cores and requires the permanent cores be installed.

D. Identification and delivery address:

Facilities, Operations, & Maintenance  
Lockshop – IC 1082A  
425 Fawell Blvd.  
Glen Ellyn, IL 60137-6599

1. Factory stamped and embossed permanent keys will be shipped under separate cover from Medeco® direct to: F.O. & M. – Lockshop by registered mail or receipted personal delivery. Each type of key will be tagged or bagged for easy identification.



2. Factory marked (SL Stamp Lok – on face) Ext. Face cores will be shipped under separate cover from Medeco® direct to: Campus services – Lockshop by registered mail or receipted personal delivery. Core face stamping will be specified by F.O. & M. – Lockshop (as per in place standards and practices). Each Ext. Face core shall be individually tagged with a corresponding architectural reference that identifies its installation location. After Ext. Face core prep is completed at F.O. & M. Lockshop, Ext. Face cores will be available for installation at the appropriate time.
3. Factory generated list/schedule for the project will be shipped under separate cover from Medeco® direct to: F.O. & M. – Lockshop by registered mail or receipted personal delivery.

## 2.8 DOOR CLOSERS

### A. Manufacturers and Products:

1. 1. Scheduled Manufacturer and Product: LCN 4040XP series.
2. 2. Acceptable Manufacturers and Products: No Substitute.

### B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2 inch diameter with 3/4 inch diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 2.9 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

### A. Manufacturers and Products:

1. 1. Scheduled Manufacturer and Product: Record 8100.
2. 2. Acceptable Manufacturers and Products: No Substitute.

### B. Requirements:

1. 1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.
  - a. Opening: Powered by DC motor working through reduction gears.
  - b. Closing: Spring force.
  - c. Manual, hydraulic, or chain drive closers: Not permitted.

- d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
- e. Cover: Aluminum.
2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 2 to 30 seconds, and logic terminal to interface with accessories, mats, and sensors.
3. Provide drop plates, brackets, or adapters for arms as required to suit details.
4. Provide hard-wired motion sensors and/or actuator switches for operation as specified. Provide weather-resistant actuators at exterior applications.
5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
7. Provide units with inputs for smoke evacuation doors, where specified, which allow doors to power open upon fire alarm activation and hold open indefinitely or until fire alarm is reset, presence detector input, which prevents closed door from opening or door that is fully opened from closing, hold open toggle input, which allows remote activation for indefinite hold open and close second time input is activated, vestibule inputs, which allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

## 2.10 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

- A. A. Manufacturers:
  1. 1. Scheduled Manufacturers: Glynn-Johnson.
  2. 2. Acceptable Manufacturers: No Substitute.
- B. B. Requirements:
  1. Provide heavy duty concealed mounted overhead stop or holder as specified for exterior and interior vestibule single acting doors.
  2. Provide heavy duty concealed mounted overhead stop or holder as specified for double acting doors.
  3. Provide heavy or medium duty and concealed or surface mounted overhead stop or holder for interior doors as specified. Provide medium duty surface mounted overhead stop for interior doors and at any door that swings more than 140 degrees before striking wall, open against equipment, casework, sidelights, and where conditions do not allow wall stop or floor stop presents tripping hazard.
  4. Where overhead holders are specified provide friction type at doors without closer and positive type at doors with closer.

## 2.11 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. A. Manufacturers:
  1. Scheduled Manufacturer: Reese.
  2. Acceptable Manufacturers: National Guard, Zero, Pemko.

- B. Requirements:
  - 1. 1. Provide thresholds by Pemko, Model 1715AK Pemkote or approved equal, weatherstripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
  - 2. 2. Size of thresholds:
    - a. Saddle Thresholds: 1/2 inch high by jamb width by door width
    - b. Bumper Seal Thresholds: 1/2 inch high by 5 inches wide by door width
  - 3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

## 2.12 DOOR POSITION SWITCHES

- A. A. Manufacturers:
  - 1. Scheduled Manufacturer: Schlage.
  - 2. Acceptable Manufacturers: GE-Interlogix, Sargent.
- B. B. Requirements:
  - 1. Provide recessed or surface mounted type door position switches as specified.
  - 2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches between switch and magnetic locking device.

## 2.13 2.13 FINSHES

- A. A. Finish: BHMA 626/652 (US26D); except:
  - 1. Hinges at Exterior Doors: BHMA 630 (US32D)
  - 2. Continuous Hinges: BHMA 630 (US32D)
  - 3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
  - 4. Protection Plates: BHMA 630 (US32D)
  - 5. Overhead Stops and Holders: BHMA 630 (US32D)
  - 6. Door Closers: Powder Coat to Match
  - 7. Wall Stops: BHMA 630 (US32D)
  - 8. Latch Protectors: BHMA 630 (US32D)
  - 9. Weatherstripping: Clear Anodized Aluminum
  - 10. Thresholds: Mill Finish Aluminum

## 2.14 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
  - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Lock Cylinders: Install construction cores to secure building and areas during construction period.
  - 1. Replace construction cores with permanent cores as indicated in keying section.
  - 2. Furnish permanent cores to Owner for installation.
- E. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- F. Wiring: Coordinate with Division 26, ELECTRICAL sections for:
  - 1. Conduit, junction boxes and wire pulls.
  - 2. Connections to and from power supplies to electrified hardware.
  - 3. Connections to fire/smoke alarm system and smoke evacuation system.
- G. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect prior to installation.
  - 1. Configuration: Provide one power supply for each door opening with electrified door hardware.

- H. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- I. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- K. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- L. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.3 FIELD QUALITY CONTROL

- A. Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
  - 1. Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

### 3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

### 3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

- A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

- B. Hardware Sets

HARDWARE SET # 01

FOR USE ON DOOR #(S): 2541A

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2 EA	CONT. HINGE	780-112HD EPT	689	HAG
2 EA	POWER TRANSFER	EPT10	689	VON
1 EA	ELEC PANIC HARDWARE	LX-QEL-XP-9949-LBL-NL-OP	626	VON
1 EA	ELEC PANIC HARDWARE	LX-QEL-XP-9949-LBL-EO-OP	626	VON
1 EA	SFIC RIM HOUSING	80-129	626	SCH
1 EA	PERMANENT CORE SFIC	33K700007 - KEYMARK EXTENDED FACE 7 PIN C.O.D. LOCKSHOP PROVIDED	626	MED
1 EA	DOOR PULL	VR910 DT	630	IVE
1 EA	DOOR PULL	VR910 NL	630	IVE
2 EA	OH STOP FOR ADA OPERATOR	100S	630	GLY
1 EA	SURFACE CLOSER	4040XP EDA	689	LCN
1 EA	AUTO OPERATOR	8100	689	REC
1 EA	FLUSH CEILNG MTG PLT	4040-18G	689	LCN
1 EA	ACTUATOR PKG WALL MT	8310-3857T HARDWIRED AND INTERFACED WITH DEVICE (LX) SWITCH	630	LCN
1 EA	WEATHER RING	8310-801	PLA	LCN
2 EA	DOOR SWEEP	18062WNB	AL	PEM
1 EA	THRESHOLD	1715AK PEMKOTE FINISH	AL	PEM
2 EA	DOOR CONTACT	679-05HM/WD AS REQ.	BLK	SCE
1 EA	POWER SUPPLY	PS904 900-4RL AND #900-BB BOARD WITH BATTERIES	LGR	VON
1 EA	CARD READER	MULLION MOUNT; COORD. W/ COD.	WHITE	HID

\*WEATHER SEALS BY ALUMINUM DOOR MANUFACTURER.

\*CARD ACCESS SYSTEM, READER, WIRING AND CONNECTIONS ARE WITHIN PROJECT SCOPE.

HARDWARE SET # 02

FOR USE ON DOOR #(S): 2541B

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2 EA	CONT. HINGE	780-112HD EPT	689	HAG
2 EA	POWER TRANSFER	EPT10	689	VON
2 EA	ELEC PANIC HARDWARE	QEL-XP-9949-LBL-EO-OP	626	VON
2 EA	DOOR PULL	VR910 DT	630	IVE
2 EA	OH STOP	100S	630	GLY
2 EA	SURFACE CLOSER	4040XP EDA	689	LCN
2 EA	FLUSH CEILNG MTG PLT	4040-18G	689	LCN
2 EA	DOOR SWEEP	18062WNB	AL	PEM
1 EA	THRESHOLD	1715AK PEMKOTE FINISH	AL	PEM
2 EA	DOOR CONTACT	679-05HM/WD AS REQ.	BLK	SCE

\*WEATHER SEALS BY ALUMINUM DOOR MANUFACTURER.

HARDWARE SET # 03

FOR USE ON DOOR #(S): 2541C

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2 EA	CONT. HINGE	780-112HD	689	HAG
2 EA	DUMMY PUSH BAR	330	626	VON
2 EA	DOOR PULL	VR910 DT	630	IVE
1 EA	OH STOP	100S	630	GLY
1 EA	SURFACE CLOSER	4040XP EDA	689	LCN
1 EA	AUTO OPERATOR	8100	689	REC
1 EA	FLUSH CEILING MTG PLT	4040-18G	689	LCN

HARDWARE SET # 04

FOR USE ON DOOR #(S): 2541D

EACH TO HAVE:

QTY	DESCRIPTION	CATALOG NUMBER	FINISH	MFR
2 EA	CONT. HINGE	780-112HD	689	HAG
2 EA	DUMMY PUSH BAR	330	626	VON
2 EA	DOOR PULL	VR910 DT	630	IVE
2 EA	OH STOP	100S	630	GLY
2 EA	SURFACE CLOSER	4040XP EDA	689	LCN
2 EA	FLUSH CEILNG MTG PLT	4040-18G	689	LCN
1 EA	ACTUATOR PACKAGE FOR ADA OPERATORS WITH INDEPENDENT CONTROL AS REQUIRED			

College of DuPage  
SRC Door Replacement

DIVISION 08 – OPENINGS  
08 71 00 – Door Hardware

END OF SECTION 08 71 00



## 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. Glass for doors and storefront framing.
  - 2. Glazing sealants and accessories.
- B. Related Requirements:

### 1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

### 1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

### 1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review temporary protection requirements for glazing during and after installation.

### 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For glass.
- C. Product Test Reports: For insulating glass and glazing sealants, for tests performed by a qualified testing agency.
  - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. Sample Warranties: For special warranties.

#### 1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

#### 1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

#### 1.11 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
  1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
  1. Warranty Period: 10 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
  1. Warranty Period: 10 years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Cardinal Glass Industries
  2. Gardner Glass, Inc.
  3. Oldcastle Building Envelope
  4. Pilkington North America
  5. PPG Industries
  6. Viracon
- B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
  1. Obtain tinted glass from single source from single manufacturer.
  2. Obtain reflective-coated glass from single source from single manufacturer.

- C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

## 2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
  - 1. Design Wind Pressures: As indicated on Drawings.
    - a. Wind Design Data: 30 lbs/sq. ft., positive and negative
    - b. Basic Wind Speed: 90 mph>.
    - c. Importance Factor: 1.0.
    - d. Exposure Category: B.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  - 1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
  - 2. For laminated-glass lites, properties are based on products of construction indicated.
  - 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
  - 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
  - 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
  - 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.
- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

## 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  - 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
  - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- C. Thickness: Where glass thickness is indicated, it is a minimum.

1. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.
- E. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

## 2.4 GLASS PRODUCTS

- A. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
  1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
  2. terephthalate film.

## 2.5 INSULATING GLASS UNITS:

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
- B. Manufacturers:
  1. Guardian
  2. Viracon
  3. PPG Industries
  4. Fabricators to be certified by glazing manufacturer for glass type, coating, treatment involved and capable of providing the required warranty.
- C. Insulated Exterior Low E glass units – General
  1. Double pane with silicon sealed edge.
  2. Outer pane ¼" clear tempered glass, Low E Coating, ½" air space, inner pane ¼" tempered, clear.
  3. Durability: Comply with ASTM E 2190, as certified by an independent testing agency.
  4. Comply with ASTM E 774 and E 773, class CBA.
  5. Comply with CPSC – 16 CFR, Part 1201.
  6. Purge inter-pane with dry hermetic air.
  7. Total Unit Thickness – 1 inch.
- D. Performance:
  1. Visible Light Transmission (VLT) 64%
  2. Solar Heat Gain Coefficient (SHGC) 0.27
  3. Reflectance in %: 12 Per Cent. Reflectance out %: 11 Per Cent.
  4. U-Value = 0.28
  5. Light to solar gain LSG = 2.37

- E. Glass Type GL-1
  - 1. Manufacturer: PPG Industries
  - 2. Outer lite: Starphire
  - 3. Inner lite: Clear
  - 4. Low-E Coating: Solar Ban 70

## 2.6 MONOLITHIC GLASS SCHEDULE

- A. Glass Type GL-2: Clear, fully tempered float glass.
  - 1. Minimum Thickness: 6 mm.

## 2.7 GLAZING SEALANTS

- A. General:
  - 1. **Compatibility:** Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. **Suitability:** Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. **Colors of Exposed Glazing Sealants:** As indicated by manufacturer's designations.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
  - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
    - a. Dow Corning Corporation
    - b. Pecora Corporation
    - c. Sika Corporation

## 2.8 GLAZING TAPES

- A. **Back-Bedding Mastic Glazing Tapes:** Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. **Expanded Cellular Glazing Tapes:** Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
  - 1. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

## 2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
  - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
    - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep systems.
  - 3. Minimum required face and edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

### 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.



- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

### 3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

### 3.6 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 80 00

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:

- 1. Non-load-bearing steel framing systems for interior partitions.
- 2. Suspension systems for interior ceilings and soffits.
- 3. Grid suspension systems for gypsum board ceilings.

- B. Related Requirements:

- 1. Section 054000 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Studs and Runners: Provide documentation that framing members' certification is according to SIFA's "Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members."

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft..

### 2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

- 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
- 2. Protective Coating: hot-dip galvanized unless otherwise indicated.

- B. Studs and Runners: ASTM C 645.

1. Steel Studs and Runners:
    - a. Minimum Base-Metal Thickness: As required by performance requirements for horizontal deflection.
    - b. Depth: As indicated on Drawings.
  
  - C. Slip-Type Head Joints: As required, provide one of the following:
    1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
    2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
  
  - D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
    1. Minimum Base-Metal Thickness: 0.0179 inch.
  
  - E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.
    1. Depth: As indicated on Drawings.
    2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
  
  - F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
    1. Minimum Base-Metal Thickness: As indicated on Drawings.
    2. Depth: 7/8 inch.
  
  - G. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
    1. Configuration: Asymmetrical or hat shaped.
  
  - H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
    1. Depth: As indicated on Drawings 3/4 inch.
    2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
    3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
  
  - I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
- 2.3 SUSPENSION SYSTEMS
- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.

- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- C. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch-wide flanges.
  - 1. Depth: 2-1/2 inches.
- E. Furring Channels (Furring Members):
  - 1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
  - 2. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
    - a. Minimum Base-Metal Thickness: 0.0179 inch.
  - 3. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.
    - a. Configuration: Asymmetrical or hat shaped.
- F. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Armstrong World Industries, Inc; Drywall Grid Systems.
    - b. Chicago Metallic Corporation; 640/660 Drywall Ceiling Suspension.
    - c. United State Gypsum Company; Drywall Suspension System.

## 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
- B. Coordination with Sprayed Fire-Resistive Materials:
  - 1. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

### 3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Single-Layer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
- B. Where studs are installed directly against dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

- a. Install two studs at each jamb unless otherwise indicated.
  - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
  - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
- E. Z-Shaped Furring Members:
1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
  2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
  3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

### 3.5 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches o.c.
  2. Carrying Channels (Main Runners): 48 inches o.c.
  3. Furring Channels (Furring Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

- a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
  3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  5. Do not attach hangers to steel roof deck.
  6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
  8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section Includes:
  - 1. Interior gypsum board.
  - 2. Exterior gypsum board for ceilings and soffits.
- B. Related Requirements:
  - 1. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

### 1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.



## PART 2 - PRODUCTS

### 2.1 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### 2.2 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C 1396/C 1396M.
  - 1. Thickness: 1/2 inch.
  - 2. Long Edges: Tapered.
- B. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
  - 1. Thickness: 1/2 inch.
  - 2. Long Edges: Tapered.

### 2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
  - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
  - 2. Shapes:
    - a. Cornerbead.
    - b. Bullnose bead.
    - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - d. L-Bead: L-shaped; exposed long flange receives joint compound.
    - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    - f. Expansion (control) joint.
- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
  - 1. Reveal Trim:
    - a. At edge of vestibule ceiling, provide Fry-Reglet "T" Molding, or similar to create reveal.
  - 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.

### 2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  - 1. Interior Gypsum Board: Paper.
  - 2. Exterior Gypsum Soffit Board: Paper.
  - 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
  - 4. Tile Backing Panels: As recommended by panel manufacturer.

- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
  - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
  - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

## 2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
  - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- D. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.

- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Wallboard Type: Vertical surfaces unless otherwise indicated.
  - 2. Ceiling Type: Ceiling surfaces.
- B. Single-Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
  - 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
  - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

### 3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

- A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
  - 1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
  - 2. Fasten with corrosion-resistant screws.

### 3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners unless otherwise indicated.
  - 2. LC-Bead: Use at exposed panel edges.
- D. Aluminum Trim: Install in locations indicated on Drawings.

### 3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

### 3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

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 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 PIPE LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Actioncraft Products, Inc.; a division of Industrial Test Equipment Co., Inc.
  - 2. Brady Corporation.
  - 3. Brimar Industries, Inc.
  - 4. Carlton Industries, LP.
  - 5. Champion America.
  - 6. Craftmark Pipe Markers.
  - 7. Emedco.
  - 8. Kolbi Pipe Marker Co.
  - 9. LEM Products Inc.
  - 10. Marking Services Inc.
  - 11. Seton Identification Products.
- B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service and showing flow direction according to ASME A13.1.
- C. Self-adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe-Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
  - 1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
  - 2. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.
- E. Pipe-Label Colors:
  - 1. Background Color: Safety Red.
  - 2. Letter Color: White.

PART 2 - PRODUCTS – Not used

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of incompatible primers, paints, and encapsulants, as well as dirt, oil, grease, release agents, and other substances that could impair bond of identification devices.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Install identifying devices before installing acoustical ceilings and similar concealment.

3.3 PIPE LABEL INSTALLATION

- A. Pipe-Label Locations: Locate pipe labels where piping is above accessible ceilings in finished spaces as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection excluding short takeoffs. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
  - 4. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to in areas of congested piping and equipment.
  - 5. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- B. Directional Flow Arrows: Arrows shall be used to indicate direction of flow in pipes including pipes where flow is allowed in both directions.

END OF SECTION 21 05 53

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 DEFINITIONS

- A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig maximum.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For wet-pipe sprinkler systems.
  - 1. Include plans, elevations, sections, attachment details, and hydraulic calculations.
  - 2. Provide minimum 1/8" = 1'-0" scale shop drawings for all piping systems.
- C. Delegated-Design Submittal: For wet-pipe sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by a qualified professional engineer, a licensed architect, or a holder of a valid NICET level 3 or 4 certification in fire protection technology automatic sprinkler system layout, who is responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- 1. Domestic water piping.
- 2. Plumbing vent.
- 3. Items penetrating finished ceiling include the following:
  - a. Lighting fixtures.
  - b. Air outlets and inlets.
- 4. HVAC Ductwork.
- B. Qualification Data: For qualified Installer and professional engineer.
- C. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
- D. Field quality-control reports.



1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wet-pipe sprinkler systems and specialties to include maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.

1.8 FIELD CONDITIONS

- A. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
  - 1. Notify Architect, Construction Manager or Owner no fewer than seven days in advance of proposed interruption of sprinkler service.
- B. All existing equipment affected by this project shall be treated as new.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
  - 1. NFPA 13.
- B. Standard-Pressure Piping System Component: Listed for 175-psig minimum working pressure.
- C. Delegated Design: Engage a qualified professional engineer to design wet-pipe sprinkler systems.
  - 1. Sprinkler system design shall be approved by authorities having jurisdiction.
    - a. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
    - b. Sprinkler Occupancy Hazard Classifications:

- 1) Classrooms, Laboratories Office and Public Areas: Light Hazard.
2. Minimum Density for Automatic-Sprinkler Piping Design:
  - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft.
  - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft.
3. Maximum Protection Area per Sprinkler: According to UL listing.
4. Maximum Protection Area per Sprinkler:
  - a. Classrooms, Laboratories Office Spaces: 225 sq. ft.
  - b. Storage Areas: 130 sq. ft.
  - c. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.

## 2.2 STEEL PIPE AND FITTINGS

- A. Standard-Weight, Black Steel Pipe: ASTM A 53/A 53M, Type E Grade B. Pipe ends may be factory or field formed to match joining method.
- B. Galvanized and Black Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
- C. Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- D. Malleable- or Ductile-Iron Unions: UL 860.

## 2.3 SPRINKLER PIPING SPECIALTIES

- A. Branch Outlet Fittings:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Anvil International.
    - b. National Fittings, Inc.
    - c. Shurjoint Piping Products.
    - d. Tyco Fire & Building Products LP.
    - e. Victaulic Company.
  2. Standard: UL 213.
  3. Pressure Rating: 175-psig minimum.
  4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
  5. Type: Mechanical-tee and -cross fittings.
  6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
  7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
  8. Branch Outlets: Grooved, plain-end pipe, or threaded.
- B. Branch Line Testers:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Elkhart Brass Mfg. Co., Inc.
  - b. Fire-End & Croker Corporation.
  - c. Potter Roemer LLC.
2. Standard: UL 199.
  3. Pressure Rating: 175 psig.
  4. Body Material: Brass.
  5. Size: Same as connected piping.
  6. Inlet: Threaded.
  7. Drain Outlet: Threaded and capped.
  8. Branch Outlet: Threaded, for sprinkler.
- C. Adjustable Drop Nipples:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Aegis Technologies, Inc.
    - b. CECA, LLC.
    - c. Corcoran Piping System Co.
    - d. Merit Manufacturing.
  2. Standard: UL 1474.
  3. Pressure Rating: 250-psig minimum.
  4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
  5. Size: Same as connected piping.
  6. Length: Adjustable.
  7. Inlet and Outlet: Threaded.
- D. Flexible Sprinkler Hose Fittings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Fivalco Inc.
    - b. FlexHead Industries, Inc.
    - c. Gateway Tubing, Inc.
    - d. Victaulic Company.
  2. Standard: UL 1474.
  3. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
  4. Pressure Rating: 175-psig minimum 300 psig.
  5. Size: Same as connected piping, for sprinkler.

## 2.4 SPRINKLERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Globe Fire Sprinkler Corporation.
  2. Reliable Automatic Sprinkler Co., Inc. (The).
  3. Venus Fire Protection Ltd.

4. Victaulic Company.
  5. Viking Corporation.
- B. Listed in UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
- C. Sprinkler Finishes: Chrome plated.
- D. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
1. Ceiling Mounting: Steel, one piece, flat, White enamel, two piece, with 1-inch vertical adjustment.
- E. Sprinkler Guards:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Reliable Automatic Sprinkler Co., Inc. (The).
    - b. Tyco Fire & Building Products LP.
    - c. Victaulic Company.
    - d. Viking Corporation.
  2. Standard: UL 199.
  3. Type: Wire cage with fastening device for attaching to sprinkler.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
- B. Report test results promptly and in writing.

#### 3.2 PIPING INSTALLATION

- A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.
  1. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.
- B. Piping Standard: Comply with NFPA 13 requirements for installation of sprinkler piping.
- C. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 and smaller.

- E. Install sprinkler piping with drains for complete system drainage.
- F. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
- G. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
- H. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
- I. Fill sprinkler system piping with water.

### 3.3 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
- E. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

### 3.4 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.
- B. Install sprinklers into flexible, sprinkler hose fittings, and install hose into bracket on ceiling grid.

### 3.5 IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

### 3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
3. Energize circuits to electrical equipment and devices.

B. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

### 3.7 CLEANING

A. Clean dirt and debris from sprinklers.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

### 3.8 PIPING SCHEDULE

A. Standard-pressure, wet-pipe sprinkler system, NPS 2 and smaller shall be the following:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

### 3.9 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms with Suspended Ceilings: Pendent sprinklers

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
2. Pendent Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 21 13 13

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Hub-and-spigot, cast-iron soil pipe and fittings.
  - 2. Hubless, cast-iron soil pipe and fittings.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For siphonic roof drainage system. Include calculations, plans, and details.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Detail storm drainage piping. Show support locations, type of support, weight on each support, required clearances, and other details, drawn to scale, and coordinated with each other, using input from installers of the items involved.
- B. Field quality-control reports.

### 1.4 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:
  - 1. Storm Drainage Piping: 10-foot head of water.

### 2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AB & I Foundry; a part of the McWane family of companies.
  - 2. Charlotte Pipe and Foundry Company.
  - 3. NewAge Casting.

4. Tyler Pipe; a part of McWane family of companies.

B. Pipe and Fittings:

1. Marked with CISPI collective trademark and NSF certification mark.
2. Class: ASTM A 74, Service class.

C. Gaskets: ASTM C 564, rubber.

### 2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. AB & I Foundry; a part of the McWane family of companies.
2. Charlotte Pipe and Foundry Company.
3. Tyler Pipe; a part of McWane family of companies.

B. Pipe and Fittings:

1. Marked with CISPI collective trademark and NSF certification mark.
2. Standard: ASTM A 888 or CISPI 301.

C. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. ANACO-Husky.
  - b. Charlotte Pipe and Foundry Company.
  - c. Dallas Specialty & Mfg. Co.
  - d. Fernco Inc.
  - e. Ideal Clamp Products, Inc.
  - f. Matco-Norca.
  - g. MIFAB, Inc.
  - h. Mission Rubber Company, LLC; a division of MCP Industries.
  - i. NewAge Casting.
  - j. Tyler Pipe; a subsidiary of McWane Inc.
2. Couplings shall bear CISPI collective trademark and NSF certification mark.
3. Standards: ASTM C 1277 and CISPI 310.
4. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Cast-Iron, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Charlotte Pipe and Foundry Company.
  - b. MG Piping Products Company.



2. Standard: ASTM C 1277.
3. Description: Two-piece ASTM A 48/A 48M, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

### PART 3 - EXECUTION

#### 3.1 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.
  1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
  2. Install piping as indicated unless deviations from layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- D. Install piping free of sags and bends.
- E. Install fittings for changes in direction and branch connections.
- F. Install piping at the following minimum slopes unless otherwise indicated:
  1. Horizontal Storm Drainage Piping: 2 percent downward in direction of flow.
- G. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- H. Install engineered controlled-flow drain specialties and storm drainage piping in locations indicated.
- I. Plumbing Specialties:
  1. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping.
    - a. Comply with requirements for cleanouts specified in Section 221423 "Storm Drainage Piping Specialties."
  2. Install drains in storm drainage gravity-flow piping.
    - a. Comply with requirements for drains specified in Section 221423 "Storm Drainage Piping Specialties."
- J. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- K. Install sleeve seals for piping penetrations of concrete walls and slabs.

### 3.2 JOINT CONSTRUCTION

- A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Hubless, Cast-Iron Soil Piping Coupled Joints:
  - 1. Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- C. Joint Restraints and Sway Bracing:
  - 1. Provide joint restraints and sway bracing for storm drainage piping joints to comply with the following conditions:
    - a. Provide axial restraint for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction, branches, and changes in diameter greater than two pipe sizes.
    - b. Provide rigid sway bracing for pipe and fittings 4 inches and larger, upstream and downstream of all changes in direction 45 degrees and greater.
    - c. Provide rigid sway bracing for pipe and fittings 5 inches and larger, upstream and downstream of all changes in direction and branch openings.

### 3.3 HANGER AND SUPPORT INSTALLATION

- A. Support horizontal piping and tubing within 12 inches of each fitting, and coupling.
- B. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.
- C. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
  - 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
  - 2. NPS 3: 60 inches with 1/2-inch rod.
- D. Install supports for vertical cast-iron soil piping every 15 feet.

### 3.4 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect storm drainage piping to roof drains and storm drainage specialties.
  - 1. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
  - 2. Comply with requirements for cleanouts and drains specified in Section 221423 "Storm Drainage Piping Specialties."

- D. Where installing piping adjacent to equipment, allow space for service and maintenance.
- E. Make connections according to the following unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

### 3.5 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
  - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
  - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
  - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
    - a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
  - 2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved.
    - a. Expose work that was covered or concealed before it was tested.
  - 3. Test Procedure:
    - a. Test storm drainage piping on completion of roughing-in.
    - b. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts until completion of inspection, water level must not drop. Inspect joints for leaks.
  - 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
  - 5. Prepare reports for tests and required corrective action.
- C. Piping will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.7 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground storm drainage piping NPS 6 and smaller shall be any of the following:
  - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
  - 2. Hubless, cast-iron soil pipe and fittings; [CISPI,] [heavy-duty,] hubless-piping couplings; and coupled joints.

END OF SECTION 22 14 13

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Metal roof drains.
  - 2. Cleanouts.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

### 1.3 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

## PART 2 - PRODUCTS

### 2.1 METAL ROOF DRAINS

- A. Cast-Iron, Small-Sump, General-Purpose Roof Drains:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Jay R. Smith Mfg. Co.
    - b. Josam Company.
    - c. Wade; a subsidiary of McWane Inc.
    - d. WATTS.
  - 2. Standard: ASME A112.6.4.
  - 3. Body Material: Cast iron.
  - 4. Dimension of Body: Nominal 8 inch diameter.
  - 5. Combination Flashing Ring and Gravel Stop: Required.
  - 6. Outlet: Bottom.
  - 7. Extension Collars: Required.
  - 8. Underdeck Clamp: Required.
  - 9. Sump Receiver Plate: Required.
  - 10. Dome Material: Cast iron.
  - 11. Wire Mesh: Not required.
  - 12. Vandal-Proof Dome: Not required.

## 2.2 CLEANOUTS

### A. Cast-Iron Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Jay R. Smith Mfg. Co.
  - b. Josam Company.
  - c. Wade; a subsidiary of McWane Inc.
  - d. WATTS.
2. Standard: ASME A112.36.2M.
3. Size: Same as connected branch.
4. Body Material: [Hub-and-spigot, cast-iron soil pipe T-branch or No-hub, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: countersunk plug.
6. Closure Plug Size: Same as, or not more than, one size smaller than cleanout size.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
  1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
  2. Install expansion joints, if indicated, in roof drain outlets.
  3. Position roof drains for easy access and maintenance.
- B. Install downspout adapters on outlet of back-outlet parapet roof drains and connect to sheet metal downspouts.
- C. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:
  1. Use cleanouts the same size as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
  2. Locate cleanouts at each change in direction of piping greater than 45 degrees.
  3. Locate cleanouts at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
  4. Locate cleanouts at base of each vertical storm piping conductor.
- D. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

3.2 FLASHING INSTALLATION

- A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.

3.3 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 14 23

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. Metal pipe hangers and supports.
  - 2. Thermal-hanger shield inserts.
  - 3. Fastener systems.
  - 4. Equipment supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
  - 1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:
  - 1. Equipment supports.
- C. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.



1. Detail fabrication and assembly of trapeze hangers.
2. Design Calculations: Calculate requirements for designing trapeze hangers.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

#### 1.7 QUALITY ASSURANCE

- A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

### PART 2 - PRODUCTS

#### 2.1 METAL PIPE HANGERS AND SUPPORTS

- A. Carbon-Steel Pipe Hangers and Supports:
  1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
  2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
  3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
  4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
  5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

#### 2.2 THERMAL-HANGER SHIELD INSERTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Buckaroos, Inc.
  2. Carpenter & Paterson, Inc.
  3. Clement Support Services.
  4. ERICO International Corporation.
  5. National Pipe Hanger Corporation.
  6. Pipe Shields Inc.
  7. Piping Technology & Products, Inc.
  8. Rilco Manufacturing Co., Inc.
  9. Value Engineered Products, Inc.
- B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig ,ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.
- C. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

- D. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

## 2.3 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- B. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

## PART 3 - EXECUTION

### 3.1 HANGER AND SUPPORT INSTALLATION

- A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
- B. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- C. Fastener System Installation:
  - 1. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
  - 2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- D. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
- E. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- F. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- G. Install lateral bracing with pipe hangers and supports to prevent swaying.
- H. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- I. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

- J. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
- K. Insulated Piping:
  - 1. Attach clamps and spacers to piping.
    - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    - c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
  - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
  - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
  - 4. Shield Dimensions for Pipe: Not less than the following:
    - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
  - 5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

### 3.2 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make bearing surface smooth.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

### 3.3 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.4 HANGER AND SUPPORT SCHEDULE

- A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use carbon-steel pipe hangers and supports and attachments for general service applications.
- F. Use thermal-hanger shield inserts for insulated piping and tubing.
- G. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated, stationary pipes NPS 1/2 to NPS 30.
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
- I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
- J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  - 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
  - 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- K. Use powder-actuated fasteners instead of building attachments where required in concrete construction.

END OF SECTION 23 05 29

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
1. Equipment labels.
  2. Warning signs and labels.
  3. Pipe labels.
  4. Duct labels.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Champion America.
    - c. Seton Identification Products.
  2. Material and Thickness: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
  3. Letter Color: White.
  4. Background Color: Black.
  5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
  6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
  7. Fasteners: Stainless-steel rivets or self-tapping screws.
  8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Seton Identification Products.

2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
  3. Letter Color: White.
  4. Background Color: Black.
  5. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
  6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
  7. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
  8. Fasteners: Stainless-steel rivets or self-tapping screws.
  9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.
- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

## 2.2 PIPE LABELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Brady Corporation.
  2. Kolbi Pipe Marker Co.
  3. Seton Identification Products.
  4. MIFAB, Inc.
- B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction according to ASME A13.1.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.
1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
  2. Lettering Size: Size letters according to ASME A13.1 for piping.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

#### 3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

#### 3.3 PIPE LABEL INSTALLATION

- A. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
  - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- B. Pipe Label Color Schedule:
  - 1. Heating Water Piping: White letters on a safety-green background.

END OF SECTION 23 05 53

## 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. Balancing Hydronic Piping Systems:
    - a. Constant-flow hydronic systems.
    - b. Variable-flow hydronic systems.
    - c. Primary-secondary hydronic systems.

### 1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. BAS: Building automation systems.
- C. NEBB: National Environmental Balancing Bureau.
- D. TAB: Testing, adjusting, and balancing.
- E. TABB: Testing, Adjusting, and Balancing Bureau.
- F. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- G. TDH: Total dynamic head.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Certified TAB reports.
- B. Sample report forms.

### 1.5 QUALITY ASSURANCE

- A. TAB Specialists Qualifications: Certified by AABC NEBB or TABB.
  - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC or NEBB.



2. TAB Technician: Employee of the TAB specialist and certified by AABC or NEBB as a TAB technician.
  - B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
  - C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.7.2.3 - "System Balancing."
- 1.6 FIELD CONDITIONS
- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine equipment performance data including fan and pump curves.
  1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
  2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.

- H. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- I. Examine strainers. Verify that startup screens have been replaced by permanent screens with indicated perforations.
- J. Examine control valves for proper installation for their intended function of throttling, diverting, or mixing fluid flows.
- K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- L. Examine operating safety interlocks and controls on HVAC equipment.
- M. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

### 3.2 PREPARATION

- A. Prepare a TAB plan that includes the following:
  - 1. Equipment and systems to be tested.
  - 2. Strategies and step-by-step procedures for balancing the systems.
  - 3. Instrumentation to be used.
  - 4. Sample forms with specific identification for all equipment.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
  - 1. Hydronics:
    - a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
    - b. Piping is complete with terminals installed.
    - c. Water treatment is complete.
    - d. Systems are flushed, filled, and air purged.
    - e. Strainers are pulled and cleaned.
    - f. Control valves are functioning per the sequence of operation.
    - g. Shutoff and balance valves have been verified to be 100 percent open.
    - h. Pumps are started and proper rotation is verified.
    - i. Pump gage connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
    - j. Variable-frequency controllers' startup is complete and safeties are verified.
    - k. Suitable access to balancing devices and equipment is provided.

### 3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 11, NEBB's "Procedural Standards for

Testing, Adjusting, and Balancing of Environmental Systems" SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

- B. Cut insulation, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

### 3.4 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports for pumps, coils, and heat exchangers. Obtain approved submittals and manufacturer-recommended testing procedures. Crosscheck the summation of required coil and heat exchanger flow rates with pump design flow rate.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. In addition to requirements in "Preparation" Article, prepare hydronic systems for testing and balancing as follows:
  - 1. Check highest vent for adequate pressure.
  - 2. Check flow-control valves for proper position.
  - 3. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
  - 4. Verify that motor starters are equipped with properly sized thermal protection.
  - 5. Check that air has been purged from the system.

### 3.5 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

- A. Adjust flow-measuring devices installed at terminals for each space to design water flows.
  - 1. Measure flow at terminals.
  - 2. Adjust each terminal to design flow.
  - 3. Re-measure each terminal after it is adjusted.
  - 4. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
  - 5. Perform temperature tests after flows have been balanced.

### 3.6 CONTROLS VERIFICATION

- A. In conjunction with system balancing, perform the following:
  - 1. Verify temperature control system is operating within the design limitations.
  - 2. Confirm that the sequences of operation are in compliance with Contract Documents.
  - 3. Verify that controllers are calibrated and function as intended.
  - 4. Verify that controller set points are as indicated.
  - 5. Verify the operation of lockout or interlock systems.
  - 6. Verify the operation of valve and damper actuators.

7. Verify that controlled devices are properly installed and connected to correct controller.
8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.
9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

- B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

### 3.7 TOLERANCES

- A. Set HVAC system's water flow rates within the following tolerances:

1. Heating-Water Flow Rate: Plus or minus 10 percent.
2. Cooling-Water Flow Rate: Plus or minus 10 percent.

- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

### 3.8 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.
3. Certify validity and accuracy of field data.

- B. Final Report Contents: In addition to certified field-report data, include the following:

1. Field test reports prepared by system and equipment installers.
2. Other information relative to equipment performance; do not include Shop Drawings and Product Data.

- C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB specialist.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

- a. Indicated versus final performance.
  - b. Notable characteristics of systems.
  - c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
  13. Data for terminal units, including manufacturer's name, type, size, and fittings.
  14. Notes to explain why certain final data in the body of reports vary from indicated values.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
  2. Water and steam flow rates.
  3. Pipe and valve sizes and locations.
  4. Terminal units.
  5. Balancing stations.
  6. Position of balancing devices.
- E. Apparatus-Coil Test Reports:
1. Coil Data:
    - a. System identification.
    - b. Location.
    - c. Coil type.
    - d. Number of rows.
    - e. Fin spacing in fins per inch o.c.
    - f. Make and model number.
    - g. Face area in sq. ft.
    - h. Tube size in NPS.
    - i. Tube and fin materials.
    - j. Circuiting arrangement.
  2. Test Data (Indicated and Actual Values):
    - a. Airflow rate in cfm.
    - b. Average face velocity in fpm.
    - c. Air pressure drop in inches wg.
    - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
    - e. Return-air, wet- and dry-bulb temperatures in deg F.
    - f. Entering-air, wet- and dry-bulb temperatures in deg F.
    - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
    - h. Water flow rate in gpm.
    - i. Water pressure differential in feet of head or psig.
    - j. Entering-water temperature in deg F.
    - k. Leaving-water temperature in deg F.
    - l. Refrigerant expansion valve and refrigerant types.
    - m. Refrigerant suction pressure in psig.
    - n. Refrigerant suction temperature in deg F.
    - o. Inlet steam pressure in psig.

3.9 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Owner.
- B. Owner shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
- C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
- E. If TAB work fails, proceed as follows:
  - 1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
  - 2. If the second final inspection also fails, Owner may contract the services of another TAB specialist to complete TAB work according to the Contract Documents and deduct the cost of the services from the original TAB specialist's final payment.
  - 3. If the second verification also fails, Owner may contact AABC Headquarters regarding the AABC National Performance Guaranty.
- F. Prepare test and inspection reports.

3.10 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 05 93

## 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 insulating the following HVAC piping systems:
  - 1. Condensate drain piping, indoors and outdoors.
  - 2. Heating hot-water piping, indoors.

### 1.3 ACTION SUBMITTALS

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

### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
  - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

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

1.8 SCHEDULING

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

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.



- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Knauf Insulation.
    - b. Johns Manville Corporation.
    - c. Owens Corning Corporation.
  - 2. Block Insulation: ASTM C 552, Type I.
  - 3. Special-Shaped Insulation: ASTM C 552, Type III.
  - 4. Board Insulation: ASTM C 552, Type IV.
  - 5. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
  - 6. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
  - 7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

## 2.2 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Johns Manville; a Berkshire Hathaway company.
  - 2. Adhesive: As recommended by jacket material manufacturer.
  - 3. Color: White.
  - 4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
    - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
  - 1. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

#### 3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.
  2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
  4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
- L. Install insulation with factory-applied jackets as follows:
1. Draw jacket tight and smooth.
  2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
  3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches o.c.
    - a. For below-ambient services, apply vapor-barrier mastic over staples.
  4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.
  5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

### 3.4 GENERAL PIPE INSULATION INSTALLATION

- A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
  2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
  4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
  5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.
  6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
  7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
  8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
  9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform to the following:
1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
  2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
  3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.
  4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

### 3.5 INSTALLATION OF CELLULAR-GLASS INSULATION

#### A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

#### B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

#### C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

#### D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

### 3.6 FIELD-APPLIED JACKET INSTALLATION

#### A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
  - 1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.8 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.9 INDOOR PIPING INSULATION SCHEDULE

- A. Heating-Hot-Water Supply and Return, 200 Deg F and Below:
  - 1. NPS 12 and Smaller: Insulation shall be the following:
    - a. Cellular Glass: 2 inches thick.
- B. Heating-Hot-Water Supply and Return, above 200 Deg F:
  - 1. NPS 3/4 and Smaller: Insulation shall be the following:
    - a. Cellular Glass: 3 inches thick.
  - 2. NPS 1 and Larger: Insulation shall be the following:
    - a. Cellular Glass: 3 inches thick.

3.10 INDOOR, FIELD-APPLIED JACKET SCHEDULE

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. Piping, Concealed:

1. PVC: 30 mils thick.

END OF SECTION 23 07 19

## 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 control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

### 1.3 DEFINITIONS

- A. DDC: Direct digital control.
- B. I/O: Input/output.
- C. LonWorks: A control network technology platform for designing and implementing interoperable control devices and networks.
- D. MS/TP: Master slave/token passing.
- E. PC: Personal computer.
- F. PID: Proportional plus integral plus derivative.
- G. RTD: Resistance temperature detector.

### 1.4 SYSTEM PERFORMANCE

- A. Comply with the following performance requirements:
  - 1. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
  - 2. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:
    - a. Water Temperature: Plus or minus 1 deg F (0.5 deg C).
    - b. Water Flow: Plus or minus 5 percent of full scale.
    - c. Ducted Air Temperature: Plus or minus 1 deg F (0.5 deg C).
    - d. Airflow (Terminal): Plus or minus 10 percent of full scale.



### 1.5 ACTION SUBMITTALS

- A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
  - 1. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
  - 2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
  - 3. Wiring Diagrams: Power, signal, and control wiring.
  - 4. Details of control panel faces, including controls, instruments, and labeling.
  - 5. Written description of sequence of operation.
  - 6. Schedule of valves including flow characteristics.
  - 7. DDC System Hardware:
    - a. Wiring diagrams for control units with termination numbers.
    - b. Schematic diagrams and floor plans for field sensors and control hardware.
    - c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.
  - 8. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
  - 9. Controlled Systems:
    - a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
    - b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
    - c. Written description of sequence of operation including schematic diagram.
    - d. Points list.
- C. Samples for Initial Selection: For each color required, of each type of thermostat or sensor cover with factory-applied color finishes.
- D. Samples for Verification: For each color required, of each type of thermostat or sensor cover.

### 1.6 INFORMATIONAL SUBMITTALS

- A. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.
- B. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with LonWorks.

- C. Qualification Data: For Installer.
- D. Software Upgrade Kit: For Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.
- E. Field quality-control test reports.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals.
  - 1. Maintenance instructions and lists of spare parts for each type of control device.
  - 2. Interconnection wiring diagrams with identified and numbered system components and devices.
  - 3. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.
- 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 ASHRAE 135 for DDC system components.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.
- B. System Software: Update to latest version of software at Project completion.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

## 2.2 CONTROL SYSTEM

- A. Extend existing controls.
- B. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.
- C. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

## 2.3 ELECTRONIC SENSORS

- A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.
- B. Thermistor Temperature Sensors and Transmitters:
  - 1. Manufacturers:
    - a. Honeywell International Inc.
  - 2. Accuracy: Plus or minus 0.5 deg F (0.3 deg C) at calibration point.
  - 3. Wire: Twisted, shielded-pair cable.
    - a. Set-Point Adjustment: Exposed.
    - b. Set-Point Indication: Exposed.
    - c. Thermometer: Concealed.
    - d. Color: White
    - e. Orientation: Vertical.

## 2.4 ACTUATORS

- A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
  - 1. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
  - 2. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2 (DN 65): Size for running torque of 150 in. x lbf (16.9 N x m) and breakaway torque of 300 in. x lbf (33.9 N x m).
  - 3. Spring-Return Motors for Valves Larger Than NPS 2-1/2 (DN 65): Size for running and breakaway torque of 150 in. x lbf (16.9 N x m).
  - 4. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft. (2.3 sq. m): Size for running torque of 150 in. x lbf (16.9 N x m) and breakaway torque of 300 in. x lbf (33.9 N x m).
  - 5. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft. (2.3 sq. m): Size for running and breakaway torque of 150 in. x lbf (16.9 N x m).

- B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
  - 1. Manufacturers:
    - a. Honeywell International Inc.
  - 2. Valves: Size for torque required for valve close off at maximum pump differential pressure.
  - 3. Coupling: V-bolt and V-shaped, toothed cradle.
  - 4. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
  - 5. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
  - 6. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
  - 7. Temperature Rating: Minus 22 to plus 122 deg F.
  - 8. Run Time: 120 seconds.

## 2.5 CONTROL VALVES

- A. Manufacturers:
  - a. Honeywell International Inc.
- B. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.
- C. Terminal Unit Control Valves: Bronze body, bronze trim, two or three ports as indicated, replaceable plugs and seats, and union and threaded ends.
  - 1. Rating: Class 125 for service at 125 psig (860 kPa) and 250 deg F (121 deg C) operating conditions.
  - 2. Sizing: 3-psig (21-kPa) maximum pressure drop at design flow rate, to close against pump shutoff head.
  - 3. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that conditioned power supply is available to control units and operator workstation.
- B. Verify that pneumatic piping and duct-, pipe-, and equipment-mounted devices are installed before proceeding with installation.

### 3.2 INSTALLATION

- A. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above the floor.

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.
  - B. Install labels and nameplates to identify control components according to Section 23 05 53 "Identification for HVAC Piping and Equipment."
  - C. Install hydronic instrument wells, valves, and other accessories according to Section 23 21 16 Hydronic Piping Specialties."
- 3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION
- A. Install raceways, boxes, and cabinets according to Section 26 05 33 "Raceways and Boxes for Electrical Systems."
  - B. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.
  - C. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.
- 3.4 FIELD QUALITY CONTROL
- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
  - B. Perform the following field tests and inspections and prepare test reports:
    1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
    2. Test and adjust controls and safeties.
    3. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
    4. Test each point through its full operating range to verify that safety and operating control set points are as required.
    5. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
    6. Test each system for compliance with sequence of operation.
    7. Test software and hardware interlocks.
  - C. DDC Verification:
    1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
    2. Check instruments for proper location and accessibility.
    3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
    4. Check instrument tubing for proper fittings, slope, material, and support.
    5. Check installation of air supply for each instrument.
    6. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.

7. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
  8. Check temperature instruments and material and length of sensing elements.
  9. Check control valves. Verify that they are in correct direction.
  10. Check air-operated dampers. Verify that pressure gages are provided and that proper blade alignment, either parallel or opposed, has been provided.
  11. Check DDC system as follows:
    - a. Verify that DDC controller power supply is from emergency power supply, if applicable.
    - b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
    - c. Verify that spare I/O capacity has been provided.
    - d. Verify that DDC controllers are protected from power supply surges.
- D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

### 3.5 ADJUSTING

#### A. Calibrating and Adjusting:

1. Calibrate instruments.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
4. Control System Inputs and Outputs:
  - a. Check analog inputs at 0, 50, and 100 percent of span.
  - b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
  - c. Check digital inputs using jumper wire.
  - d. Check digital outputs using ohmmeter to test for contact making or breaking.
  - e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.
5. Flow:
  - a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
  - b. Manually operate flow switches to verify that they make or break contact.
6. Pressure:
  - a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
  - b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.
7. Temperature:
  - a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.

- b. Calibrate temperature switches to make or break contacts.
  - 8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
  - 9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
  - 10. Provide diagnostic and test instruments for calibration and adjustment of system.
  - 11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.
- B. Adjust initial temperature and humidity set points.

END OF SECTION 23 09 13

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes pipe and fitting materials and joining methods for the following:
  - 1. Steel pipe and fittings.
  - 2. Joining materials.
  - 3. Transition fittings.
  - 4. Dielectric fittings.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of the following:
  - 1. Pipe.
  - 2. Fittings.
  - 3. Joining materials.
- B. Delegated-Design Submittal:
  - 1. Design calculations and detailed fabrication and assembly of pipe anchors and alignment guides, hangers and supports for multiple pipes, expansion joints and loops, and attachments of the same to the building structure.
  - 2. Locations of pipe anchors and alignment guides and expansion joints and loops.
  - 3. Locations of and details for penetrations, including sleeves and sleeve seals for exterior walls, floors, basement, and foundation walls.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

### 1.4 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature unless otherwise indicated:



1. Hot-Water Heating Piping: 100 psig, 200 deg F..

## 2.2 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.
- B. Annealed-Temper Copper Tubing: ASTM B 88, Type K.
- C. DWV Copper Tubing: ASTM B 306, Type DWV.
- D. Wrought-Copper Unions: ASME B16.22.

## 2.3 STEEL PIPE AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; welded and seamless, Grade B, and wall thickness as indicated in "Piping Applications" Article.

## 2.4 JOINING MATERIALS

- A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.
- C. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

## 2.5 DIELECTRIC FITTINGS

- A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:
  1. Description:
    - a. Standard: ASSE 1079.
    - b. Pressure Rating: 150 psig.
    - c. End Connections: Solder-joint copper alloy and threaded ferrous.

## PART 3 - EXECUTION

### 3.1 PIPING APPLICATIONS

- A. Hot-water heating piping, aboveground, NPS 1-1/2 and smaller, shall be the following:

1. Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered or brazed joints.
- B. Hot-water heating piping, aboveground, NPS 2-, shall be the following:
  1. Schedule 40 steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.

### 3.2 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- D. Install piping to permit valve servicing.
- E. Install piping free of sags and bends.
- F. Install fittings for changes in direction and branch connections.
- G. Install piping to allow application of insulation.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- J. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- K. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
- L. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
- M. Install shutoff valve immediately upstream of each dielectric fitting.
- N. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for identifying piping.

### 3.3 DIELECTRIC FITTING INSTALLATION

- A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
- B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric unions.
- C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges.

### 3.4 HANGERS AND SUPPORTS

- A. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hanger, support, and anchor devices. Comply with the following requirements for maximum spacing of supports.

### 3.5 PIPE JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.
- E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- G. Grooved Joints: Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.
- H. Mechanically Formed, Copper-Tube-Outlet Joints: Use manufacturer-recommended tool and procedure, and brazed joints.

### 3.6 TERMINAL EQUIPMENT CONNECTIONS

- A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.
- B. Install control valves in accessible locations close to connected equipment.
- C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

3.7 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:
1. Leave joints, including welds, uninsulated and exposed for examination during test.
  2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
  3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
  4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
  5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Perform the following tests on hydronic piping:
1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
  2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
  3. Isolate expansion tanks and determine that hydronic system is full of water.
  4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times the "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
  5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
  6. Prepare written report of testing.
- C. Perform the following before operating the system:
1. Open manual valves fully.
  2. Inspect pumps for proper rotation.
  3. Set makeup pressure-reducing valves for required system pressure.
  4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
  5. Set temperature controls so all coils are calling for full flow.
  6. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
  7. Verify lubrication of motors and bearings.

END OF SECTION 23 21 13

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Strainers.
  - 2. Connectors.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product:
  - 1. Include construction details and material descriptions for hydronic piping specialties.
  - 2. Include rated capacities, operating characteristics, and furnished specialties and accessories.
  - 3. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.

### 1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

### 1.4 QUALITY ASSURANCE

- A. Pipe Welding: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- B. Safety Valves and Pressure Vessels: Shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

## PART 2 - PRODUCTS

### 2.1 STRAINERS

- A. Y-Pattern Strainers:
  - 1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
  - 2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
  - 3. Strainer Screen: Stainless-steel, 40 mesh strainer, or perforated stainless-steel basket.
  - 4. CWP Rating: 125 psig.

## 2.2 CONNECTORS

### A. Stainless-Steel Bellow, Flexible Connectors:

1. Body: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
2. End Connections: Threaded or flanged to match equipment connected.
3. Performance: Capable of 3/4-inch misalignment.
4. CWP Rating: 150 psig.
5. Maximum Operating Temperature: 250 deg F.

## PART 3 - EXECUTION

### 3.1 VALVE APPLICATIONS

- #### A.
- Install shut-off-duty valves at each branch connection to supply mains and at supply connection to each piece of equipment.

END OF SECTION 23 21 16

## PART 1 - GENERAL

### 1.1 WORK INCLUDED

- A. Electrical contractor to provide:
  - 1. Equipment grounding conductor.

### 1.2 RELATED DOCUMENTS

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

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Burndy; Part of Hubbell Electrical Systems.
  - 2. Dossert; AFL Telecommunications LLC.
  - 3. ERICO International Corporation.
  - 4. Fushi Copperweld Inc.
  - 5. Galvan Industries, Inc.; Electrical Products Division, LLC.
  - 6. Harger Lightning & Grounding.
  - 7. ILSCO.
  - 8. O-Z/Gedney; a brand of Emerson Industrial Automation.
  - 9. Robbins Lightning, Inc.
  - 10. Siemens Power Transmission & Distribution, Inc.
  - 11. Thomas & Betts Corporation, A Member of the ABB Group.

### 2.2 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### 2.3 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

### 2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

### 2.5 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
  - 1. Feeders and branch circuits.
  - 2. Lighting circuits.
  - 3. Receptacle circuits.
  - 4. Single-phase motor and appliance branch circuits.
  - 5. Three-phase motor and appliance branch circuits.
  - 6. Flexible raceway runs.
  - 7. Armored and metal-clad cable runs.
- C. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.

### 2.6 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

END OF SECTION 26 05 26



PART 1 - -GENERAL

1.1 WORK INCLUDED

- A. Electrical contractor to provide:
1. Hangers and supports for electrical equipment and systems.

1.2 RELATED DOCUMENTS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
    - a. Hangers.
    - b. Steel slotted support systems.
    - c. Trapeze hangers.
    - d. Clamps.
    - e. Sockets.
    - f. Eye nuts.
    - g. Saddles.
    - h. Brackets.
  2. Include rated capacities and furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Suspended ceiling components.
  2. Structural members to which hangers and supports will be attached.
  3. Size and location of initial access modules for acoustical tile.
  4. Items penetrating finished ceiling, including the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Access panels.

- B. Seismic Qualification Certificates: For hangers and supports for electrical equipment and systems, accessories, and components, from manufacturer.
  - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

C. Welding certificates.

## 1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M.
  - 2. AWS D1.2/D1.2M.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Hangers and supports shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the supported equipment and systems will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
  - 2. Component Importance Factor: 1.5.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame Rating: Class 1.
  - 2. Self-extinguishing according to ASTM D 635.

### 2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4 factory-fabricated components for field assembly.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit; a part of Atkore International.
    - b. B-line, an Eaton business.
    - c. ERICO International Corporation.
    - d. Flex-Strut Inc.
    - e. GS Metals Corp.
    - f. G-Strut.
    - g. Haydon Corporation.

- h. Metal Ties Innovation.
    - i. Thomas & Betts Corporation, A Member of the ABB Group.
    - j. Unistrut; Part of Atkore International.
    - k. Wesanco, Inc.
  2. Material: Galvanized steel.
  3. Channel Width: 1-5/8 inches.
  4. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  5. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
  6. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
  7. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
  8. Channel Dimensions: Selected for applicable load criteria.
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
  1. Powder-Actuated Fasteners: Shall not be used.
  2. Mechanical-Expansion Anchors: Precast expansion anchors, or preset insert, zinc-coated steel, for use in hardened Portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) B-line, an Eaton business.
      - 2) Empire Tool and Manufacturing Co., Inc.
      - 3) Hilti, Inc.
      - 4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
      - 5) MKT Fastening, LLC.
  3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
  4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
  5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.

6. Toggle Bolts: All steel springhead type.
7. Hanger Rods: Threaded steel.

### 2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems unless requirements in this Section are stricter.
- B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMTs, IMCs, and RMCs as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
  1. Secure raceways and cables to these supports with two-bolt conduit clamps.
- E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

### 3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMTs, IMCs, and RMCs may be supported by openings through structure members, according to NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  1. To Wood: Fasten with wood screws.
  2. To New Concrete: Bolt to precast, expansion, or preset inserts.

3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  4. To Existing Concrete: Expansion anchor fasteners.
  5. To Steel: Welded threaded studs complying with AWS D.1.1/D1.1M, with lock washers and nuts, or beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69 or spring tension clamps..
  6. To Light Steel: Sheet metal screws.
  7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements with minimum of four anchors.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

### 3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

### 3.4 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touchup: Comply with requirements in Section 099123 "Interior Painting" for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
1. Metal conduits and fittings.
  2. Boxes, enclosures, and cabinets.

### 1.2 RELATED DOCUMENTS

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

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
1. Structural members in paths of conduit groups with common supports.
  2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- B. Seismic Qualification Data: Certificates, for enclosures, cabinets, and conduit racks and their mounting provisions, including those for internal components, from manufacturer.

## PART 2 - PRODUCTS

### 2.1 METAL CONDUITS AND FITTINGS

- A. Metal Conduit:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Allied Tube & Conduit; a part of Atkore International.
    - b. Republic Conduit.
    - c. Wheatland Tube Company.
    - d. Wiremold

2. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. ARC: Comply with ANSI C80.5 and UL 6A.
5. IMC: Comply with ANSI C80.6 and UL 1242.
  - a. Comply with NEMA RN 1.
  - b. Coating Thickness: 0.040 inch, minimum.
6. EMT: Comply with ANSI C80.3 and UL 797.
7. FMC: Comply with UL 1; zinc-coated steel.
8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Conduit Color

1. Manufacturers: Setmark Semi-rigid plastic identification markers or equal.
2. Spacing: 20 feet on center.
3. Identify all conduit using coded identifying bands.
  - a. Spacing:
    - 1) Minimum every 20'.
    - 2) Within 1' of each junction box.
4. For 208/120V:
  - a. A-Phase – Black.
  - b. B-Phase – Red.
  - c. C-Phase – Blue.
  - d. Neutral – White.
5. For 277/408V:
  - a. A-Phase – Brown.
  - b. B-Phase – Orange.
  - c. C-Phase – Yellow.
  - d. Neutral – Gray.
6. Conductor colors shall apply to all conductor sizes and apply to entire insulation. No exceptions for larger cables. Identifying colored tape shall not be allowed. Other colors allowed for branch circuits and switch leg conductors.
7. Fire Alarm System: Red

C. Metal Fittings: Comply with NEMA FB 1 and UL 514B.

1. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Fittings, General: Listed and labeled for type of conduit, location, and use.
3. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
4. Fittings for EMT:

- a. Material: Steel.
  - b. Type: Compression.
    - 1) Steel set screw type shall be used for conduit runs within block walls.
- D. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- D. Metal Floor Boxes:
  - 1. Material: Cast metal.
  - 2. Type: Fully adjustable.
  - 3. Shape: Rectangular.
  - 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.
- F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.
- H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.
- J. Gangable boxes are prohibited.
- K. Hinged-Cover Enclosures: Comply with UL 50 and 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.
  - 3. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- L. 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.
6. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### PART 3 - EXECUTION

#### 3.1 RACEWAY APPLICATION

- A. Indoors: Apply raceway products as specified below unless otherwise indicated.
1. Exposed, Not Subject to Physical Damage: EMT. (Do not use as surface raceway).
  2. Exposed, Not Subject to Severe Physical Damage: EMT. (Do not use as surface raceway).
  3. Exposed and Subject to Severe Physical Damage: IMC.
  4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  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.
- B. Minimum Raceway Size: 3/4-inch trade size.
- C. 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. Comply with NEMA FB 2.10.
  2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
  3. EMT: Use compression or steel fittings. Comply with NEMA FB 2.10.
  4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- D. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- E. Install surface raceways only where indicated on Drawings.

#### 3.2 INSTALLATION

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. 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.
- F. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches of enclosures to which attached.
- L. Raceways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
  - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 3. Arrange raceways to keep a minimum of 1 inch.
  - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
- M. Stub-ups to Above Recessed Ceilings:
  - 1. Use EMT, IMC, or RMC for raceways.
  - 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- N. Threaded Conduit Joints: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- O. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- P. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- Q. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-

1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

- 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. Cap underground raceways designated as spare above grade alongside raceways in use.
- S. Install raceway sealing fittings at accessible locations according to NFPA 70 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.
- T. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
  - 1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
  - 2. Where an underground service raceway enters a building or structure.
  - 3. Conduit extending from interior to exterior of building.
  - 4. Conduit extending into pressurized duct and equipment.
  - 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
  - 6. Where otherwise required by NFPA 70.
- U. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches] of flexible conduit for recessed 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. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
- V. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- 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. Prepare block surfaces to provide a flat surface for a raintight connection between the box and cover plate or the supported equipment and box.
- X. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
- Y. Locate boxes so that cover or plate will not span different building finishes.
- Z. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.
- AA. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.
- BB. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
  - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  - 2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33

## PART 1 - GENERAL

### 1.1 WORK INCLUDED

- A. Electrical contractor to provide:
  - 1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.

### 1.2 RELATED DOCUMENTS

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

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

## PART 2 - PRODUCTS

### 2.1 SLEEVES

- A. Wall Sleeves:
  - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
  - 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.
- E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- F. Sleeves for Rectangular Openings:
  - 1. Material: Galvanized sheet steel.
  - 2. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.

- b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

## 2.2 SLEEVE-SEAL SYSTEMS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Advance Products & Systems, Inc.
    - b. CALPICO, Inc.
    - c. Metraflex Company (The).
    - d. Pipeline Seal and Insulator, Inc.
    - e. Proco Products, Inc.
  2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  3. Pressure Plates: Carbon steel.
  4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

## 2.3 SLEEVE-SEAL FITTINGS

- A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
  1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. HOLDRITE.

## 2.4 GROUT

- A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
- B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

## 2.5 SILICONE SEALANTS

- A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
  - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
  - 2. Sealant shall have VOC content of when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 3. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

## PART 3 - EXECUTION

### 3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.
- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
  - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
    - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
    - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
  - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
  - 3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
  - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
  - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
  - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.

2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

### 3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
- B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

### 3.3 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 26 05 44



## PART 1 - GENERAL

### 1.1 WORK INCLUDES

#### A. Base Bid:

##### 1. Electrical Contractor to Provide:

- a. Identification for raceways.
- b. Identification of power and control cables.
- c. Identification for conductors.
- d. Underground-line warning tape.
- e. Warning labels and signs.
- f. Instruction signs.
- g. Equipment identification labels, including arc-flash warning labels.
- h. Miscellaneous identification products.
- i. Update all panel directories affected by demolition and new work per COD standards and NEC 408.4 at the completion of work.

#### B. Alternates Bid: None

### 1.2 SUMMARY

#### A. Section Includes:

### 1.3 ACTION SUBMITTALS

#### A. Product Data: For each type of product.

#### B. Delegated-Design Submittal: For arc-flash hazard study.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

#### A. Comply with ASME 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.

## 2.2 COLOR AND LEGEND REQUIREMENTS

- A. Raceways and Cables Carrying Circuits at 600 V or Less:
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage.
- B. Warning labels and signs shall include, the following legends:
  - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
  - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

## 2.3 LABELS

- A. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible labels laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing label ends.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Champion America.
    - c. emedco.
    - d. Grafoplast Wire Markers.
    - e. HellermannTyton.
    - f. LEM Products Inc.
    - g. Marking Services, Inc.
    - h. Panduit Corp.
    - i. Seton Identification Products.
- B. Self-Adhesive Labels:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. A'n D Cable Products.
    - b. Brady Corporation.
    - c. Brother International Corporation.
    - d. emedco.
    - e. Grafoplast Wire Markers.
    - f. Ideal Industries, Inc.
    - g. LEM Products Inc.
    - h. Marking Services, Inc.
    - i. Panduit Corp.
    - j. Seton Identification Products.
  - 2. Preprinted, 3-mil-thick, polyester flexible label with acrylic pressure-sensitive adhesive.

3. Polyester, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
  - a. Nominal Size: 3.5-by-5-inch.

#### 2.4 TAPES AND STENCILS:

- A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Carlton Industries, LP.
    - b. Champion America.
    - c. HellermannTyton.
    - d. Ideal Industries, Inc.
    - e. Marking Services, Inc.
    - f. Panduit Corp.
- B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils thick by 1 to 2 inches wide; compounded for outdoor use.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Carlton Industries, LP.
    - c. emedco.
    - d. Marking Services, Inc.
- C. Floor Marking Tape: 2-inch-wide, 5-mil pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Carlton Industries, LP.
    - b. Seton Identification Products.
- D. Underground-Line Warning Tape
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Ideal Industries, Inc.
    - c. LEM Products Inc.
    - d. Marking Services, Inc.
    - e. Reef Industries, Inc.
    - f. Seton Identification Products.
  2. Tape:

- a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
  - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
  - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
3. Color and Printing:
- a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
  - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
  - c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".
4. Tag: Type I:
- a. Pigmented polyolefin, bright colored, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Thickness: 4 mils. Weight: 18.5 lb/1000 sq. ft..
  - d. Tensile according to ASTM D 882: 30 lbf and 2500 psi.
5. Tag: Type ID:
- a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, compounded for direct-burial service.
  - b. Width: 3 inches.
  - c. Overall Thickness: 5 mils.
  - d. Foil Core Thickness: 0.35 mil.
  - e. Weight: 28 lb/1000 sq. ft..
  - f. Tensile according to ASTM D 882: 70 lbf and 4600 psi.
6. Tag: Type IID:
- a. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright-colored, compounded for direct-burial service.
  - b. Width: 3 inches
  - c. Overall Thickness: 8 mils.
  - d. Foil Core Thickness: 0.35 mil.
  - e. Weight: 34 lb/1000 sq. ft..
  - f. Tensile according to ASTM D 882: 300 lbf and 12,500 psi.
- 2.5 Tags
- A. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.

- b. Carlton Industries, LP.
  - c. emedco.
  - d. Marking Services, Inc.
  - e. Seton Identification Products.
- B. Nonmetallic Preprinted Tags: Polyethylene tags, 0.015 inch thick, color-coded for phase and voltage level, with factory screened permanent designations; punched for use with self-locking cable tie fastener.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Brady Corporation.
    - b. Carlton Industries, LP.
    - c. emedco.
    - d. Grafoplast Wire Markers.
    - e. LEM Products Inc.
    - f. Marking Services, Inc.
    - g. Panduit Corp.
    - h. Seton Identification Products.
- C. Write-On Tags:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Carlton Industries, LP.
    - b. LEM Products Inc.
    - c. Seton Identification Products.
  - 2. Polyester Tags: 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to raceway, conductor, or cable.
  - 3. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
  - 4. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

## 2.6 Signs

- A. Baked-Enamel 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.
  - 4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Carlton Industries, LP.
    - b. Champion America.
    - c. emedco.
    - d. Marking Services, Inc.
- B. Metal-Backed Butyrate Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396-inch galvanized-steel backing and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal Size: 10 by 14 inches.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Brady Corporation.
  - b. Champion America.
  - c. emedco.
  - d. Marking Services, Inc.

C. Laminated Acrylic or Melamine Plastic Signs:

1. Engraved legend.
2. Thickness:
  - a. For signs up to 20 sq. inches, minimum 1/16-inch-.
  - b. For signs larger than 20 sq. inches, 1/8 inch thick.
  - c. Engraved legend with black letters on white face.
  - d. Self-adhesive.
  - e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Brady Corporation.
  - b. Carlton Industries, LP.
  - c. emedco.
  - d. Marking Services, Inc.

2.7 CABLE TIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. HellermannTyton.
2. Ideal Industries, Inc.
3. Marking Services, Inc.
4. Panduit Corp.

B. 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.

C. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, 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.

D. 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.

## 2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. 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. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Apply identification devices to surfaces that require finish after completing finish work.
- C. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- D. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to the location and substrate.
- E. 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.
- F. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

### 3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive vinyl label. Install labels at 10-foot maximum intervals.

- B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels containing the wiring system legend and system voltage. System legends shall be as follows:
  - 1. "EMERGENCY POWER."
  - 2. "POWER."
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
  - 1. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use industry standard colors for ungrounded feeder and branch-circuit conductors.
    - a. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use write-on tags with the conductor or cable designation, origin, and destination.
- E. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive, self-laminating polyester labels with the conductor designation.
- F. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- G. 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 operation and maintenance manual.
- H. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
  - 1. Limit use of underground-line warning tape to direct-buried cables.
  - 2. Install underground-line warning tape for direct-buried cables and cables in raceways.
- I. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- J. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
  - 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.
  
- K. Arc Flash Warning Labeling: Self-adhesive thermal transfer vinyl labels.
  1. Comply with NFPA 70E and ANSI Z535.4.
  2. Comply with Section 260574 "Overcurrent Protective Device Arc-Flash Study" requirements for arc-flash warning labels.
  
- L. 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.
  
- M. 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.
  
- N. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
  1. Labeling Instructions:
    - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine plastic 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.
    - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    - d. Unless labels are provided with self-adhesive means of attachment, fasten them with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

END OF SECTION 26 05 53

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section Includes:
  - 1. Standard-grade receptacles, 125 V, 20 A.
  - 2. Wall plates

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

## PART 2 - PRODUCTS

### 2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Comply with NFPA 70.
- C. RoHS compliant.
- D. Comply with NEMA WD 1 and NEMA WD6.
- E. Device Color:
  - 1. Wiring Devices Connected to Normal Power System: Ivory unless otherwise indicated or required by NFPA 70 or device listing.
- F. Wall Plate Color: For plastic covers, match device color.
- G. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 STANDARD-GRADE RECEPTACLES, 120 V, 20 A

- A. Duplex Receptacles, 120 V, 20 A heavy duty rated:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Hubbell.
    - b. Pass and Seymour
    - c. Leviton
    - d. Cooper Wiring Devices
  2. Description: Two pole, three wire, and self-grounding.
  3. Configuration: NEMA WD 6, Configuration 5-20R.
  4. Standards: Comply with UL 498 and FS W-C-596.

2.3 WALL PLATES

- A. Single Source: Obtain wall plates from same manufacturer of wiring devices.
- B. Single and combination types shall match corresponding wiring devices.
1. Plate-Securing Screws: Metal with head color to match plate finish.
  2. Material for Finished Spaces: 0.035-inch-thick, satin-finished, Type 302 stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
1. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  2. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  3. Install wiring devices after all wall preparation, including painting, is complete.
- C. Device Installation:
1. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
  2. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.
- D. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.
- E. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
- F. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top.
- G. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.
- H. Connect wiring device grounding terminal to outlet box with bonding jumper.

### 3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections.
  1. In healthcare facilities, prepare reports that comply with NFPA 99.
  2. Test Instruments: Use instruments that comply with UL 1436.
  3. Test Instrument for Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.
- B. Tests for Receptacles:
  1. Line Voltage: Acceptable range is 105 to 132 V.
  2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
  3. Ground Impedance: Values of up to 2 ohms are acceptable.
  4. Using the test plug, verify that the device and its outlet box are securely mounted.
- C. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz.
- D. Wiring device will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION 26 27 26

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Molded-case circuit breakers (MCCBs).

1.2 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in PDF electronic format.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.

C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: One from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.2 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

2.3 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton.
  - 2. General Electric Company.
  - 3. Siemens Industry, Inc., Energy Management Division.
  - 4. Square D; by Schneider Electric.
- B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.
- C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip

circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

- D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be 100 percent rated.
- E. Standards: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- F. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits.
- G. Features and Accessories:
  - 1. Standard frame sizes, trip ratings, and number of poles.
  - 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.

### PART 3 - EXECUTION

#### 3.1 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
  - 1. Indoor, Dry and Clean Locations: NEMA 250, Type 1.
  - 2. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

#### 3.2 INSTALLATION

- A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
  - 1. Notify Architect, Construction Manager and Owner no fewer than seven days in advance of proposed interruption of electric service.
  - 2. Indicate method of providing temporary electric service.
  - 3. Do not proceed with interruption of electric service without Owner's written permission.
  - 4. Comply with NFPA 70E.
- B. Coordinate layout and installation of circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- C. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Comply with NFPA 70 and NECA 1.

3.3 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
  - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
  - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Perform tests and inspections with the assistance of a factory-authorized service representative.
- D. Tests and Inspections for Molded Case Circuit Breakers:
  - 1. Visual and Mechanical Inspection:
    - a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
    - b. Inspect physical and mechanical condition.
    - c. Inspect anchorage, alignment, grounding, and clearances.
    - d. Verify that the unit is clean.
    - e. Operate the circuit breaker to ensure smooth operation.
    - f. Inspect bolted electrical connections for high resistance using one of the two following methods:

END OF SECTION 26 28 16



## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Section includes the following types of LED luminaires:

1. Downlight.

### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
2. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

### 1.3 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale and coordinated with each other, using input from installers of the items involved.
- B. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
- C. Product Certificates: For each type of luminaire.
- D. Product test reports.
- E. Sample warranty.

### 1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

### 1.5 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.

- C. Provide luminaires from a single manufacturer for each luminaire type.
- D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

#### 1.6 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five year(s) from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.
  - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event.
- C. Ambient Temperature: 41 to 104 deg F.
  - 1. Relative Humidity: Zero to 95 percent.
- D. Altitude: Sea level to 1000 feet.

#### 2.2 LUMINAIRE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
  - 1. Label shall include the following lamp characteristics:
    - a. "USE ONLY" and include specific lamp type.
    - b. Lamp diameter, shape, size, wattage, and coating.
    - c. CCT and CRI.
- C. Recessed luminaires shall comply with NEMA LE 4.

2.3 DOWNLIGHT E000, E100.

A. Nominal Operating Voltage: 277V.

B. Lamp:

1. Minimum 1200 lm.
2. Minimum allowable efficacy of 88.2 lm/W.
3. CRI of minimum 80 CCT of 4,000 K.
4. Rated lamp life of 36,000 hours to L70.
5. Dimmable from 100 percent to 0 percent of maximum light output.
6. Internal driver.
7. User-Replaceable Lamps:
  - a. Bulb shape complying with ANSI C78.79.
  - b. Lamp base complying with ANSI C81.61.
8. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

C. Housings:

1. Extruded-aluminum housing and heat sink.
2. Powder-coat painted finish.
3. Universal mounting bracket.
4. Integral junction box with conduit fittings.

D. 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.

E. Diffusers and Globes:

1. Fixed lens.
2. Medium light distribution.
3. Polycarbonate lens.
4. Acrylic Diffusers: One hundred percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
5. Glass: Annealed crystal glass unless otherwise indicated.
6. Lens Thickness: At least 0.125-inch minimum unless otherwise indicated.

F. Standards:

1. ENERGY STAR certified.
2. RoHS compliant.
3. UL Listing: Listed for damp location.
4. Recessed luminaires shall comply with NEMA LE 4.

## 2.4 MATERIALS

### A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

### B. Steel:

1. ASTM A 36/A 36M for carbon structural steel.
2. ASTM A 568/A 568M for sheet steel.

### C. Stainless Steel:

1. 1. Manufacturer's standard grade.
2. 2. Manufacturer's standard type, ASTM A 240/240 M.

### D. Aluminum: ASTM B 209.

## 2.5 METAL FINISHES

- A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

## 2.6 LUMINAIRE SUPPORT

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire.
- C. Wires: ASTM A 641/A 641 M, Class 3, soft temper, zinc-coated steel, 12 gage.
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to luminaire, line voltage, and equipment with threaded attachment, cord, and locking-type plug.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

- C. Install lamps in each luminaire.
- D. Supports:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position after cleaning and relamping.
  - 3. Provide support for luminaire without causing deflection of ceiling or wall.
  - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.

### 3.2 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 26 51 19

## 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. Emergency lighting units.
  - 2. Luminaire supports.

### 1.3 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Emergency Lighting Unit: A lighting unit with internal or external emergency battery powered supply and the means for controlling and charging the battery and unit operation.
- D. Fixture: See "Luminaire" Paragraph.
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of emergency lighting unit, and emergency lighting support.
  - 1. Include data on features, accessories, and finishes.
  - 2. Include physical description of the unit and dimensions.
  - 3. Include life, output of luminaire (lumens, CCT, and CRI), and energy-efficiency data.
  - 4. Include photometric data and adjustment factors based on laboratory tests, complying with IES LM-45, for each luminaire type.
    - a. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
    - b. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Product Schedule:

1. For emergency lighting units. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Luminaires.
2. Suspended ceiling components.
3. Partitions and millwork that penetrate the ceiling or extend to within 12 inches of the plane of the luminaires.
4. Structural members to which equipment will be attached.
5. Size and location of initial access modules for acoustical tile.
6. Items penetrating finished ceiling including the following:
  - a. Other luminaires.
  - b. Air outlets and inlets.
  - c. Sprinklers.
  - d. Access panels.
7. Moldings.

B. Qualification Data: For testing laboratory providing photometric data for luminaires.

C. Product Certificates: For each type of luminaire.

D. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Product Test Reports: For each luminaire for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in emergency, operation, and maintenance manuals.

1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

1.7 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
- C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- D. Mockups: For interior luminaires in room or module mockups, complete with power and control connections.
  - 1. Obtain Architect's approval of luminaires and signs in mockups before starting installations.
  - 2. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.9 WARRANTY

- A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 Luminaires and lamps shall be labeled vibration and shock resistant.
  - 1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event.



## 2.2 GENERAL REQUIREMENTS FOR EMERGENCY LIGHTING

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. NRTL Compliance: Fabricate and label emergency lighting units, exit signs, and batteries to comply with UL 924.
- C. Comply with NFPA 70 and NFPA 101.
- D. Comply with NEMA LE 4 for recessed luminaires.
- E. Comply with UL 1598 for fluorescent luminaires.
- F. Lamp Base: Comply with ANSI C81.61.
- G. Bulb Shape: Complying with ANSI C79.1.

## 2.3 EMERGENCY LIGHTING

- A. General Requirements for Emergency Lighting Units: Self-contained units.
- B. Emergency Luminaires:
  - 1. Emergency Luminaires: E000, E200 as indicated on Lighting Fixture Schedule , Drawings and described in Section 265119, with the following additional features:
    - a. Operating at nominal voltage of 277 V ac.
    - b. Rated for installation in damp locations, and for sealed and gasketed luminaires in wet locations.
    - c. UL 94 5VA flame rating.

## 2.4 MATERIALS

- A. Metal Parts:
  - 1. Free of burrs and sharp corners and edges.
  - 2. Sheet metal components shall be steel unless otherwise indicated.
  - 3. Form and support to prevent warping and sagging.
- B. Doors, Frames, and Other Internal Access:
  - 1. Smooth operating, free of light leakage under operating conditions.
  - 2. Designed to permit relamping without use of tools.
  - 3. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- C. Diffusers and Globes:
  - 1. Polycarbonate lens..

2. Glass: Annealed crystal glass unless otherwise indicated.
3. Acrylic: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
4. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

D. Housings:

1. Extruded aluminum housing and heat sink.
2. Powder coat painted finish.

2.5 METAL FINISHES

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
- B. Support Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for conditions affecting performance of luminaires.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Examine walls, floors, roofs, and ceilings for suitable conditions where emergency lighting luminaires will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with NECA 1.
- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position when testing emergency power unit.
3. Provide support for luminaire and emergency power unit without causing deflection of ceiling or wall.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire and emergency power unit weight and vertical force of 400 percent of luminaire weight.

### 3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
  1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
- B. Luminaire will be considered defective if it does not pass operation tests and inspections.
- C. Prepare test and inspection reports.

### 3.5 ADJUSTING

- A. Adjustments: Within 12 months of date of Substantial Completion, provide on-site visit to do the following:
  1. Inspect all luminaires. Replace lamps, or luminaires that are defective.
    - a. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  2. Conduct short-duration tests on all emergency lighting.

END OF SECTION 26 52 19

## PART 1 - GENERAL

### 1.1 SUMMARY

#### A. Section Includes:

1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
2. Luminaire supports.

### 1.2 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating
- E. Lumen: Measured output of lamp and luminaire, or both.
- F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of luminaire.
- B. Shop Drawings: For nonstandard or custom luminaires.
  1. Include plans, elevations, sections, and mounting and attachment details.
  2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  3. Include diagrams for power, signal, and control wiring.
- C. Delegated-Design Submittal: For luminaire supports.
  1. Include design calculations for luminaire supports and seismic restraints.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans, drawn to scale and coordinated.
- B. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.
- C. Product Certificates: For each type of the following:

1. Luminaire.

D. Sample warranty.

#### 1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

#### 1.6 FIELD CONDITIONS

A. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

#### 1.7 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year(s) from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.

1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

#### 2.2 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

- D. UL Compliance: Comply with UL 1598 and listed for wet location.
- E. Lamp base complying with ANSI C81.61.
- F. CRI of minimum 80 CCT of 4,000.
- G. L70 lamp life of 36,000 hours.
- H. Lamps dimmable from 100 percent to 0 percent of maximum light output.
- I. Nominal Operating Voltage: 277 V ac.
- J. In-line Fusing: On the primary for each luminaire.
- K. Lamp Rating: Lamp marked for outdoor use.
- L. Source Limitations: Obtain luminaires from single source from a single manufacturer.
- M. Source Limitations: For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

### 2.3 LUMINAIRE TYPES

- A. Canopy:
  - 1. Shape: Round.
  - 2. Dimensions: 12 inches in diameter.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Corrosion-resistant aluminum. Form and support to prevent warping and sagging.
- D. 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.
- E. Diffusers and Globes:
  - 1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
  - 2. Glass: Annealed crystal glass unless otherwise indicated.
  - 3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.
- F. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- G. 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.

H. Housings:

1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
2. Provide filter/breather for enclosed luminaires.

2.4 FINISHES

- A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. 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.
- C. 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 requirements; 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.
- D. 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, 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 or SSPC-SP 8.
  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.
    - b. Color: Match Architect's sample of manufacturer's standard color.
    - c. Color: As selected by Architect from manufacturer's full range.

## 2.5 LUMINAIRE SUPPORT COMPONENTS

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

## PART 3 - EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with NECA 1.
- B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Install lamps in each luminaire.
- D. Fasten luminaire to structural support.
- E. Supports:
  - 1. Sized and rated for luminaire weight.
  - 2. Able to maintain luminaire position after cleaning and relamping.
  - 3. Support luminaires without causing deflection of finished surface.
  - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- F. Wiring Method: Install cables in raceways. Conceal raceways and cables.
- G. Install luminaires at height and aiming angle as indicated on architectural drawings.
- H. Coordinate layout and installation of luminaires with other construction.
- I. Adjust luminaires that require field adjustment or aiming.
- J. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

### 3.2 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 Section 260533 "Raceways 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.



### 3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.4 FIELD QUALITY CONTROL

- A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.
- B. Perform the following tests and inspections.
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. Verify operation of photoelectric controls.
- C. Illumination Tests:
  - 1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IES testing guide(s):
    - a. IES LM-5.
    - b. IES LM-50.
    - c. IES LM-52.
    - d. IES LM-64.
    - e. IES LM-72.
  - 2. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
- D. Luminaire will be considered defective if it does not pass tests and inspections.
- E. 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.

### 3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires.

END OF SECTION 26 56 19

System Description:

- A. The Owner has in place a state of the art cabling system that is supportive of the mission to provide voice, high speed data, video and multimedia services to the College of DuPage Main Campus and Satellite sites well into the future. The requirements for this cabling, its installation and termination equipment are very stringent to support these goals.
- B. This document describes the product and execution requirements relating to new Telecommunications Cabling System for the College of DuPage and Regional Campus Locations. If exceptions or changes to these requirements are desired by A/E, A/E shall discuss proposed changes and exceptions with Owner's Information Department.

Specifications:

- A. The communications cabling system installation work detailed in these standards shall be carried out by a specialist installer, trained and certified by PANDUIT and capable of providing a system warranty as described herein.
- B. The Cabling Contractor shall have a Registered Communications Distribution Designer (RCDD) or equal as a permanent member of staff. The RCDD shall be in good standing with the Building Industry Consulting Service International (BICSI) and shall have a current registration.
- C. The Contractor shall hold a valid State Contractors License for the duration of the project. The installer shall be responsible for obtaining permits and other requirements for performing work on this project.
- D. The Cabling Contractor shall provide an on-site manager responsible for all Communication work. This individual shall be the single point of contact for the duration of the project.
- E. The Air Blown Fiber®, each bidder must submit current documentation signed by Sumitomo Electric Lightwave representative stating the Contractor is authorized and certified by Sumitomo Electric Lightwave to provide the FutureFLEX® Air Blown Fiber® cable products installation and warranty certification. Each bidder must also submit documentation with the bid, listing the names of employees that will be used on this project indicating their experience, level of expertise, and certificates of training signed by Sumitomo Electric Lightwave representatives.
- F. The Contractor shall furnish and install all Tube Cables, Tube Couplings, Tube Distribution Units (TDUs), Fiber Bundles, connectors, and equipment as shown on the drawings and per Sumitomo Recommended Procedures (SRP's).

Definitions

- A. Telecommunications Closet (TC): The generic term, this refers to the equipment rooms in which telecommunications cabling terminates. These rooms also house network, video and telephone electronics.
- B. Building Distribution Facility (BDF): The "Main wiring switching for the building
- C. Intermediate Distribution Facility (IDF): A secondary wiring switching room
- D. Horizontal Cabling: Cabling runs from Work Station to IDF or BDF.
- E. Backbone: Linkage from BDF to IDF.

- F. House Count: The Contractor shall cross-connect the first (BLUE) pair of each new workstation cable to the riser backbone to link the telecommunications closet to the next closet in the hierarchy. The cross connects wire of colors matching the color of the station cabling conductors (BLUE) shall be used for each cross connect.
- G. Backbone transmission media may be:
  - 1. Traditional and Air Blown Optical fiber
  - 2. Twisted-pair copper
  - 3. Coaxial copper
  - 4. A combination of the above
  - 5. Miscellaneous support facilities
- H. Material needed for the proper termination and installation of the backbone cables:
  - 1. Cable support hardware
  - 2. Firestopping equipment and supplies
  - 3. Grounding hardware (TIA/EIA-607)
  - 4. Protection and security
- I. Inter-Building Cabling – First Level Backbone: provides the transmission path between adjacent buildings. Includes Fiber Optic and copper cabling.
- J. Intra-Building Cabling – Second Level Backbone: Provides the transmission path to join the main Telecommunications Closet (or BDF) with other TC's (or IDF) located within the building. Includes Fiber Optic and copper cabling.
- K. Horizontal cabling and Work Station Cabling: Provides the link from offices, classrooms and common areas to the Telecommunications Closet (TC) serving the area and includes the following transmission media:
  - 5. 4-pair 100 Ohm Unshielded Twisted Pair (UTP) Category 6
  - 6. Fiber Optic Cable (Multi-Mode and Single-Mode)
  - 7. RG-6 Coax

Work shall be in accordance with the following:

- A. Equipment and material shall be Underwriters Laboratories listed and labeled. The latest editions of the following codes, standards and guidelines are minimum requirements:
  - 1. City, State, and Federal codes.
  - 2. NFPA 70 National Fire Protection Agency
  - 3. National Electric Code (NEC 1999)
  - 4. Institute of Electrical and Electronic Engineers (IEEE)
  - 5. TIA/EIA-568-B.1 Commercial Building Telecommunication Cabling Standard.
  - 6. TIA/EIA-568-B.2 Commercial Building Telecommunication Cabling Standard.
  - 7. TIA/EIA-568-B-2.1 Commercial Building Telecommunication Cabling Standard Category 6.
  - 8. TIA/EIA-569 Commercial Building Standard for Telecommunications Pathways and Spaces.
  - 9. TIA/EIA-606 the Administration Standard for Telecommunications Infrastructure of Commercial Buildings.
  - 10. TIA/EIA-607 Commercial Building Grounding and Bonding Requirements for Telecommunications.
  - 11. TIA/EIA TSB-67 Transmission Performance specifications for Field Testing of Unshielded Twisted Pair Cabling Systems
  - 12. TIA/EIA TSB-72 Centralized Optical Fiber Cabling Guidelines.
  - 13. TIA/EIA TSB-75 Additional Horizontal Cabling Practices for Open Offices.
  - 14. Telecommunications Distribution Methods Manual, (BICSI).
  - 15. Manufacture's recommendations and installation guidelines.

### General Requirements

#### Specifications:

- A. The Cabling Contractor shall examine all drawings and specifications to familiarize themselves with the type of construction to be used, and the nature and extent of work provided by other trades.
- B. Beginning installation means Contractor accepts existing conditions.
- C. Contractor shall verify dimensions and the correct locations of hardware before proceeding with the installation of hardware, cabling and/or connections.
- D. The Cabling Contractor shall be responsible for identifying and reporting to the Owner any existing damage to walls, flooring, tiles and furnishings in the work area prior to start of work. All damage caused by the cable, raceway, or miscellaneous material to the interior surfaces during the communication installation shall be repaired by the Contractor. The repairs must match preexisting color and finish of walls, floors and ceilings. Any contractor damaged ceiling tiles are to be replaced to match color, size, style and texture and shall not be taken from Owner's attic stock.
- E. The Cabling Contractor shall be responsible for securing all Telecommunications Rooms and offices when not in use. At no time shall the Telecommunications Room be unattended if unsecured.
- F. Contractor should assume that all installation work including cable placement, termination and testing shall be performed between the hours of 7:00 a.m. to 5:00 p.m. Monday through Friday unless stated otherwise in the bid.
- G. Qualified personnel utilizing state-of-the-art equipment and techniques shall complete all installation work.
  - 1. The Cable system will be tested and documented upon completion of the installation as defined in the section below.
  - 2. Products selection, installation plans and termination layouts must be reviewed and approved by the Owner prior to construction. The review does not exempt the Contractor from meeting any of the requirements stated in this document.

### Submittals

#### Specifications

- A. At A/E option, Contractor shall submit a two-foot section of cable(s) of the type(s) to be sent to the site for final approval by the College. This two-foot section shall have the manufacturer's cable markings visible. Upon request, samples from every reel sent to the site shall be provided.
- B. At A/E option, Contractor shall submit if requested, a full mockup of the proposed Information Outlet and Jack configuration with appropriate cabling for each of the installation environments described below. A/E shall discuss full mockup requirements with Owner prior to specifying.
- C. Contractor shall submit house count table in spreadsheet/tabular format with shop drawing submittals. House count table shall include house count and location ID's.

Delivery, Storage and Handling

Requirements:

- A. The Cabling Contractor shall be responsible for all deliveries of material construction site. The Owner will not accept deliveries.
- B. For purposes of bidding, it is to be assumed that the Owner will not provide storage facilities for material. Pending availability, however, this may be arranged subsequent to award.
- C. Cable shall be stored according to manufacturer's recommendations at a minimum. Cable must be stored in a location protected from vandalism and weather. If cable is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. Manufacturer's storage specifications - in particular, those relating to temperature - shall be followed. All storage costs shall be included in Contract price.
- D. Tools, materials and equipment shall be confined to area designated by the Owner. The Contractor shall clean up and dispose of all debris and rubbish resulting from work on a daily basis.
- E. The Contractor is responsible for the cleanup of the dust, debris, shipping and packaging material associated with their installation. The Owner's disposal containers, shall not to be utilized without written authorization.

END OF SECTION 27 00 01

### Data/Voice UTP Station Cable

#### Requirements:

1. Transmission characteristics of the cable shall meet full Category 6 performance as defined by TIA/EIA-568-B-2.1. Cable shall be UL and/or ETL verified Category 6.
2. Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code and shall meet the specifications of NEMA (low loss), UL 444, and ICEA.
3. The jacket color for Data Station Cables shall be BLUE.
4. Data Station Cables shall meet a CMR (Riser) or CMP (Plenum) rating depending on the particulars of the installation and be suitable for installation in the environments defined including free-air, in conduit, in cable tray and in modular furniture.
5. Cable shall be packaged in a way that minimizes tangling and kinking of the cable during installation. Examples are open reels or packages, which incorporate a rotating reel.
6. Data UTP Station Cables shall be Panduit PUP6004BU-UY High Performance Category 6 plenum (CMP) Twisted 4-pair UTP copper cable or Panduit PUR6004BU-UY High Performance Category 6 riser (CMR) Twisted 4-pair UTP copper cable.

### Telecommunications Outlet

#### Requirements:

1. At the workstation location, Station Cables shall each be secured in a housing, which shall also accommodate the termination assemblies for those cables. The combined assembly, referred to as the Telecommunications Outlet (TO), shall be modular in design and allow for flexibility in integrating the different configurations required at the site.
2. There shall be one (1) basic Telecommunications Outlet configuration:
  - o The "Copper-Only" Communication outlet that is capable of supporting only UTP and Coaxial Cabling.
3. In addition, provision of a separate, "Voice Only" outlet that is installed to accommodate a wall-mounted Telephone Set shall be considered. This configuration, referred to as "Split Voice", can be used in concert with either of the above configurations.
4. The color and material of the frame cover and inserts (if applicable) shall be Electric Ivory Plastic.
5. The cover of the telecommunications outlet shall be secured to the base with a screw. The screw(s) shall, in turn, be hidden from view by a label or other covering to discourage casual access.

### Copper Only Outlet

#### Requirements:

1. The Copper-Only Outlet shall comply with the general requirements defined above and with the following *additional* requirements:
  - A. The Copper-Only Outlet shall provide adequate capacity to accommodate the following maximum configurations:
    - i. Two (2), four (4) or six (6) modular jacks (Voice or Data)
    - ii. The same as above but one (1) "F" Connector substituted for one (1) modular jack.
  - B. All jacks and couplings shall mount on either the base of the unit or the cover.
  - C. The Copper-Only Outlet shall be available in both "flush" and surface mount designs and shall be adaptable to mounting on cellular floor presets or posttests poke thru or under floor wiring.
  - D. Where flush mounting is not possible, a Surface box shall be used. Surface Box shall be Panduit Single Gang One-piece Deep Box.
2. Wall-Mounted Copper-Only Outlets

- A. Wall mounted Copper-Only Telecommunications Outlets shall be Panduit CFPL2 2 Port CFPL4 4 Port and CFPL6 6 Port.
3. Floor-mounted Copper Only Outlets
  - A. Floor-mounted Copper-only Outlets shall comply with the above general requirements plus the following:
    - i. Floor-mounted Copper-only Outlets shall be mounted in an aluminum floor "monument".
    - ii. Communications jack assemblies shall mount on one side of the assembly and be sideways facing (parallel floor). Mounting plates shall be designed to accommodate the modular jack type installed.
    - iii. A protective bracket shall be available to guard against damage to the jack assemblies or patch cord plugs.
    - iv. "Copper-Only" Telecommunications Outlets shall be Walker 500HB (Monument) and 500B back plate, with 500DR front plate. Monument shall be fitted with adapter(s) appropriate for the floor-type being accessed.
    - v. Jack assemblies shall be mounted on Panduit CF1062 for 2 port and CF1064 for 4 port access. Bracket shall be 500-GUARD.
4. Wall mounted Voice Only Outlet
  - A. Wall-mounted "Voice Only" Outlets shall consist of a mounting plate on which a telephone set may be mounted.
  - B. The Wall Plate shall be of Stainless Steel construction, mount on a standard single gang outlet box or bracket and include mating lugs for wall phone mounting.
  - C. The wall plate shall be Panduit KWP6PY or equivalent and be fitted with one (1) voice jack meeting the criteria defined below.
5. Station Voice Copper Termination at Media Outlet
  - A. Station Voice Copper Cables shall each be terminated at the Media Outlet in an Eight-pin Modular Jack, Panduit CJE88T.
  - B. Jacks are to be pinned per TIA/EIA-568B with the pairing as follows:
    - i. Pair 1 - Pins 5&4
    - ii. Pair 2 - Pins 1&2
    - iii. Pair 3 - Pins 3&6
    - iv. Pair 4 - Pins 7&8
  - C. The interface between the jack and the station cable shall be a 110-Style block. Blocks shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.
  - D. Voice Termination hardware shall meet Category 6 performance specifications as defined by TIA/EIA-A-5 and TSB40 specifications for connecting hardware.
6. Station Data Copper Termination at Outlet
  - A. Station data copper cables shall each be terminated at the Media Outlet in an Eight-pin Modular Jack. Jack contacts shall have a minimum of 50-micro-inches of gold plating. Panduit CJ688T3.
  - B. Jacks are to be pinned per EIA 568B with the pairing as follows:
    - i. Pair 1 - Pins 5&4
    - ii. Pair 2 - Pins 1&2
    - iii. Pair 3 - Pins 3&6
    - iv. Pair 4 - Pins 7&8
  - C. The interface between the jack and the station cable shall be a 110-Style block. Blocks shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination
  - D. Data Termination hardware shall meet full Category 6 performance specifications as defined by TIA/EIA-568-B-2.1 and TSB-40A specifications for connecting hardware. All pair combinations must be considered, with the worst-case measurement being the basis for compliance. The Jack

must be UL verified and listed. All pair combinations must be considered with the worse case measurement being the basis for compliance.

- E. The color of the Data Jack shall be BLACK.
- F. Data Jack shall be Panduit CJ688T3.

### Miscellaneous Materials

#### Requirements:

1. Equipment Rack and Associated Hardware
  - A. Communications equipment rack and cabinets shall be properly anchored at top and bottom.
  - B. Racks shall be anchored to floor with properly sized drop-in anchors with appropriately sized bolts and washers. All racks and cabinets shall be attached to ladder rack system. If ladder rack system does exist, coordinate with project manager.
  - C. Horizontal cable management hardware shall be positioned on the equipment racks to allow for an orderly routing of copper and fiber optic jumpers.
  - D. Jumper Management Panels shall incorporate Horizontal and Vertical distribution rings to accommodate a defined routing of individual jumper cables. Horizontal distribution rings shall be 3" x 3.5" (minimum dimension) and mounted on a 3.5" painted steel plate.
  - E. Each Jumper Management Panel shall be supplied with a minimum of ten (10) releasable cable support ties. Ties shall be minimum 6-inches in length
  - F. Vertical Jumper Rings shall be positioned on each rack upright equidistant between each Horizontal Management Panel installed.
  - G. There shall not be more than (3) three Panduit 48 port patch panels per rack.
  - H. Relay Racks Panduit NetFrame NFR84 Jumper Management Panels shall be Panduit CMPHH2. Vertical Jumper rings shall be Panduit CMVDRC or equivalent. Releasable cable support ties shall be Panduit HLT2I-X0 (BLACK).
2. Surface Raceway
  - A. The installation of surface mounted outlets and surface mounted station cable is anticipated at some locations where solid walls inhibit the installation of cable behind the wall. Nonmetallic surface raceway shall be used - no exposed cable shall be permitted.
  - B. The surface raceway shall have a screw-applied base and have a snap on cover. The use of double-sided tape to anchor the raceways will not be permitted.
  - C. Both the base and cover shall be manufactured of rigid PVC compounds and be suitable for painting.
  - D. The raceway shall be of a color fitting the decor of the area and be paintable (by others). Approval of samples by the Engineer prior to installation is required (Upon request by Owner). All fittings including, but not limited to, extension boxes, elbows, tees, fixture boxes and fittings shall match the color of the raceway.
  - E. Fittings and couplings shall be sized to insure that Category 6 and fiber optic cables that are routed through them do not exceed their recommended minimum bend radius requirements.
  - F. The raceway and all system devices must be UL Listed and exhibit nonflammable self-extinguishing characteristics, tested to specifications of the UL94V-0.
  - G. Raceway shall be sized to accommodate a 50% increase in the number of cables initially installed while maintaining a fill (ratio of cable area vs. raceway area) no greater than 60%. A nominal cable diameter of 0.2" (Voice and Data Cables) should be assumed.
  - H. The non-metallic raceway shall be Panduit *Pan-way L Series*.
3. Bonding and Grounding
  - A. All bonding conductors shall have green insulation and be copper. The minimum bonding conductor size shall be No. 6 AWG (TIA/EIA-607 5.1.3).

END OF SECTION 27 00 02



Data Patch Panel

Requirements:

- A. Copper Data Station Cables shall each be terminated at their designated TC to a Panduit patch panel.
- B. Category 6 performance per TIA/EIA T568B.2.1 must be maintained by the panel as a system and include this interface. All pair combinations must be considered, with the worst-case measurement being the basis for compliance.
- C. Jacks are to be pinned per TIA/EIA T568B with the pairing as follows:
  1. Pair 1 - Pins 5&4
  2. Pair 2 - Pins 1&2
  3. Pair 3 - Pins 3&6
  4. Pair 4 - Pins 7&8
- D. Panels shall incorporate cable support and/or strain relief mechanisms to secure the horizontal cables at the termination block and to insure that all manufacturers minimum bend radius specifications are adhered to.
- E. When multiple floors are being serviced in a closet, each floor should have separate patch panels. Each patch panel should start with lowest sequential number starting with one per each floor, per each closet and then increment by one until each panel is full or no more drops available on that floor with its closet. If possible the patch panel for each floor should be installed on a separate rack.
- F. Contractor shall discuss the use of 24 port patch panel with the owner before usage. Use of 24 port patch panel is discouraged.

END OF SECTION 27 00 03

Requirements:

- A. The installation shall follow recognized industry recommendations including those defined by the:
  1. TIA/EIA-568-B.1 Commercial Building Wiring Standard
  2. TIA/EIA-568-B.2 Commercial Building Wiring Standard
  3. TIA/EIA-568-B.2.1 Commercial Building Wiring Standard
  4. TIA/EIA-569 Commercial Building Standard for Pathways and Spaces
  5. TIA/EIA-606 Labeling Guidelines
  6. TIA/EIA-607 Grounding
  7. National Electrical Code (NEC; 1999)
  8. BICSI TDM Manual
  9. Applicable State and Local Codes
  - 10.
- B. Cable Pathways (Renovation Projects)
  1. Renovation Projects: The Contractor is responsible for verifying the availability of riser access between floors. Where required, the contractor shall core new risers.
  2. All Projects: All new riser holes shall be fitted with sleeves. All riser holes used for the installation, both new and existing, shall be firestopped upon completion of cable installation.
  - 3.
- C. Cable Installation
  1. All cables, termination components and support hardware shall be furnished, tested, installed and wired by the Contractor.
  2. During pulling operation an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit as well as the feed cable and operate pulling machinery.
  3. Cable pulling shall be done in accordance with cable manufacturer's recommendations and ANSI/IEEE C2 standards. Recommended pulling tensions shall not be exceeded.
  4. Manufacturers minimum bend radius specifications shall followed in handling, installation and securing of all cables. Any cable bent or kinked to radius less than recommended dimension shall not be installed.
  5. All cables shall be installed splice-free.
  6. Cable sheaths shall be protected from damage from sharp edges during and after installation.
  7. Where a cable passes over a sharp edge, a bushing or grommet shall be used to protect the cable.
  8. All cable shall be free of tension at both ends. In cases where the cable must bear some stress, Kellem grips may be used to spread the strain over a longer length of cable.
  9. Ventilation of buildings on the Glen Ellen Campus includes both ducted and ceiling-plenum air return designs as follows:
    - Plenum Return Sites:
      - IC, SRC and PE
    - Ducted Return Sites:
      - M, K & L Buildings, OCC, and Arts Center
    - COD Satellite sites vary by location.
  10. The contractor is responsible for verifying cabling requirements prior to construction to insure that the installation is compliant with all code restrictions.
  11. All openings made to accommodate the installation of any cable shall be sleeved and fire stopped per prevailing code requirements upon completion of cable installation.
  12. At no time shall horizontal cabling share the same raceway or path with Backbone cabling.

Horizontal Cabling Station

Requirements:

- A. All Cables and Termination hardware shall be technically compliant with and installed in accordance with TIA-568A, TIA-568-B.2.1 (Standard for Commercial Building Wiring), TIA-569, TSB 36 and TSB-40.
- B. Where installed free-air, Station Cable shall run at right angles and be kept clear of other trades work. Cables shall be supported according to code utilizing Caddy type J-Hooks mountings and anchored to ceiling concrete, or structural steel beams. The Contractor shall not exceed the maximum cable limit of the cable supports. Cables shall not be attached to existing cabling, plumbing or steam piping, ductwork, ceiling supports or electrical or communications conduit. Supports should be spaced at a maximum 5-foot interval unless limited by building construction. Cable shall never be laid directly on the ceiling grid.
- C. The maximum Station Cable length shall not exceed 295-feet (90-meters) in order to meet data communications performance specifications. This length is measured from the termination panel in the Telecommunications Closet to the Outlet and must include any slack required for the installation and termination. The Contractor is responsible for installing station cabling in a fashion as to avoid unnecessarily long runs. Any area that cannot be reached within the above constraints should be identified and reported to the College prior to installation. The College must approve any plan changes.
- D. Slack cable shall be left above each Work Station to allow for repair and/or future office rearrangements without re-cabling. These "service loops" shall be secured at the last cable support (e.g. Caddy type J-Hook) before the cable leaves the ceiling and shall be coiled from 100% to 200% of the cable recommended minimum bend radius. Slack lengths are as follows:
  1. At any location where cables are installed into movable partition walls or modular furniture via a service Pole, approximately 6 feet of slack shall be left for each station cable under 250-foot in length.
- E. To reduce or eliminate EMI, the following minimum distances shall be adhered to. In particular, regard must be paid to the routing of cable and avoidance of potentially disruptive sources of electrical noise such as motors and fluorescent lighting. The contractor shall notify the College if installation conditions inhibit these guidelines.
  1. No less than (5) five inches from power lines of 2kVa.
  2. No less than (30) thirty inches from high voltage lighting (including fluorescent lighting).
  3. No less than (39) thirty-nine inches from power lines of 5kVa or greater.
  4. No less than (39) thirty-nine inches from transformers and motors.
- F. Care should be taken in the use of cable ties to secure and anchor the station cabling. Ties should not be over tightened as to compress the cable jacket. No sharp burrs should remain where excess length of the cable tie has been cut.

Telecommunications Outlet

Requirements:

- A. Telecommunications Outlets shall be positioned at a height matching existing services. Where no guide is available, outlets shall be mounted with the center of the outlet 18-inches above floor height unless instructed otherwise by the College.

- B. Positioning of wall-mounted telephone outlets should be in compliance with the provisions of the Americans with Disabilities Act (ADA).
- C. Outlets shall be securely mounted and level.
- D. All unused slots or positions in the Telecommunications Outlet shall be covered with blank inserts.
- E. At the Outlet location, subsurface routing of cables inside "fishable" walls is preferred. Where this cannot be accommodated, however, station cable shall be routed via surface raceway. Raceway should be of adequate dimensions to allow for installation of the cable in compliance with the manufacturers specification including bend radius, crush and tensile limits. Exposed surface raceway should be paintable and fit the decor of the space. Telecommunication Outlet installation on sheetrock walls shall be preceded by the installation of a bracket which mounts securely to the sheetrock (e.g. "Caddy" or "MPLS" Bracket). The Outlet Frame shall, in turn, be secured to the bracket. Telecommunications Outlets shall not be screwed directly to the sheetrock.

### Copper Termination Hardware

#### Requirements:

- A. Copper Termination Hardware at TC
  - 1. At the Telecommunications Closets, all Data and Voice Cables shall be positioned on termination hardware in sequence of the Outlet I.D. starting with the lowest number. All four pairs, terminating on each voice modular jack shall appear on the Telecommunications Closet 110 blocks. Termination Hardware (Blocks and Patch Panels) Positioning and Layout must be reviewed and approved by the College prior to construction. The review does not exempt the Contractor from meeting any of the requirements stated in this document.
  - 2. Except in the IC PBX Room, Voice Termination Hardware shall be wall mounted on plywood board. The contractor shall neatly route and secure new cables via cable management hardware (e.g. D Rings and cable guides) from cable tray to the cable termination hardware. Old cable ties shall be removed and replaced with Velcro style cable wraps to maintain a tidy appearance. Cables shall be fed from below the Termination Hardware in a manner that will facilitate growth.
  - 3. The Height of the Voice Termination Field shall not exceed 6-feet (72-inches) above floor level to facilitate cable maintenance. Backbone Cabling should be positioned to the Left; Station cabling to the Right.
  - 4. Where multiple floors are served from a single TC, the Termination Field for each floor shall be segregated from each of the others. Following the standard established at the site, each cross connect field for a given floor is positioned in a separate vertical column (Voice). Spare capacity should be considered in the design and be provided for each grouping.
  - 5. At the Voice Termination Blocks (all 110-type interface), the installer shall insure that the twists in each Voice Cable pair are preserved to within 1.0-inch of the termination. The cable jacket shall be removed only to the extent required to make the termination.
  - 6. Where Voice Termination Hardware is wall mounted, Horizontal Troughs incorporating split plastic distribution rings shall be provided by the Contractor to accommodate routing of jumpers. Troughs shall be positioned at the top of each column of termination blocks and between each 300-pair wiring block. Troughs shall be Panduit P110JTW.
  - 7. The Contractor shall cross-connect the first 1<sup>st</sup> (BLUE) pair of each new workstation cable to the riser backbone to link the telecommunications closet to the next closet in the hierarchy. The cross-connects wire of colors matching the color of the station cabling conductors (BLUE) shall be used for each cross-connect.

8. In new installations, a jumper wire spool holder shall be installed at the Telecommunications Closet(s). One full (1000-foot) spool of 24-AWG one-pair jumper wires, one spool each white-blue/blue shall be supplied with the holder. The holder shall be designed for use as a spool holder and shall mount securely to the plywood or ladder rack (above the Voice Field).
9. The Contractor shall provide house count to Owner

B. Data Patch Panel

1. At the Data Patch Panel 110-type interface, the installer shall insure that the twists in each Data Cable pair are preserved to within 0.5-inch of the termination. The cable jacket shall be removed only to the extent required to make the termination.

Miscellaneous Materials Installation

Requirements:

A. Jumper Management Hardware

1. Horizontal cable management hardware shall be positioned on the equipment racks to allow for an orderly routing of copper and fiber optic jumpers. At minimum, these Jumper Management Panels shall be positioned:
  - i. Horizontal management shall be placed above and below each forty-eight (48) port Data Patch Panels.
  - ii. Horizontal management shall be placed above and below each fiber Optic HDC (Station fiber).
  - iii. Horizontal management shall be placed above and below each pair (2) of Fiber Optic Termination Panels (Backbone).

B. Surface Raceway

1. Where Outlets are installed in areas where the walls cannot be fished, the Station Cabling serving these outlets shall be covered with raceways. No exposed wire shall be permitted within offices, laboratories, conference rooms, classrooms, etc.
2. The base and cover of the raceway shall be of PVC have a screw applied base and have a snap on cover. Both the base and cover shall be manufactured of rigid natural PVC compounds. The raceway must be UL Listed and exhibit nonflammable self-extinguishing characteristics.
3. The raceway shall originate from a surface mounted Outlet box, have a screw-applied base and terminate above the ceiling. A fitting designed for the raceway shall be used to conceal the ceiling penetration.
4. Surface mounting of an outlet intended for flush-mount installation shall be preceded by the installation of a Surface Box ("Back-box") onto which the outlet frame is mounted.
5. The contractor shall be responsible for all penetrations required to accommodate the raceway in making any transitions between office areas and hallways or other common areas through which the raceway may be routed. All cut molding sections shall be patched and painted upon completion of the raceway installation.
6. All cuts and penetrations must be patched and painted. Upon completion of installation, raceways must be cleaned of all fingerprints, soil, etc.

C. Firestop Systems

1. All penetrations through fire rated building structures, walls, and floors; shall be sealed with an appropriate Firestop system. The requirements applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating items i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.

2. All Firestop systems shall be installed in accordance with the manufacture's recommendations and shall be completely installed and available for inspection by the College.

D. Bonding, Grounding and Electrical Protection

1. All Telecommunications Equipment and raceways shall be properly grounded in accordance with TIA/EIA-607 the NFPA 70 (National Electrical Code), and all other applicable codes and regulations.
2. The major components of the telecommunications grounding and bonding infrastructure are as follows:
  - i. The bonding conductor for telecommunications
  - ii. The Telecommunications Main Grounding Busbar (TMGB)
  - iii. The Telecommunications Grounding Busbar (TGB)
  - iv. The Telecommunications Bonding Backbone (TBB)
  - v. The Telecommunications Bonding Backbone Interconnecting Bonding Conductor (TBBIBC). The conductors used to bond the components to the TMGB & the TGB's
1. All bonding conductors and connectors shall be listed for the purpose intended and approved by a Nationally Recognized Testing Laboratory (NRTL).
2. Route ground conductors to provide the shortest, most direct path from point to point.
3. Splices in bonding or grounding conductors are not allowed. The minimum bend radius of the conductors shall be eight inches (8").
4. The TMGB and the TGB's shall be electro-tin plated and insulated from the supporting structure by at least two inches.
5. If an electrical sub-panel resides in a Telecommunications Room, that panel must have a #6 AWG bonding conductor from the TGB to electrical panel ground bar.
6. All Telecommunication Closets (TC) shall be equipped with a ground bus bar capable of terminating multiple #6 AWG ground cable conductors. All TC's ground bus bars shall be labeled TGB (Telecommunications Grounding Bulbar). TGB shall have a #6AWG cable conductor continuously run to the TMGB (Telecommunications Main Grounding Bulbar). The TMGB shall be bonded to the Main Building Grounding Electrode.
7. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, ladder racks, etc. entering or residing in all Telecommunications Rooms. Shall be grounded to the respective TGM or TMGB using a minimum #6 AWG stranded copper bonding conductor and 2 hole compression connectors. Provide a ground bar at the base of each rack for equipment connections.
8. All incoming outdoor cables shall be terminated on the appropriate sized protector, and all protectors shall be attached to the TMGB via a #6 AWG stranded conductor.
9. All ground cables shall be labeled with the proper FROM - TO (Origination Point to Destination Point) designation.

END OF SECTION 27 00 04

Requirements:

- A. The Telecommunications Administration System shall meet or exceed TIA/EIA-606-A standards.
- B. All Telecommunications Outlets, Data Patch Panel, Voice Termination Blocks AND CABLES shall be clearly labeled using a Code identifying each Information Outlet location as unique throughout the COD Campus. **The font type shall be similar to Arial, Bold faced with font size of 14. All alternate font type and size must be approved by the owner.** This code, which will identify cabling and terminations at both IDF and Media Outlet locations, shall be as follows:
  1. BB-XCC-F-###A
    - i. BB= the designation to identify the specific building
    - ii. XCC = the Telecommunications Closet (TC) serving that jack. The TC is designated by Floor (XX) and their geographic location on that floor (CC) (e.g. Northwest, Southeast, etc.).
    - iii. F = the Floor on which the jack is located.
    - iv. ### = a sequential number assigned to that jack.
    - v. A = Alpha designation used ONLY if multiple jacks of a given type (e.g. Voice or Data) are housed in the same Outlet assembly.
    - vi. For example, "IC-2NW-3-123" designates the 123rd jack on the 3rd Floor served from the IDF in the Northwest area of the 2nd Floor of the IC building. If multiple Data cables would be contained in the outlet, they would be identified as "A", "B", "C", and so on.
- C. This numbering sequence plus a two (2) character Building Designator shall be utilized in the Cable Management System for identification of station cabling. Building designations are as follows:
  1. Arts Center (MAC)= AR
  2. Instructional Center(BIC) = IC
  3. Physical Education(PEC) = PE
  4. Seaton Computing Center(SCC) = SC
  5. Student Resource Center (SRC) = SR
  6. Student Services Center (SSC) = SS
  7. WDCB Tower = JJ
  8. Westmont Center = WC
  9. Naperville Center = NC
  10. Addison = AD
  11. Lisle Center = LC
  12. Carol Stream Community Education Center = CC
  13. Early Childhood Education Center(ECC) = EC
  14. Technical Education Center(TEC) = TE
  15. Health and Science Center(HSC) = HS
  16. Culinary and Hospitality Center (CHC) = CH
  17. Homeland Security Education Center (HEC) = HE
  18. Homeland Training Center (HTC) = HT
- D. Where adding to an existing installation, cable identification numbering must be integrated into the established plan and must be approved by the Owner.
- E. Where adding to an installation, both voice and data numbering must remain in a "matched" sequence. Throughout the school, at each location has the "same" numbering on the faceplate ID for both voice and data. Example: If the 4th location in a series is a "voice only" location, then the data patch panel would be skipping number 4 in its sequence. Therefore, if the numbers are continuing, (assuming the "next" location is

both voice and data) the data patch panel's next number would be 5 (skipping # 4) with NO blank data jacks open on the data patch panel. By the same description, if a location in a series is a "data only", the voice designation strip would represent a "skip" in its sequence. Again the arrangement of the added cables would leave NO blanks on the 110-voice frame.

- F. ALL labeling shall be machine generated (Panduit) in black ink on white background tags and be permanent. NO HAND WRITTEN LABELS SHALL BE ALLOWED.
- G. Cables
  - 1. ALL Cables shall be identified AT BOTH ENDS using a self-laminating tag wrapped around the cable (e.g. not a "flag"). The Contractor shall use labeler. Cable labels shall indicate cable designation and destination. In Station cables, for example, this designation shall be the Telecommunications Outlet identification.
- H. Telecommunications Outlets
  - 1. Telecommunications Outlets are to be labeled (1) on the cover of the assembly, (2) on the base of the assembly (if applicable) and (3) on each cable terminated at that location.
  - 2. Where multiple cables of a given type (e.g. "Data") are contained in a single outlet, the alpha-designator ("A", "B", "C", and so on) those jack positions shall be so labeled.
- I. Data Patch Panels
  - 1. Data Patch panels shall be clearly labeled as to the destination and position of each cable terminated on that panel. Cables shall be positioned in sequence of Outlet I.D.
  - 2. The TC designator may be omitted on each jack position provided that the panel itself includes the TC designator.
  - 3. Station cables shall be labeled within 4-inches of the cable choke at Data Patch Panels.
- J. Voice Termination Block
  - 1. Each horizontal row (in pairs) of the Voice Termination Block shall be labeled with "Designation Strips" which identify the destination and position of each cable terminated on that block.
  - 2. Designation Strips shall be color coded to indicate the block's application. Color-coding shall be as follows:
    - i. Inter-Building Cable (e.g. IC-PE or OCC-"K") = Brown
    - ii. Intra-Building Cable (MDF-IDF) = White
    - iii. Station Cable = Blue
  - 3. Blocks on which "Station" Cabling is terminated will be labeled as to identify Telecommunications Outlet I.D.s. Voice termination blocks on which "Backbone" or "Tie" Cabling is terminated will be labeled to identify Pair Count are identified (e.g. 1-25, 26-50, etc.). Assignment of Pair Count(s) shall consider the existing count and must be approved by Owner.



Requirements:

- A. Upon completion of installation work, the contractor shall visually inspect all cabling and terminations to insure that they are complete and conform to the requirements defined herein.
- B. The contractor shall provide to the College a written certification that this inspection has been made.
- C. All cable sub-systems (e.g. Inter-building, Intra-Building and Station) must be tested independently. Testing of these sub-systems cannot be combined (e.g. through interconnection).
- D. Contractor shall conduct acceptance testing according to a schedule coordinated with the College. Representatives of the College may be in attendance to witness the test procedures. The contractor shall offer adequate advance notice to the College as to allow for such participation.
- E. The Contractor is responsible for supplying all test equipment and personnel to conduct acceptance test.
- F. If any link is found to be outside the specification defined herein, that cable and the associated terminations (if applicable) shall be replaced at the expense of the contractor. The applicable tests shall then be repeated.
- G. Data/Voice UTP Station Cable Testing
  1. Cat 6 Installation: field test requirements upon completion of the installation.
    - i. Every cabling link in the installation shall be tested in accordance with the Telecommunications Industry Association (TIA) standard ANSI/TIA/EIA-568-B.1 (most current version) Length of the run must be given on test results.
  2. Optional Requirements:
  3. A representative of the end-user may select a random sample of 5% of the installed links. The Owner shall test these randomly selected links and the results shall be stored. Field Test Specifications to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the end-user representative shall repeat 100% testing and the cost shall be borne by the installation contractor.

Test Result Documentation and Follow Up

Requirements:

- A. In system documentation, contractor shall provide test results and describe the conduct of the tests. Test documentation shall include a record of test frequencies or wavelengths, cable type, conductor pair and cable I.D. (e.g. Outlet I.D.), measurement direction, test equipment type, model and serial number, date, reference setup, and crewmember name(s) and the length of the run. Where applicable, printouts generated for each cable by the wire test instrument (e.g. *Fluke DSP4300*) shall be submitted as part of the documentation package.
- B. At the request of the Owner, the contractor shall provide copies of original test results.
- C. The Owner may request that a 10% random field re-test be conducted on the cable system - at no additional cost - to verify documented findings. If findings contradict the documentation submitted by the Contractor, additional testing can be requested to the extent determined necessary by the Owner, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

- D. Should it be determined by the Owner or A/E that the materials or any portion thereof furnished and installed fail to comply with the specifications defined herein, these materials and the related installation shall be rejected and replaced by the Contractor. All work disturbed by changes necessitated in consequence of said defects or imperfections shall be made good at the Contractor's expense. All replaced components shall be re-tested.

END OF SECTION 27 00 06

Requirements:

- A. Upon completion of cable plant installation, the contractor shall provide a complete set of cable records documentation including:
  1. Test Data as defined above
  2. As-Built Drawings (where applicable)
  3. Input Data for Facilities Management System
  
- B. As built drawings
  1. See also Division 01 of the Design and Engineering Criteria
  2. Contractor shall provide accurate as-built construction drawings.
  3. The drawing package shall include one or more of the following:
    - i. Floor plans showing (1) the location of all Telecommunications Outlets as installed and (2) paths by which all cables are routed.
    - ii. Cable lengths as obtained through review of sheath footage markings.
    - iii. Termination field, equipment rack and frame layouts.
  4. Numbering and drawing conventions used shall be consistent throughout all documentation provided and comply with established standards at the College. Telecommunications Outlet locations shall be identified by their sequential number as defined elsewhere in this document and include the Building Designator.
  5. All documentation, including hard copy and electronic forms (if applicable) shall become the property of the Owner.
  6. Documentation shall be submitted within ten (10) working days of the completion of testing.

END OF SECTION 27 00 07

The following products are acceptable to the Owner. Any variation shall be subject to review and acceptance by Owner.

Mfgr	Mfgr PN	Description
Panduit	PUP6004BU-UY	High performance Category 6 plenum (CMP) 4-pair UTP copper cable. Copper conductors are 23 AWG construction with FEP insulation. Conductors are twisted in pairs, separated by an integrated pair divider, and placed in a low smoke, flame-retardant PVC jacket.
Panduit	PUR6004BU-UY	High performance Category 6 riser (CMR) 4-pair UTP copper cable. Copper conductors are 23 AWG construction with HDPE insulation. Conductors are twisted in pairs, separated by an integrated pair divider, and placed in a flame-retardant PVC jacket.
Panduit	CFPL2EI	CLASSIC FACEPLATE W/LABEL
Panduit	CFPL4EI	CLASSIC FACEPLATE W/LABEL
Panduit	CFPL6EI	CLASSIC FACEPLATE W/LABEL
Panduit	CF1062EIY	106 FRAME - DATA - 2 PORT
Panduit	CF1064EIY	MINI-COM 106 FRAME
Panduit	JB1DEI-A	1 PCS DEEP JUNCTION BOX**
Panduit	CFPL4BL	FURN. FACEPLATE 4 POS. W/LABEL&LABEL COV
Panduit	CJ688TGEI	MINICOM CAT6 JACK MODULE
Panduit	P110BW300-X	110 WIRING BLOCK W/LEGS
Panduit	P110CB4-X	110 CONNECTING BLOCK 4PR
Panduit	P110CB5-X	110 CONNECTING BLOCK 5PR
Panduit	P110JTW-X	GIGA PUNCH JUMPER TROUGH
Panduit	DP48688TGY	48 PORT FLAT DP6 DATA
Panduit	DP24688TGY	24 PORT FLAT DP6 DATA
Panduit	CMPHH2	PANNET 2 RU HORZ. 3X5" D-RINGS FRONT
Panduit	NFR84	PANNET NETFRAME RACK, 7FT
Panduit	CMPH1	19" Manager, Front and Rear, 1 RU
Panduit	CMPH2	19" Manager, Front and Rear, 2 RU
Panduit	NFD884	Full length, dual hinged metal door
Panduit	NFD484	Full length, single hinged metal door
Panduit	NFBRFK	Bend Radius Fingers Kit
Panduit	NFEP	84" NetFrame End Panel

Panduit	HLT2I-X0	TAK-TY LOOP TIE
<b>Mfgr</b>	<b>Mfgr PN</b>	<b>Description</b>
Panduit	DPLF	KIT- FRONT LABEL HOLDER
Panduit	DPLT	KIT - TOP LABEL HOLDER
Panduit	FRME1	PANNET OPTICOM 1 RU BLACK ENCL
Panduit	FRME2	PANNET OPTICOM 2 RU BLACK ENCL
Panduit	FRME3	PANNET OPTICOM 3 RU BLACK ENCL
Panduit	FAPB	FIBER ADAPTER PANELS
Panduit	FAP6WBUDSCZ	FIBER ADAPTER PANEL W/6BU
<b>Work Station Hardware</b>		
Panduit	CFPL2EI	Single gang, vertical faceplate accepts two <i>Mini-Com</i> ® Modules
Panduit	CFPL4EI	Single gang, vertical faceplate accepts four <i>Mini-Com</i> ® Modules
Panduit	CFPL6EI	Single gang, vertical faceplate accepts six <i>Mini-Com</i> ® Modules
Panduit	CFPF12EI-2G	Double gang, vertical faceplate frame and six flat inserts (two module spaces each). Accepts twelve <i>Mini-Com</i> ® Modules.
Panduit	JB1EI-A	Single gang one-piece outlet box with adhesive backing
Panduit	KWP6PY	Stainless steel phone plate with <i>Giga-TX</i> ™ Style cat 6 Keystone Jack Module
Panduit	CFFP4BL	Faceplate snaps into industry standard knockouts found on modular furniture
Panduit	CMBEI-X	1-position, reserves space for future use

END OF SECTION 27 00 08

**EXHIBIT B – SPECIFICATION DRAWINGS**

# COLLEGE OF DUPAGE

## SRC DOOR REPLACEMENT

425 FAWELL BLVD.  
GLEN ELLYN, IL 60137

100% CONSTRUCTION DOCUMENTS

04 / 18 / 18



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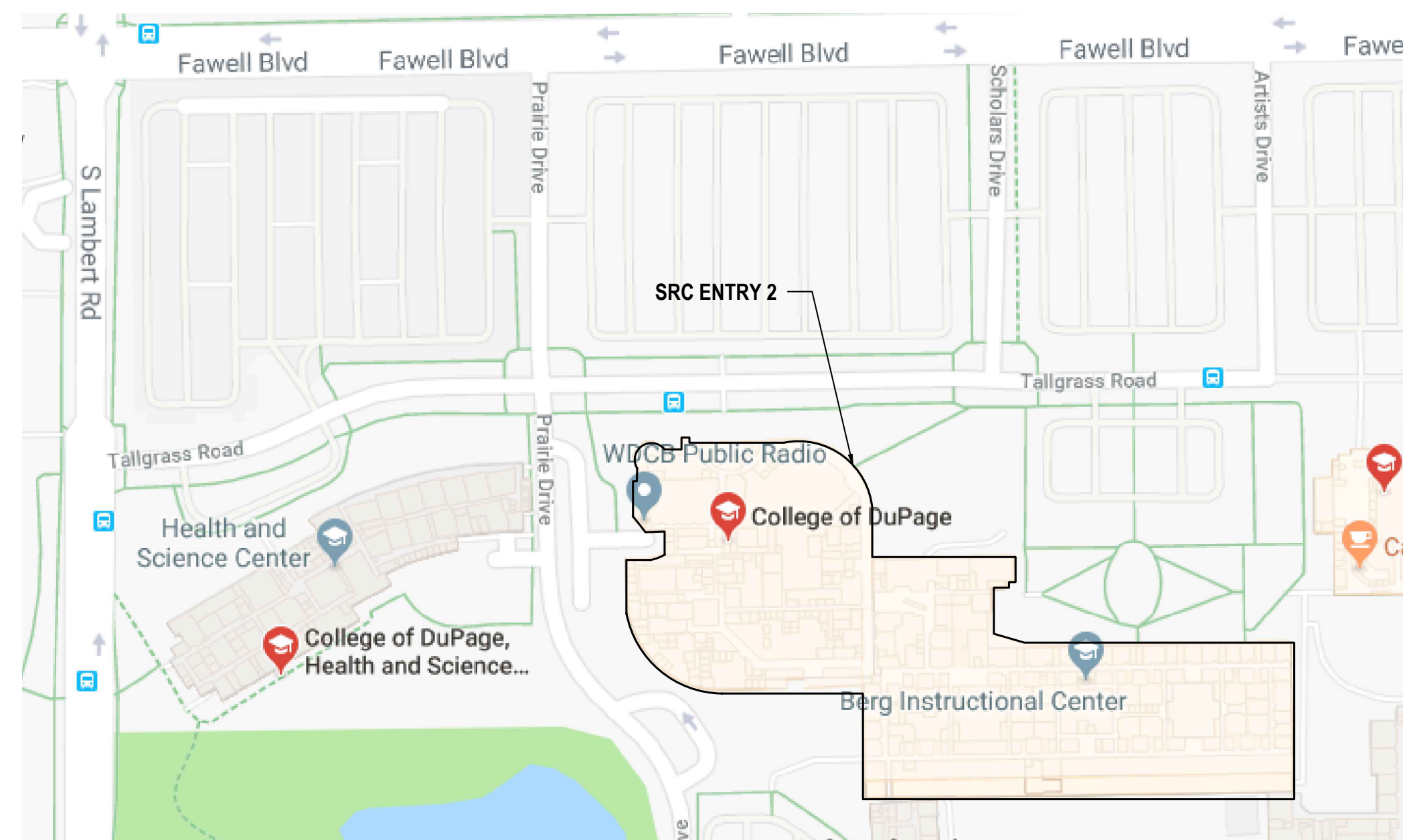
35 East Wacker Dr  
Suite 2800  
Chicago, IL  
60601-2308

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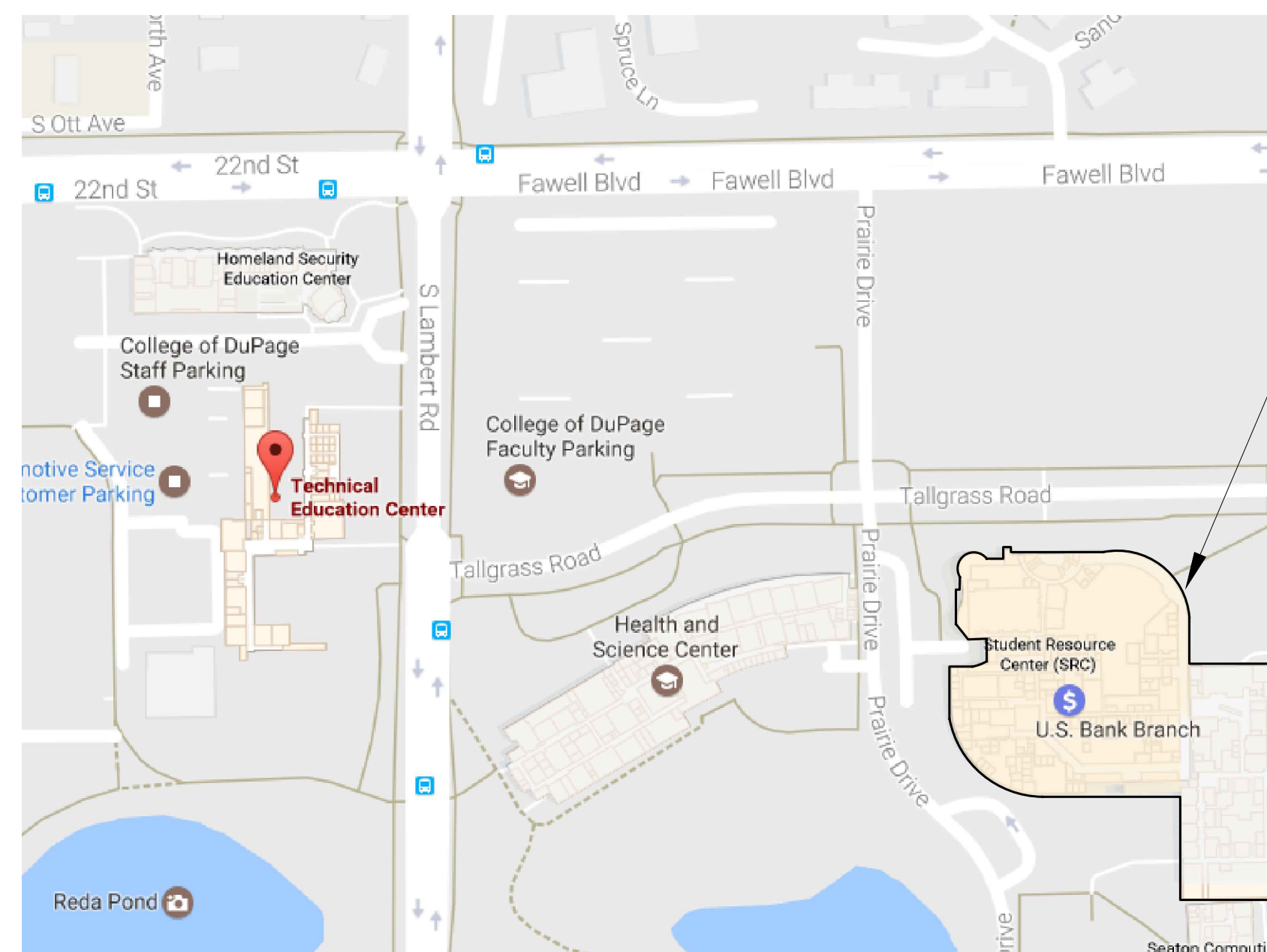
Structural Engineer  
SP Engineers,  
134 N LaSalle Dr.,  
Chicago, IL 60602

MEP Engineer  
Bailey Edward Design,  
35 E Wacker Drive, Suite 2800,  
Chicago, IL 60601

### LOCATION MAP



### COLLEGE OF DUPAGE CAMPUS MAP



COLLEGE OF DUPAGE  
STUDENT RESOURCE CENTER  
425 FAWELL BLVD  
GLEN ELLYN, IL 60137

### DRAWING INDEX

#### GENERAL

- G000 COVER SHEET
- G001 GENERAL NOTES, SYMBOLS, ABBREVIATIONS & ASSEMBLY TYPES

#### STRUCTURAL

- S101 STRUCTURAL NOTES
- S201 CANOPY FRAMING PLAN AND FOUNDATION PLAN
- S301 FOUNDATION SECTIONS AND DETAILS
- S401 SECTIONS AND DETAILS

#### ARCHITECTURE

- D100 FIRST FLOOR DEMOLITION PLAN
- D200 FIRST FLOOR DEMOLITION REFLECTED CEILING PLAN
- A100 VESTIBULE PLAN
- A200 VESTIBULE REFLECTED CEILING PLAN
- A300 VESTIBULE ROOF PLAN
- A400 VESTIBULE ELEVATIONS
- A500 VESTIBULE SECTION
- A800 DETAILS
- A900 FINISH SCHEDULE, DOOR SCHEDULE AND DOOR DETAILS

#### FIRE PROTECTION

- FP100 FIRE PROTECTION NEW WORK PLAN
- FP200 FIRE PROTECTION NOTES, SYMBOLS AND DETAILS

#### PLUMBING

- PD100 PLUMBING DEMOLITION PLAN
- P100 PLUMBING NEW WORK PLAN

#### MECHANICAL

- H100 HEATING NEW WORK PLAN
- H200 HEATING SYMBOLS, ABBREVIATIONS AND DETAILS

#### ELECTRICAL

- ED101 POWER AND SYSTEM DEMOLITION PLAN
- E000 ELECTRICAL NOTES, ABBREVIATION AND SYMBOLS LIST
- E100 LIGHTING NEW WORK PLAN
- E101 POWER AND SYSTEM NEW WORK PLAN

Date	Drawing Set Title
4/18/18	100% CONSTRUCTION DOCUMENTS


--

COLLEGE OF DUPAGE  
SRC ENTRY #2  
REPLACEMENT

425 FAWELL BLVD, GLEN ELLYN,  
IL 60137

Drawing Title

COVER SHEET

Expiration Date of Seal: 11/30/2018

	BE Project No. 15044-17-10
	Drawn By: PDK
	Drawing No. G000

# CODE INFORMATION

AUTHORITY HAVING JURISDICTION:  
THE COUNTY OF DUPAGE  
421 N. COUNTY FARM ROAD,  
WHEATON, IL 60187  
630-407-6500

APPLICABLE CODES:

### MUNICIPAL CODE, BUILDING CODE REQUIREMENTS FOR DUPAGE COUNTY, ILLINOIS

- 2015 INTERNATIONAL BUILDING CODE (IBC) W/AMENDMENTS
- 2014 NATIONAL ELECTRICAL CODES (NEC) W/AMENDMENTS
- 2015 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)
- 2015 INTERNATIONAL MECHANICAL CODE (IMC) W/AMENDMENTS
- ILLINOIS ENERGY EFFICIENT BUILDING CODE
- 2015 INTERNATIONAL FIRE CODE

\*ALL INTERIOR FINISH MATERIALS TO BE CLASS A FRAME SPREAD RATING (0-25) PER LIFE SAFETY CODE NFPA 101 AND SECTION 803.1 OF THE INTERNATIONAL BUILDING CODE

\*ALL INTERIOR FINISH MATERIALS TO BE CLASS 1 PER NFPA 260/UFAC FABRIC CLASSIFICATION AND CLASS 1 OR A ASTM E34

### EXISTING BUILDING:

- 3 - STORIES
- APPROXIMATELY 200,000 SQFT
- STRUCTURE: STEEL SPRAY FIREPROOFED
- CONSTRUCTION TYPE: IB, FULLY SPRINKLERED
- USE GROUP: BUSINESS GROUP 'B', EDUCATIONAL COLLEGE
- OCCUPANT LOAD: ACCESSORY STORAGE AREAS, MECHANICAL EQUIPMENT ROOMS: 300 PPS/F.
- MECH.CLOSET 2316D: 55SF/300SF /PP = 2 PP. ASSUME 1PP.
- 1 EXIT DOORS REQD: 3 - EXIT DOORS PROVIDED
- NEW IS O.K.
- FIRE RATED ASSEMBLIES (TYPE I)  
PRIMARY STRUCTURAL FRAME: 2- HOURS  
NON-BEARING WALLS: NO EXISTING FIRE RATION  
PARTITION IN THE AREA OF RENOVATION, NONE REQUIRED

### FIRE RESISTANCE RATINGS, TYPE IB:

- STRUCTURAL FRAME: 2 HOURS (EXISTING)
- NON-BEARING WALLS(INTERIOR): 0 HOURS- NONE (EXISTING)
- FLOOR CONSTRUCTION: 2-HOURS (EXISTING)

### ACCESSIBILITY:

ADA STANDARDS FOR ACCESSIBLE DESIGN, DEPARTMENT OF JUSTICE - ISSUED SEPTEMBER 15,2010 TITLE II/28 CFR 35.151

ADAAG 36CFR, 2004 WITH APPENDICES B AND D ICC/ANSI A117.1-2003

ICC/ANSI A 117.1 ACCESSIBLE AND USABLE BUILDING AND FACILITIES

ILLINOIS ACCESSIBILITY CODE (IAC) 1997

ILLINOIS ENVIRONMENTAL BARRIERS ACT - IEBA

# GENERAL DEMOLITION NOTES

- CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH THE EXISTING CONDITIONS PRIOR TO COMMENCING THE WORK.
- CONTRACTOR SHALL NOTIFY THE ARCHITECT OF ANY AND ALL DISCREPANCIES BETWEEN THE DEMOLITION DRAWINGS AND ACTUAL CONDITIONS PRIOR TO PROCEEDING WITH THE WORK.
- REFER TO MEP AND FP DEMOLITION AND NEW WORK DRAWINGS FOR ADDITIONAL REQUIREMENTS.
- ALL PENETRATIONS OF EXISTING FIRE RATED WALL OR SMOKE PARTITIONS SHALL BE PATCHED & REPAIRED AS REQUIRED TO MAINTAIN THE EXISTING FIRE RATINGS OR SMOKE INFILTRATION INTEGRITY OF THE WALL. ALL SLEEVES, WIREWAYS, CABLE TRAYS, PIPES, DUCTWORK, ETC. SHALL BE FIRE SEALED TIGHT TO THE WALL OR FLOOR PENETRATIONS TO MAINTAIN THE REQUIRED CODE COMPLIANT FIRE RATING.
- PROTECT EXISTING INTERIOR WALLS DURING REMOVAL AND CONSTRUCTION. PROVIDE TEMPORARY PROTECTION FROM DUST, NOISE, DAMAGE, ETC. AND CONSTRUCTION BARRIERS AND OTHER SITE PROTECTION REQUIREMENTS.
- REFER TO THE PROJECT MANUAL, SPECIFICATIONS DIVISION 1, AND GENERAL REQUIREMENTS, FOR RELATED PROJECT, DEMOLITION, CONSTRUCTION AND PROTECTION REQUIREMENTS.
- SALVAGED MATERIALS INDICATED ARE PROPERTY OF THE OWNER. TEMPORARILY STORE MATERIALS ON SITE AS DIRECTED BY THE OWNER. PROVIDE ALL NECESSARY PROTECTION AGAINST MOISTURE, IMPACT, AND ANY OTHER TYPE OF POTENTIAL DAMAGE.
- CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS, WORK ORDERS REQUIRED & SHALL NOTIFY ALL UTILITIES HAVING SERVICE CONNECTIONS WITHIN THE SITE.
- CONTRACTOR SHALL REMOVE ALL TRASH AND DEBRIS DAILY. DEMOLITION WORK SHALL REMAIN SAFE & CLEAN FOR THE BUILDING'S OCCUPANTS & CONSTRUCTION WORKERS. OCCUPIED AREAS ADJACENT TO THE PROJECT WORK AREAS SHALL BE KEPT CLEAN AT ALL TIMES DURING THE WORK.
- ROOM LAYOUTS AND CONFIGURATIONS AND FOR AREAS OUTSIDE OF THE CURRENT PHASE OF WORK ARE SHOWN FOR REFERENCE ONLY. EXISTING CONSTRUCTION IS BASED UPON INFORMATION PROVIDED BY THE OWNER. FIELD VERIFICATION PRIOR TO COMMENCEMENT OF CONSTRUCTION IS REQUIRED.
- REMOVE CEILINGS & ASSOCIATED HANGERS AND SUPPORTS IN LOCATIONS TO RECEIVE NEW CEILINGS. SEE THE FINISH SCHEDULE & THE REFLECTED CEILING PLANS.
- IN AREA OF REMOVAL AND WHERE NEW FINISHES ARE NOT SCHEDULED, CONTRACTOR SHALL REPAIR WALLS, FLOORS, WALL BASES, AND CEILING AS REQUIRED TO MATCH EXISTING FINISHES TO BE FLUSH, SMOOTH, AND MATCH ADJACENT MATERIALS IN ALL RESPECTS. RELOCATE LIGHT FIXTURES AND OTHER CEILING AND WALL MOUNTED DEVICES WHERE NEW PARTITIONS ARE SHOWN ADJACENT TO AREAS NOT SCHEDULED FOR NEW FINISHES.
- THE CONTRACTOR SHALL PROVIDE TEMPORARY PROTECTION, SUPPORT, BRACING SEALING AND CAPPING OF EXISTING PARTITIONS, CEILINGS, PIPES, DUCTS, CONDUITS, ETC., SHOWN TO BE PARTIALLY DEMOLISHED IN THIS PHASE OF WORK. THE TEMPORARY WORK SHALL KEEP THE PARTIALLY DEMOLISHED WORK STABILIZED. WHERE EXISTING CONSTRUCTION IS SHOWN TO BE PARTIALLY DEMOLISHED IN THIS PHASE OF WORK, EXTEND DEMOLITION A MINIMAL DISTANCE AS REQUIRED TO INSTALL NEW WORK INDICATED.
- PREPARE ALL EXISTING SURFACES TO REMAIN PROVIDING CLEAN SMOOTH SURFACES TO RECEIVE SCHEDULED FINISHES.
- CLEAN AND PREPARE FOR NEW FINISHES EXISTING SURFACES INDICATED TO REMAIN. COORDINATE WITH THE FACILITY REMOVAL AND DISPOSAL OF UNWANTED SIGNAGE, FIXTURES, HARDWARE, ETC. ON EXISTING SURFACES TO MATCH EXISTING SUBSTRATES AND PROVIDE AN ADDITIONAL PRIME PAINTED COATING ON ALL REPAIRS PRIOR TO REFINISHING AS SCHEDULED. COORDINATE WITH THE REQUIREMENTS OF THE FINISH SCHEDULE.

# ARCHITECTURAL PROJECT NOTES

- THE FOLLOWING GENERAL NOTES APPLY TO ALL ARCHITECTURAL DRAWINGS
- THE ARCHITECTURAL DRAWINGS ARE PART OF A LARGER SET OF DRAWINGS WHICH, WHEN COMPLETE, CONSIST OF SPECIFICATIONS AND ALL DRAWINGS LISTED BY THE INDEX OF DRAWINGS. THE WORK DESCRIBED BY THE DRAWINGS OF ANY ONE DISCIPLINE MAY BE AFFECTED BY THE WORK DESCRIBED ON DRAWINGS OF ANOTHER DISCIPLINE AND MAY REQUIRE REFERENCE TO DRAWINGS OF ANOTHER DISCIPLINE. PARTIAL SETS OF DRAWINGS OR DRAWINGS WITHOUT SPECIFICATIONS ARE INCOMPLETE AND SHALL NOT BE DISTRIBUTED AND UTILIZED.
- THE ARCHITECTURAL FLOOR PLANS AND REFLECTED CEILING PLANS SHOW THE EXACT LOCATION OF MANY - BUT NOT ALL - EXPOSED PARTS OF THE WORK. FOR ITEMS NOT LOCATED EXACTLY, APPLY THE RULES INDICATED BY G001 FOR TYPICAL RULES FOR DETERMINING MOUNTING HEIGHTS AND LOCATIONS TO DETERMINE THE EXACT LOCATION OF EACH EXPOSED PART OF THE WORK.
- DESIGN REFERENCE ELEVATION -0'-0" AS SHOWN ON THE ARCHITECTURAL DRAWINGS CORRESPONDS TO THE FINISH FLOOR ELEVATION OF THE FLOOR ILLUSTRATED.
- FOR GENERAL NOTES AND SYMBOLS APPLICABLE ONLY TO THE DRAWINGS OF DISCIPLINES OTHER THAN ARCHITECTURE, REFER TO THE SPECIFIC DRAWINGS OF THAT DISCIPLINE.
- THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE WORK OF ALL SUBCONTRACTORS, TRADES, AND SUPPLIERS. THE CONTRACTOR SHALL ENDEAVOR TO IDENTIFY AND NOTIFY THE OWNER OF ANY CONFLICTS BETWEEN THE WORK OF DIFFERENT PARTIES AT THE EARLIEST POSSIBLE DATE SO AS TO ALLOW REASONABLE AND ADEQUATE TIME FOR THE CONFLICT TO BE RESOLVED WITHOUT DELAYING THE WORK. ALL DEVIATIONS FROM THAT WHICH IS REQUIRED BY THE CONTRACT DOCUMENTS MUST BE APPROVED IN ADVANCE BY THE OWNER.

# GENERAL PROJECT NOTES

- THESE DRAWINGS INDICATE THE GENERAL SCOPE OF THE PROJECT IN TERMS OF THE ARCHITECTURAL DESIGN CONCEPT, DIMENSIONS, MAJOR ELEMENTS AND MATERIALS. THESE DRAWINGS DO NOT NECESSARILY INDICATE OR DESCRIBE ALL WORK REQUIRED FOR THE FULL COMPLETION OF THE PROJECT. ALL CONTRACTORS SHALL FURNISH ALL OF THOSE ITEMS AND LABOR REQUIRED FOR THE FULL COMPLETION OF THIS PROJECT IN A FIRST CLASS WORKMANSHIP-LIKE MANNER.
- ALL WORK IS TO BE PERFORMED FROM FINAL CONSTRUCTION DOCUMENTS ONLY AND A COPY OF THE APPROVED FINAL SET MUST BE LOCATED ON THE SITE AT ALL TIMES. ALL CONTRACTOR'S SUBCONTRACTORS SHALL BE GIVEN FULL SETS OF FINAL CONSTRUCTION DOCUMENTS WITH NO SHEETS EXCLUDED.
- DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS HOLD PRIORITY OVER APPARENT SCALE. ANY DISCREPANCIES SHOULD BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IN WRITING.
- EXISTING CONDITIONS AND DIMENSIONS SHOWN ON THE DRAWINGS HAVE BEEN COMPILED BY THE ARCHITECT FROM EXISTING DRAWINGS PROVIDED BY THE OWNER AND FIELD MEASURING AND SHALL BE USED BY THE CONTRACTOR ONLY AS A GUIDE. ALL CONTRACTORS SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF ALL DIMENSIONS AND CONDITIONS AND SHALL REPORT ANY DISCREPANCIES IN THE SITE CONDITIONS OR THE DOCUMENTS TO THE ARCHITECT IN WRITING.
- PROVIDE CONCRETE FINISHES AS INDICATED ON THE DRAWING AND IF NOT, DIRECTION OF FINISH SHALL BE PERPENDICULAR TO DIRECTION OF TRAFFIC WITH EXPOSED AGGREGATE FINISH.
- UNLESS OTHERWISE SHOWN, EXTERIOR PAVING EXPANSION JOINTS SHALL BE 1/2 INCH WIDE. EXPANSION JOINT SEALER SHALL BE ONE PART POURABLE, SELF-LEVELING POLYURETHANE. SEALANT COLOR SHALL MATCH ARCHITECT'S SAMPLE.
- PROVIDE CONTROL JOINTS IN DRYWALL PARTITIONS AND CEILINGS AS SHOWN OR IF NOT SHOWN AS FOLLOWS:
  - AT DOOR FRAMES UPWARD FROM ONE JAMB CORNERS
  - WHERE EXPANSION OR CONTROL JOINTS OCCUR IN FLOOR OR WALL CONSTRUCTION SUPPORTING THE LATH AND PLASTER SYSTEM.
  - WHERE GYPSUM BOARD SYSTEM ABUTS A STRUCTURAL ELEMENT OTHER THAN THE FLOOR, OR ABUTS DISSIMILAR CONSTRUCTION OR THE CONSTRUCTION CHANGES WITHIN THE PLANE OF THE SYSTEM.
  - WHERE DIMENSIONS OF GYPSUM BOARD SYSTEM EXCEED 30 FEET IN EITHER DIRECTION OF THE SAME PLANE OR 50 FEET FOR INTERIOR CEILING SYSTEMS CONSTRUCTED WITH PERIMETER RELIEF WHERE WINGS OF "L", "U" AND "T" SHAPED CEILING AREAS ARE JOINED
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF ALL UTILITIES AFFECTED BY PROJECT.
- THE CONTRACTOR SHALL VERIFY ALL PARTITION LAYOUTS WITH ARCHITECT BEFORE CONSTRUCTION.
- THE PROJECT SHALL BE ENTIRELY CLEANED BY THE GENERAL CONTRACTOR BEFORE OWNER OCCUPATION INCLUDING ALL WINDOW GLASS, PANELS, FLOORS, WALLS AND ELECTRICAL PLATES.
- THE WORK AREAS SHALL BE KEPT IN BROOM-SWEPT FINISH CONDITION. ALL CONTRACTORS AND SUBCONTRACTORS SHALL BE RESPONSIBLE FOR CLEANING UP AND DISPOSING OF THEIR LITTER AND LEFT OVER MATERIALS ON A REGULAR BASIS AND BE RESPONSIBLE FOR LEAVING THE PROJECT IN A BROOMSWEPT FINISH CONDITIONS UPON COMPLETION OF THEIR PORTION OF THE PROJECT.
- THE ELECTRICAL AND MECHANICAL CONTRACTORS SHALL VERIFY ALL UTILITY CHASES AND EQUIPMENT LOCATION AND REPORT ANY DISCREPANCIES OR CONFLICTS TO THE OWNER PRIOR TO SUBMITTING HIS / HER BID. UNLESS THE OWNER AND THE ARCHITECT ARE NOTIFIED IN WRITING OF THE CONFLICTS OR ADDITIONAL SPACE REQUIREMENTS BEFORE THE START OF CONSTRUCTION, ALL CORRECTIVE MEASURES WILL BE MADE BY THE CONTRACTORS AT NO ADDITIONAL COST TO THE OWNER.
- THE OWNER'S WRITTEN AUTHORIZATION MUST BE OBTAINED PRIOR TO THE ORDERING OF ANY MATERIAL, AWARDED OF ANY CONTRACTS OR THE EXECUTION OF ANY WORK WHICH INVOLVES EXTRA COST.
- THE OWNER HAS NOT IDENTIFIED ASBESTOS CONTAINING MATERIALS ARE PRESENT ON-SITE. NOTIFY THE OWNER IMMEDIATE IF ASBESTOS OR ANY OTHER HAZARDOUS MATERIALS ARE IDENTIFIED. DO NOT PROCEED WITH THE WORK UNTIL THE HAZARDOUS MATERIALS HAVE BEEN REMOVED.
- REFER TO DRAWINGS OF OTHER DISCIPLINES FOR ADDITIONAL INFORMATION AND COORDINATION OF WORK, INCLUDING ME AND FP DRAWINGS.
- DETAILS SHOWN ARE INDICATIVE OF THE CHARACTER, PROFILES, MATERIALS AND SYSTEMS REQUIRED FOR THE WORK INCLUDING THOSE CONDITIONS NOT COVERED BY SPECIFIC DETAILS.
- WHERE THE DESIGN INTENT CANNOT BE DETERMINED FROM THE DRAWINGS OR SPECIFICATIONS, CONSULT THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.
- DIMENSIONS SHALL GOVERN. DO NOT SCALE DRAWINGS. WHERE THERE APPEARS TO BE A CONFLICT BETWEEN DIMENSIONS OR WHERE DIMENSIONS CANNOT BE DETERMINED FROM THE DRAWINGS, CONSULT THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.
- NO WOOD OR WOOD COMPOSITE PRODUCTS ARE ACCEPTABLE, U.N.O.



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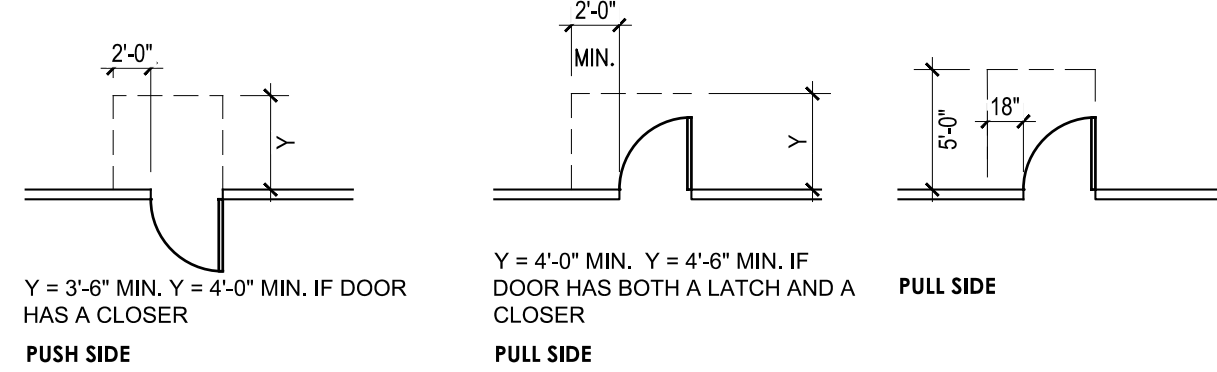
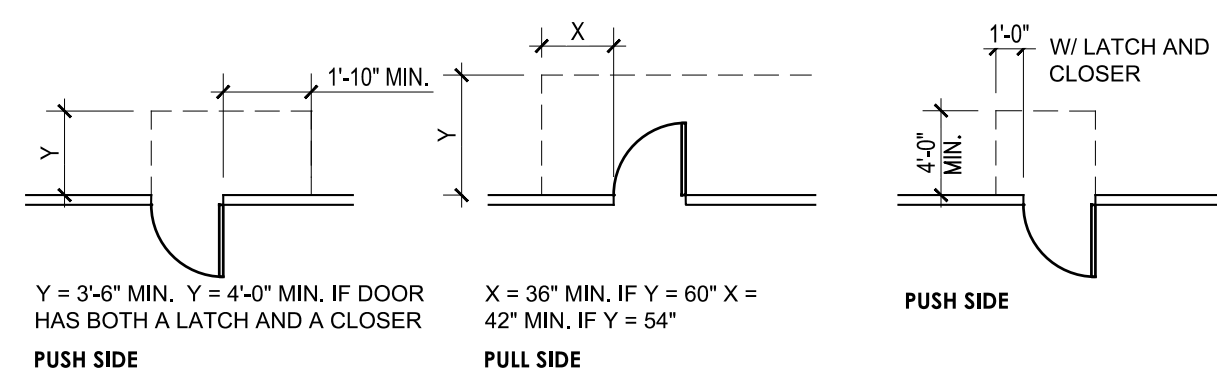
35 East Wacker Dr  
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60601-2308

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Structural Engineer  
SP Engineers,  
134 N LaSalle Dr.,  
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MEP Engineer  
Bailey Edward Design,  
35 E Wacker Drive, Suite 2800,  
Chicago, IL 60601

## ACCESSIBILITY CLEARANCES AND MOUNTING LOCATIONS



### MANEUVERING CLEARANCES AT DOORS

Scale: N1S



### LEVEL CHANGES

Scale: N1S

## IDENTIFICATION SYMBOLS

	BUILDING SECTION		REVISION
	WALL SECTION		WALL TYPE
	DETAIL REFERENCE		NORTH ARROW
	DETAIL REFERENCE		DOOR REFERENCE
	INTERIOR ELEVATION		DEMOLITION KEYNOTE
	GRID LINE		NEW WORK KEYNOTE
	GRID LINE		DETAIL NUMBER
	ROOM NAME		SHEET NUMBER
	ROOM NUMBER		DIMENSION STRING
	ROOM NUMBER		ALIGN/FLUSH SURFACES
	GENERAL DRAWING NOTE		GENERAL DRAWING NOTE

Issue Date	Title
4/18/18	100% CONSTRUCTION DOCUMENTS

COLLEGE OF DUPAGE  
SRC ENTRY #2  
REPLACEMENT

425 FAWELL BLVD, GLEN ELLYN,  
IL 60137

Drawing Title  
**GENERAL NOTES,  
SYMBOLS,  
ABBREVIATIONS, &  
ASSEMBLY TYPES**

Expiration Date of Seal: 11/30/2018  
BE Project No.: 15044-17-10

Drawn By: PDK  
Drawing No.: G001



## GENERAL

- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THE STRUCTURAL WORK WITH THE ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS, AS WELL AS ANY OTHER APPLICABLE TRADES. IN CASE OF CONFLICT BETWEEN THE STRUCTURAL WORK AND DRAWINGS RELATED TO OTHER TRADES, THE CONTRACTOR SHALL MAKE ALLOWANCES IN HIS BID FOR THE MORE SEVERE REQUIREMENTS. CONFLICTS BETWEEN THE STRUCTURAL WORK AND THE DRAWINGS OF OTHER TRADES SHALL NOT BE REASON FOR ANY EXTRA COST OR DELAY IN EXECUTION OF THE WORK. CONTRACTOR IS RESPONSIBLE FOR COORDINATING THE REQUIREMENTS OF ALL DRAWINGS INTO THEIR SHOP DRAWINGS AND WORK.
- NO CHANGE IN SIZE OR DIMENSION OF STRUCTURAL MEMBERS SHALL BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ARCHITECT.
- THE CONTRACTOR IS RESPONSIBLE FOR LIMITING THE AMOUNT OF CONSTRUCTION LOAD IMPOSED UPON STRUCTURAL FRAMING. CONSTRUCTION LOADS SHALL NOT EXCEED THE CAPACITY OF THE FRAMING AT THE TIME THE LOADS ARE IMPOSED.
- THE STRUCTURE IS DESIGNED TO FUNCTION AS A UNIT UPON COMPLETION. THE CONTRACTOR SHALL FURNISH ALL TEMPORARY BRACING AND/OR SUPPORTS REQUIRED AS THE RESULT OF THE CONTRACTOR'S CONSTRUCTION METHODS AND/OR SEQUENCES.
- USE ONLY DIMENSIONS INDICATED ON THE DRAWINGS. DO NOT SCALE DRAWINGS OR USE ANY DIMENSIONS TAKEN FROM ELECTRONIC DRAWING FILES.
- THE CONTRACTOR SHALL INFORM THE ARCHITECT IN WRITING OF ANY DEVIATION FROM THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL NOT BE RELIEVED OF THE RESPONSIBILITY FOR SUCH DEVIATION BY THE ARCHITECT'S APPROVAL OF SHOP DRAWINGS, PRODUCT DATA, ETC., UNLESS THE CONTRACTOR HAS SPECIFICALLY INFORMED THE ARCHITECT OF SUCH DEVIATION AT THE TIME OF SUBMISSION AND THE ARCHITECT HAS GIVEN WRITTEN APPROVAL TO THE SPECIFIC DEVIATION.
- ALL THINGS WHICH, IN THE OPINION OF THE CONTRACTOR, APPEAR TO BE DEFICIENCIES, OMISSIONS, CONTRADICTIONS AND AMBIGUITIES IN THE PLANS AND SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT. PLANS AND/OR SPECIFICATIONS WILL BE CORRECTED, OR A WRITTEN INTERPRETATION OF THE ALLEGED DEFICIENCY, OMISSION, CONTRADICTION OR AMBIGUITY WILL BE MADE BY THE ARCHITECT BEFORE THE AFFECTED WORK PROCEEDS.

## CODES

THE PROJECT DOCUMENTS REFER TO THE FOLLOWING CODES AND STANDARDS, U.N.O.:

**BUILDING CODE:** INTERNATIONAL BUILDING CODE - 2009

**STRUCTURAL STEEL:** MANUAL OF STEEL CONSTRUCTION ASD, THIRTEENTH EDITION THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC-ASD)

**STRUCTURAL CONCRETE:** BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, THE AMERICAN CONCRETE INSTITUTE (ACI 318-05)

## SUBMITTALS AND TESTING

FOLLOWING ITEMS REQUIRE SUBMITTALS FOR STRUCTURAL REVIEW:

- CONCRETE REINFORCING LAYOUT
- CONCRETE MIX DESIGNS
- MASONRY UNIT AND GROUT DESIGNS
- STRUCTURAL STEEL
- STRUCTURAL STEEL CONNECTIONS
- COLD-FORMED METAL FRAMING

THESE SUBMITTALS MAY BE SUBMITTED FOR STRUCTURAL REVIEW IN FORM OF SHOP DRAWINGS AND CALCULATIONS, AS REQUIRED, SIGNED AND SEALED BY A LICENSED STRUCTURAL ENGINEER IN THE STATE OF ILLINOIS.

THE FOLLOWING STRUCTURAL ITEMS REQUIRE TESTING AND/OR INSPECTIONS:

- CONCRETE REINFORCEMENT
- EXPANSION AND ADHESIVE ANCHORS
- FOUNDATIONS
- CAST-IN-PLACE CONCRETE
- STRUCTURAL CONCRETE MASONRY CONSTRUCTION
- STRUCTURAL STEEL MATERIALS, WELDS, AND CONNECTIONS.

## DESIGN CRITERIA

**LIVE LOADS:**  
ROOF = 20 PSF

**SNOW LOAD:**  
Pg = 25 PSF + DRIFT  
EXPOSURE = B

**WIND LOAD:**  
V = 90MPH  
I = 1.0

## STRUCTURAL CONCRETE

- ALL CONCRETE WORK SHALL CONFORM TO THE REQUIREMENTS OF ACI 318-05 AND ACI 301-05. THESE DOCUMENTS SHALL BE AVAILABLE IN THE FIELD OFFICE.
- ALL CONCRETE SHALL BE NORMAL WEIGHT AND WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3000 PSI UNLESS NOTED OTHERWISE. ALL EXTERIOR CONCRETE AND CONCRETE IN UNHEATED SPACES SHALL BE AIR ENTRAINED WITH 5%-7% AIR ENTRAINMENT.
- CEMENT SHALL CONFORM TO ASTM C150 TYPE I OR II. USE ONLY ONE BRAND OF CEMENT FOR ALL EXPOSED TO VIEW CONCRETE. AGGREGATES SHALL CONFORM TO ASTM C33 (REGULAR WEIGHT). ALL CONCRETE SHALL CONTAIN AN APPROVED WATER REDUCING ADMIXTURE. NO CALCIUM CHLORIDE SHALL BE USED IN ANY CONCRETE.
- REINFORCING BARS SHALL CONFORM TO ASTM A615, GRADE 60. ALL WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185.
- ALL CONCRETE REINFORCEMENT SHALL BE DETAILED, FABRICATED, LABELED, SUPPORTED AND SPACED IN FORMS AND SECURED IN PLACE IN ACCORDANCE WITH THE PROCEDURES AND REQUIREMENTS OUTLINED IN THE LATEST EDITION OF THE "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES" ACI 315. BAR SUPPORTS IN CONTACT WITH EXPOSED SURFACES SHALL BE PLASTIC TIPPED.
- CONCRETE PROTECTION FOR REINFORCEMENT SHALL BE PROVIDED BY CLEAR COVER FROM FACE OF CONCRETE TO OUTSIDE OF BAR AS PER ACI 318-99 SECTION 7.7.
- CHECKED SHOP DRAWINGS SHOWING REINFORCING DETAILS, INCLUDING STEEL SIZES, SPACING AND PLACEMENT SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW PRIOR TO FABRICATION.
- THE CONTRACTOR SHALL SUBMIT DETAILED DRAWINGS SHOWING THE LOCATIONS OF ALL CONSTRUCTION JOINTS, REVEALS, CURBS, SLAB DEPRESSIONS, SLEEVES, OPENINGS, ETC.
- ALL REINFORCING SPLICES SHALL CONFORM TO THE REQUIREMENTS OF ACI 318, LATEST EDITION, BUT IN NO CASE SHALL BE LESS THAN 36 BAR DIAMETERS, UNLESS NOTED OTHERWISE. ALL WELDED WIRE FABRIC SHALL BE LAPPED TWO (2) FULL MESH PANELS AND TIED SECURELY. WHERE REQUIRED, DOWELS SHALL MATCH SIZE AND NUMBER OF MAIN REINFORCING, UNLESS NOTED OTHERWISE.
- ALL WALLS AND STRUCTURAL SLABS SHALL BE REINFORCED WITH AT LEAST #4 AT 12" EACH WAY, EACH FACE, UNLESS NOTED OTHERWISE. ALL SLABS-ON-GRADE SHALL BE REINFORCED WITH AT LEAST ONE (1) LAYER OF 6X6-W2.1XW2.1 W.W.R., UNLESS NOTED OTHERWISE. PROVIDE ONE (1) LAYER OF 6X6-W1.4XW1.4 W.W.R. CONTINUOUS IN ALL CONCRETE FILLS OVER THE STRUCTURAL SLAB.
- ADDITIONAL BARS SHALL BE PROVIDED AROUND ALL FLOOR AND WALL OPENINGS.
- UNLESS NOTED OTHERWISE, ALL MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT PADS SHALL BE REINFORCED WITH AT LEAST ONE (1) LAYER OF 6X6-W4XW4 W.W.R. SEE HVAC, PLUMBING AND ELECTRICAL DRAWINGS FOR ADDITIONAL REINFORCING REQUIREMENTS OF PADS.
- PLACE ALL SLABS-ON-GRADE WITH AN APPROVED PATTERN AND SEQUENCE OF CONSTRUCTION AND CONTROL JOINTS TO MINIMIZE SHRINKAGE CRACKS. THE MAXIMUM SPACING BETWEEN JOINTS SHALL BE 15 FEET.
- CONCRETE TESTING WILL BE PERFORMED BY THE CONTRACTOR'S TESTING LABORATORY IN ACCORDANCE WITH ACI 301-84 CHAPTER 16 AND THE CONCRETE SPECIFICATIONS.
- STEEL FIBERS SHALL BE NOVOCON INTERNATIONAL, INC. TYPE XOREX 2" STEEL FIBERS OR APPROVED EQUAL.

## STRUCTURAL METAL DECK

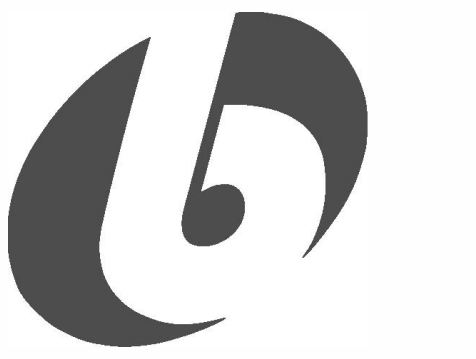
- ALL METAL DECK SHALL BE DESIGNED FOR THE CONDITIONS SHOWN ON THE DRAWINGS. ALL DECK SHALL BE GALVANIZED.
- METAL DECK SECTION PROPERTIES SHALL BE COMPUTED IN ACCORDANCE WITH AISI SPECIFICATIONS FOR THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS.
- ALL METAL DECKING SHALL BE FABRICATED FROM STEEL TYPE ASTM A446, GRADE A, HAVING A MINIMUM YIELD STRENGTH OF 33,000 PSI. ALL ROOF METAL DECK SHALL BE FORMED WITH TELESCOPED ENDS TO LAP ENDS OF SHEETS A MINIMUM OF 2 INCHES.
- THE FABRICATOR/ERECTOR SHALL PROVIDE ENGINEERING CALCULATIONS AND/OR PUBLISHED MANUFACTURER'S DATA VERIFYING THE SPECIFIED DECK REQUIREMENTS TO THE ARCHITECT FOR REVIEW. PROVIDE ENGINEERED AND CHECKED SHOP DRAWINGS INDICATING LOCATION, GAGE AND SIZE OF EACH PIECE OF DECKING. THE DRAWINGS SHALL CLEARLY SHOW WELDING DETAILS TO STRUCTURAL FRAMING AND SIDE LAP CONNECTION DETAILS.
- THE MINIMUM GAUGE OF THE METAL DECK SHALL BE 20 GAUGE U.N.O.
- ALL METAL DECKING SHALL BE WELDED AT 12 INCHES MAX. ON CENTER TO THE SUPPORTING STEEL WITH A 5/8" DIAMETER PUDDLE WELD. SIDE LAPS SHALL BE FASTENED AT 18 INCHES MAX. ON CENTER. NO WELD OR FASTENER SPACING SHALL BE GREATER THAN THAT RECOMMENDED BY THE DECK MANUFACTURER.
- THE METAL DECK SHALL BE DESIGNED TO BE CONTINUOUS OVER THREE (3) SPANS IN THE DIRECTION INDICATED. SINGLE AND DOUBLE SPANS, IF REQUIRED, SHALL SATISFY LOAD AND DEFLECTION REQUIREMENTS.
- ALL METAL DECK SHALL BE DESIGNED FOR A MAXIMUM DEAD LOAD DEFLECTION OF L/240 OF THE SPAN OR 1/2 INCH WHICHEVER IS LESS AND FOR A MAXIMUM SUPERIMPOSED LOAD DEFLECTION OF L/360.

## STRUCTURAL STEEL

- ALL STRUCTURAL STEEL WORK SHALL CONFORM TO THE AISC "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS", EFFECTIVE MARCH 9, 2005, AND THE AISC "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES", EFFECTIVE MARCH 18, 2005, EXCEPT AS MODIFIED BELOW OR IN THE SPECIFICATIONS.
- STRUCTURAL STEEL SHALL CONFORM TO FOLLOWING STANDARD AND MATERIAL PROPERTIES, U.N.O.:  
WF AND WT SHAPES: ASTM A992, GRADE 50  
PLATES, ANGLES, CHANNELS: ASTM A36  
HOLLOW STRUCTURAL SECTIONS: ASTM A500, GRADE B  
ANCHOR RODS: ASTM F1554
- ALL BOLTS (OTHER THAN ANCHOR BOLTS), NUTS AND WASHERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM A325 UNLESS OTHERWISE INDICATED. ALL BOLTS SHALL BE 3/4 INCH DIAMETER, MINIMUM.
- ALL WELDING SHALL BE DONE BY QUALIFIED WELDERS AND SHALL CONFORM TO AWS D1.1 "STRUCTURAL WELDING CODE", LATEST EDITION. ALL WELDING ELECTRODES SHALL BE E70XX.
- ALL CONNECTIONS SHALL BE DESIGNED AND DETAILED BY THE FABRICATOR. THE CONNECTIONS SHALL BE DESIGNED BY, OR UNDER THE SUPERVISION OF, A STRUCTURAL OR PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF ILLINOIS. DETAILING SHALL BE PERFORMED USING RATIONAL ENGINEERING DESIGN AND STANDARD PRACTICE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE GENERAL DETAILS SHOWN ON THE DRAWINGS ARE CONCEPTUAL ONLY AND DO NOT INDICATE THE REQUIRED NUMBER OF BOLTS OR WELD SIZES, UNLESS SPECIFICALLY NOTED. ADVISE THE ARCHITECT IMMEDIATELY, IF THE INFORMATION ON THE DRAWINGS IS NOT SUFFICIENT FOR COMPLETE DESIGN OF CONNECTIONS.
- THE FABRICATOR/ERECTOR SHALL SUBMIT TO THE ARCHITECT, FOR REVIEW, ENGINEERED AND CHECKED DRAWINGS SHOWING SHOP FABRICATION DETAILS, FIELD ASSEMBLY DETAILS AND ERECTION DIAGRAMS FOR ALL STRUCTURAL STEEL. WITH EACH SUBMITTAL OF SHOP DRAWINGS, THE FABRICATOR'S ENGINEER SHALL CERTIFY THAT THE CONNECTIONS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AISC SPECIFICATIONS AND THE CONTRACT DOCUMENTS. CERTIFIED MILL TEST REPORTS SHALL BE SUBMITTED.
- ALL CONNECTIONS SHALL BE BOLTED OR WELDED AND SHALL BE DESIGNED FOR THE END REACTIONS INDICATED ON PLANS OF IF NOT INDICATED SHALL BE DESIGNED TO DEVELOP 60% OF THE ALLOWABLE UNIFORM LOAD TABULATED IN THE THIRTEENTH EDITION OF THE AISC "MANUAL OF STEEL CONSTRUCTION" FOR ALLOWABLE STRESS DESIGN UNLESS NOTED OTHERWISE. NUMBER OF BOLTS MUST SATISFY MIN. REQUIREMENTS AS FOLLOWS: 2 BOLTS PER CONNECTION FOR 8" AND 10" DEEP MEMBERS, 3 FOR 12" AND 14" DEEP MEMBERS, 4 FOR 16" AND 18" DEEP MEMBERS, 5 FOR 21" AND 24" DEEP MEMBERS AND 6 FOR 27" AND DEEPER MEMBERS.
- THE DEPTH OF A SIMPLE SHEAR CONNECTION SHALL NOT BE LESS THAN ONE HALF OF THE NOMINAL DEPTH OF THE BEAM. THE MINIMUM NUMBER OF BOLTS PER CONNECTION SHALL BE TWO (2).
- CONNECTIONS OF BEAMS FRAMING INTO COLUMNS SHALL BE CAPABLE OF RESISTING AN AXIAL FORCE IN ORDER TO BRACE THE COLUMN. THE BRACING FORCE (IN KIIPS) SHALL BE TAKEN AS 0.127 TIMES THE NOMINAL WEIGHT IN POUNDS PER LINEAR FOOT OF THE COLUMN FOR A36 COLUMNS. THE BRACING FORCE ACTS IN BOTH PRINCIPAL AXES OF THE COLUMN, AND MAY BE RESISTED BY A COMBINATION OF BEAM CONNECTIONS.
- COLUMN BASES AND SPLICED ENDS SHALL BE MILLED OR SAW CUT TO PROVIDE FULL BEARING.
- GUSSET PLATES SHALL BE 3/8" THICK, MINIMUM, UNLESS NOTED OTHERWISE.
- SHOP AND FIELD TESTING OF WELDS AND BOLTS SHALL BE AS FOLLOWS:
  - ALL WELDS SHALL BE VISUALLY INSPECTED.
  - FILLET WELDS : TWENTY FIVE (25) PERCENT OF THE FILLET WELDS, SELECTED AT RANDOM SHALL BE MEASURED, AND TEN (10) PERCENT SELECTED AT RANDOM SHALL BE CHECKED BY MAGNETIC PARTICLE FOR FINAL PASS ONLY.
  - PENETRATION WELDS: ULTRASONICALLY TEST 100 PERCENT OF ALL FULL PENETRATION WELDS, AND ALL PARTIAL PENETRATION COLUMN SPLICE WELDS. IF THE WELDS MADE BY AN INDIVIDUAL WELDER ARE CONSISTENTLY SATISFACTORY, TESTING OF HIS WELDS MAY BE REDUCE TO 50 PERCENT.
  - BOLTED CONNECTIONS: CHECK BY CALIBRATED TORQUE WRENCH 25 PERCENT OF BOLTS IN EACH CONNECTION, BUT NOT LESS THAN TWO (2) BOLTS PER CONNECTION.
  - THE CONTRACTOR'S TESTING AGENCY SHALL PERFORM ALL SHOP AND FIELD INSPECTION AND TESTING AS OUTLINED ABOVE AND SUBMIT THE REPORTS TO ARCHITECT/ENGINEER.
- ALL BEAMS SHALL BE FABRICATED WITH THE NATURAL CAMBER UP. PROVIDE CAMBER, OR SHORING AS INDICATED ON THE DRAWINGS.
- AFTER FABRICATION, ALL STEEL SHALL BE CLEANED OF ALL RUST, LOOSE MILL SCALE AND OTHER FOREIGN MATERIALS. STRUCTURAL STEEL EXPOSED TO VIEW IS TO BE PAINTED WITH SHOP PRIMER. STEEL EXPOSED TO THE WEATHER SHALL BE BLAST CLEANED (SSPC-SP6) AND GIVEN SHOP PRIME AND FIELD FINISH COATS OF PAINT AS SPECIFIED.
- THERE SHALL BE NO FIELD CUTTING OF STRUCTURAL STEEL MEMBERS FOR THE WORK OF OTHER TRADES WITHOUT THE PRIOR APPROVAL OF THE ARCHITECT.

## EXISTING STRUCTURE

- EXISTING CONDITIONS SHOWN ON THE DRAWINGS ARE BASED ON ORIGINAL BUILDING DRAWINGS PREPARED BY LZT/FILLIUNG PARTNERSHIP DATED OCTOBER 7, 1992. ALL CONDITIONS SHOW ARE TO BE FIELD VERIFIED BY G.C. PRIOR TO CONSTRUCTION. G.C. SHALL EXPOSE ALL EXISTING FRAMING AND NOTIFY S.E.O.R. PRIOR TO CONSTRUCTION OF ANY DISCREPANCIES.
- ENGINEER OF RECORD SHALL BE NOTIFIED OF ANY DAMAGE OR DETERIORATION OF EXISTING FRAMING OR STRUCTURAL ELEMENTS DURING CONSTRUCTION.



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Issue Date	Title
3/23/18	75% CONSTRUCTION DOCUMENTS
4/18/18	100% CONSTRUCTION DOCUMENTS

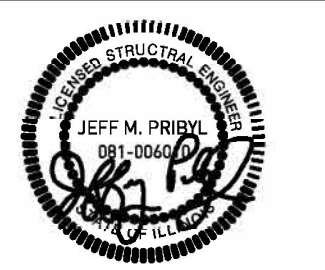
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SRC ENTRY #2  
REPLACEMENT

425 FAWELL BLVD, GLEN ELLYN,  
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Drawing Title

STRUCTURAL NOTES

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Drawing No: S101



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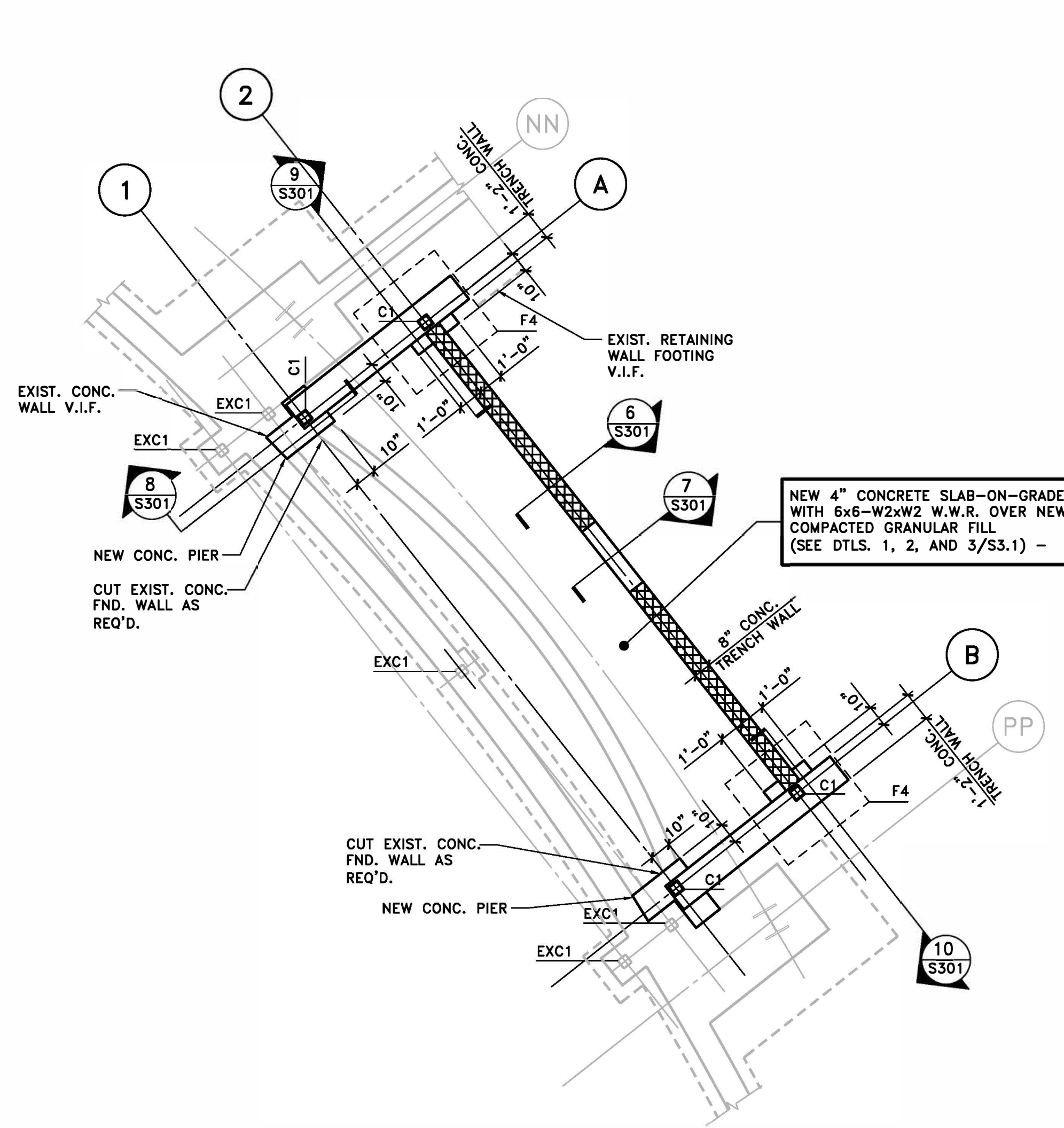
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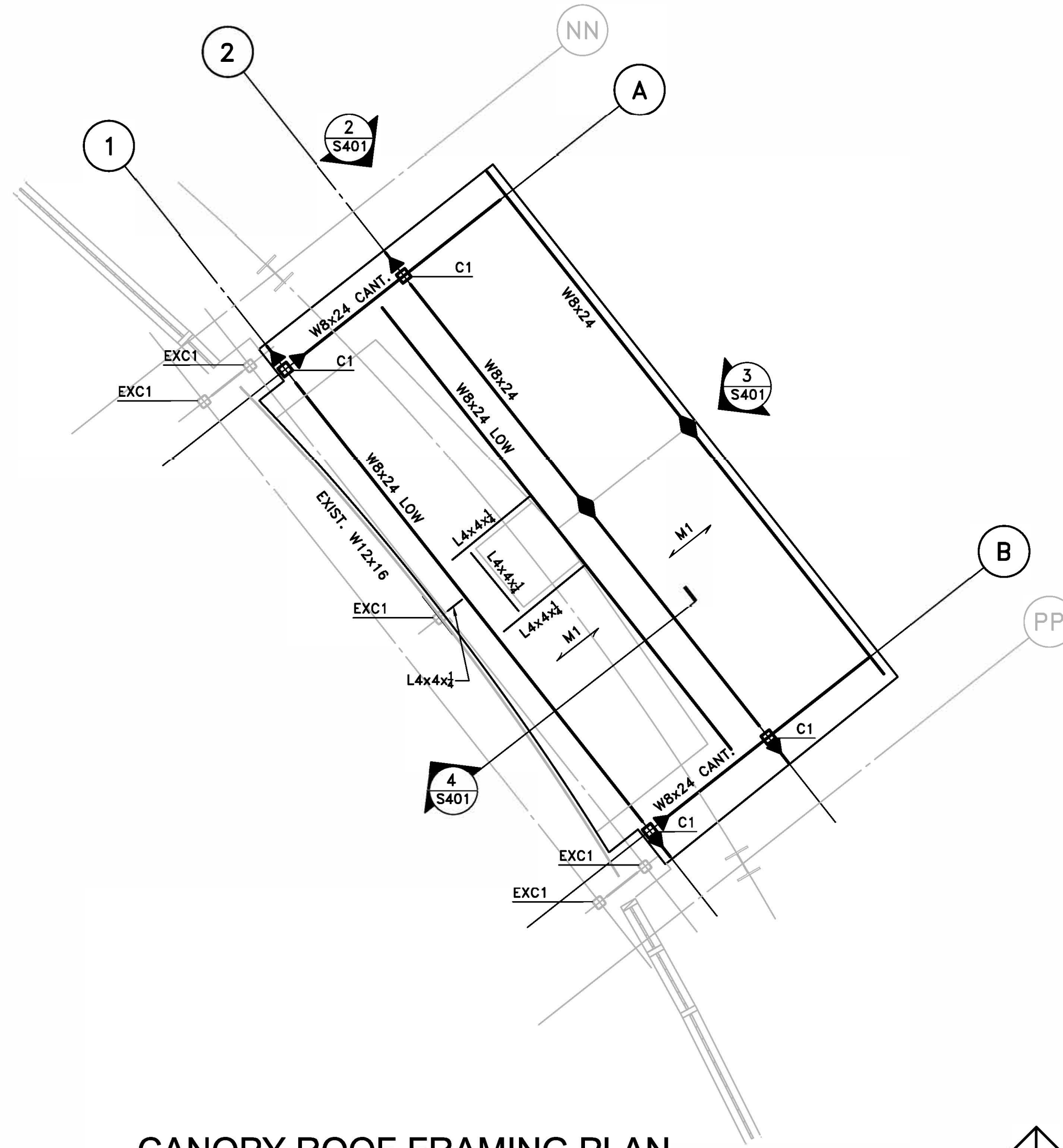
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**A CANOPY FOUNDATION PLAN**  
SCALE: 1/4" = 1'-0"



**B CANOPY ROOF FRAMING PLAN**  
SCALE: 1/4" = 1'-0"

COLUMN SCHEDULE				
MARK	SIZE	BASE PLATE	ANCHOR RODS	REMARKS
C1	HSS5x5x1/2	3/4"x11"x11"	(4) 3/4" #4 - 4" EMBED EXP. ANCHORS	
EXC1	EXIST. HSS5x5			

M1 = 1 1/2" x 20GA. WIDE RIB TYPE  
"B" METAL DECK

FOOTING SCHEDULE					
MARK	SIZE	THICKNESS	BOTTOM REINFORCING		NOTES
			SHORT WAY	LONG WAY	
F4	4'-0" x 4'-0"	1'-0"	(5) #5	(5) #5	

CONCRETE, F<sub>c</sub> = 3000 PSI  
ALLOWABLE SOIL BEARING = 3000 PSF

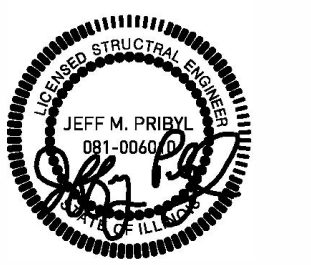
Issue Date	Title
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4/18/18	100% CONSTRUCTION DOCUMENTS

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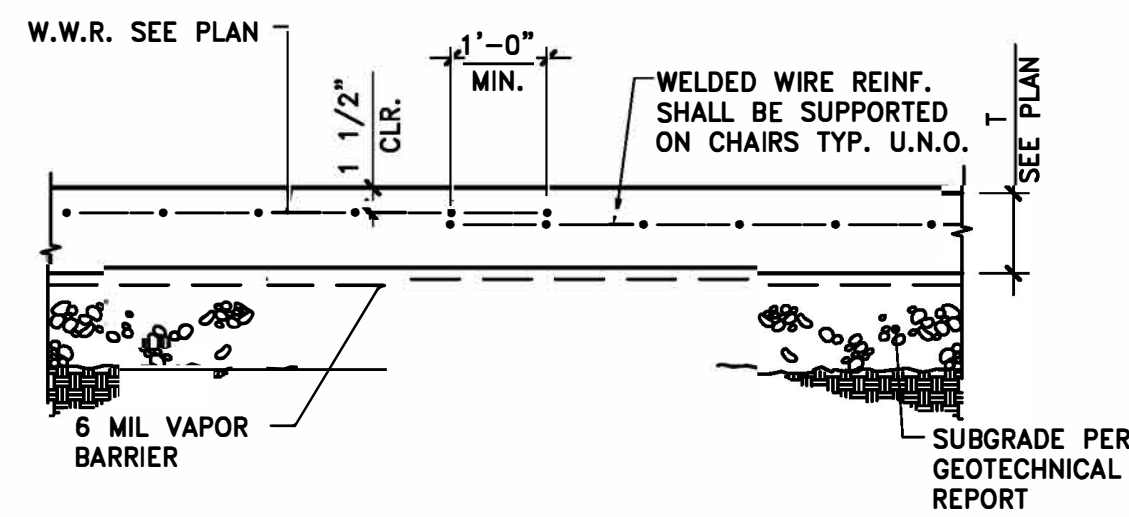
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**CANOPY FRAMING AND  
FOUNDATION PLAN**

BE Project No.  
15044-17-10

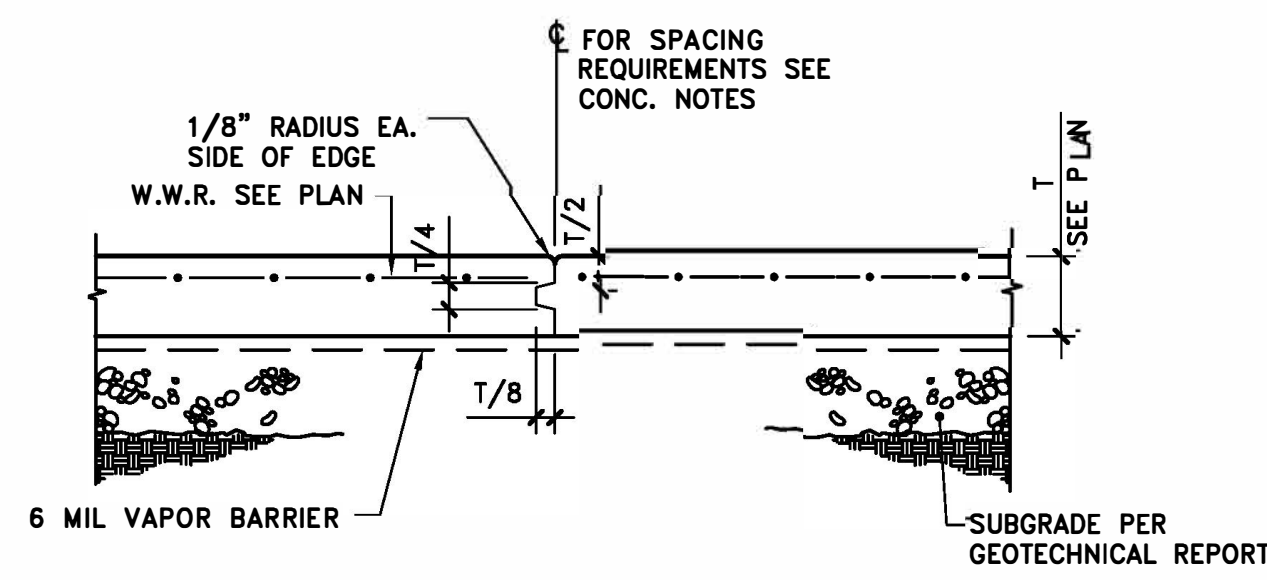


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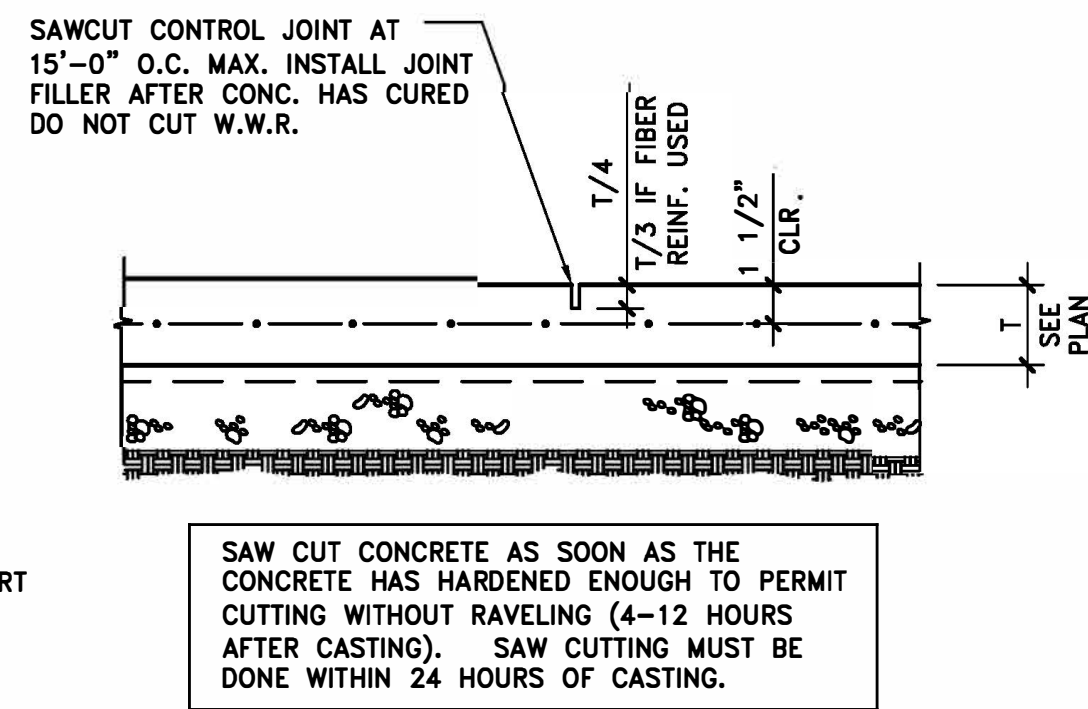
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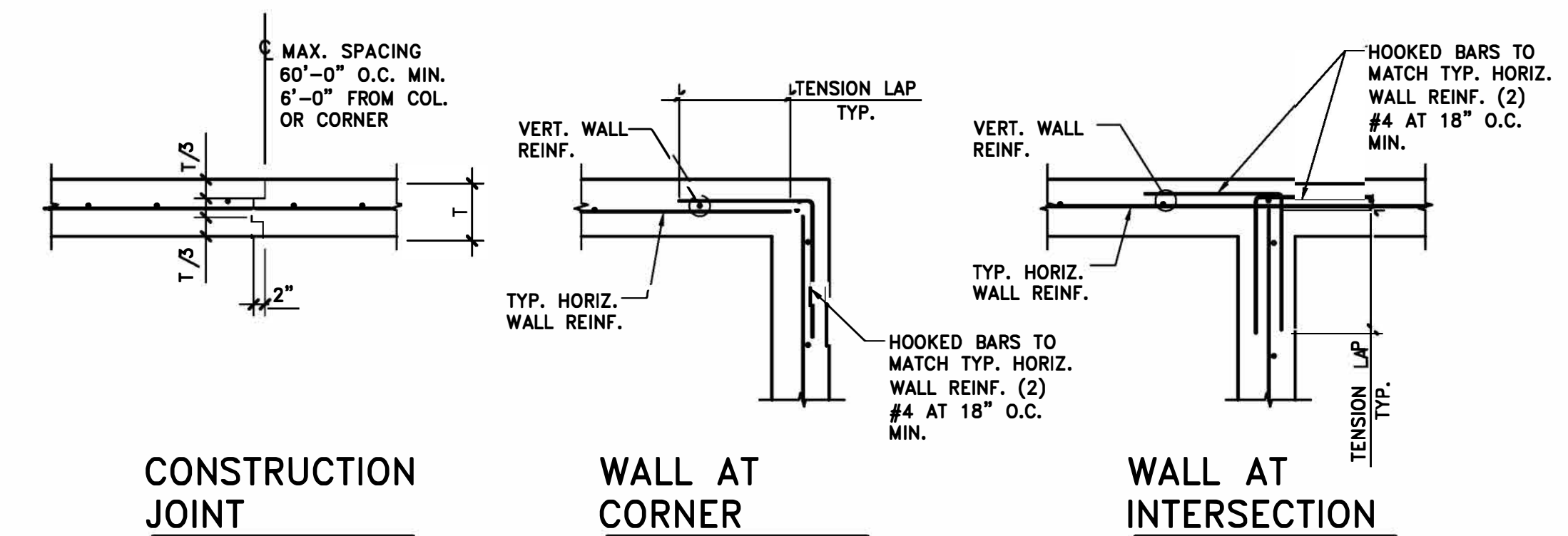
**1** TYPICAL SLAB-ON-GRADE  
SCALE: N.T.S.



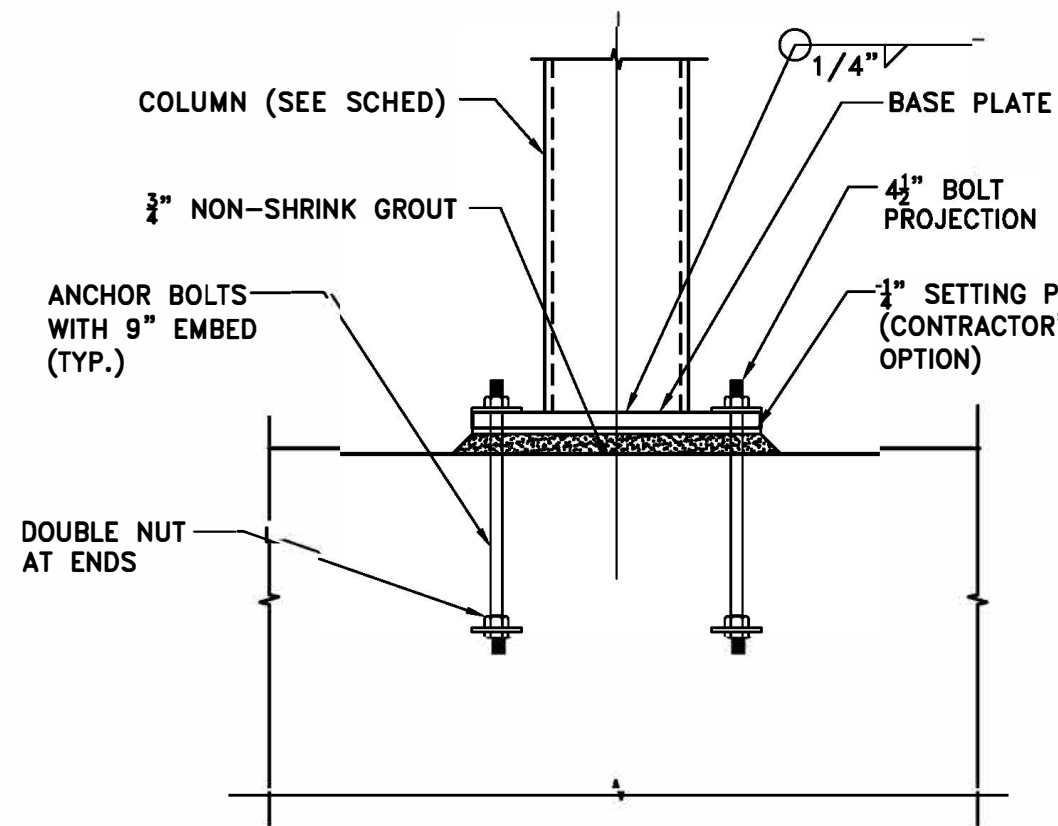
**2** TYPICAL SLAB-ON-GRADE CONSTRUCTION JOINT  
SCALE: N.T.S.



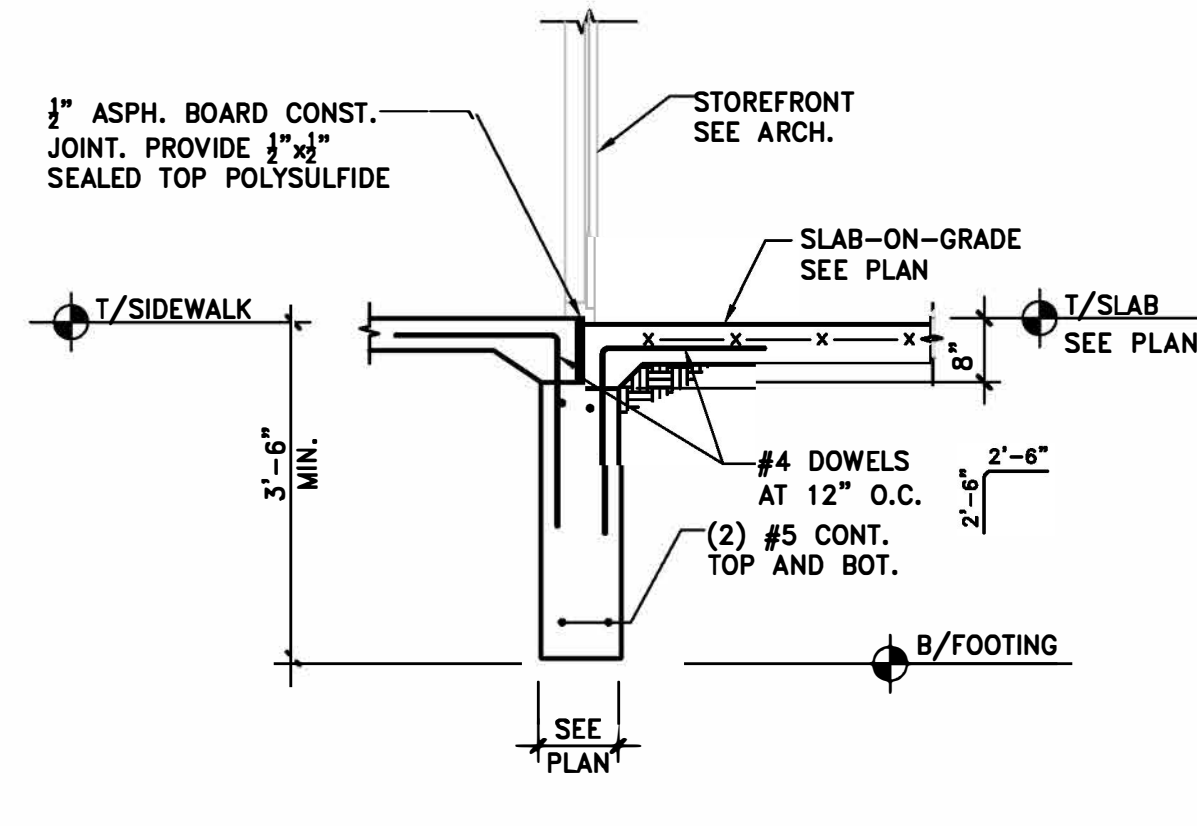
**3** TYPICAL SLAB-ON-GRADE CONTROL JOINT  
SCALE: N.T.S.



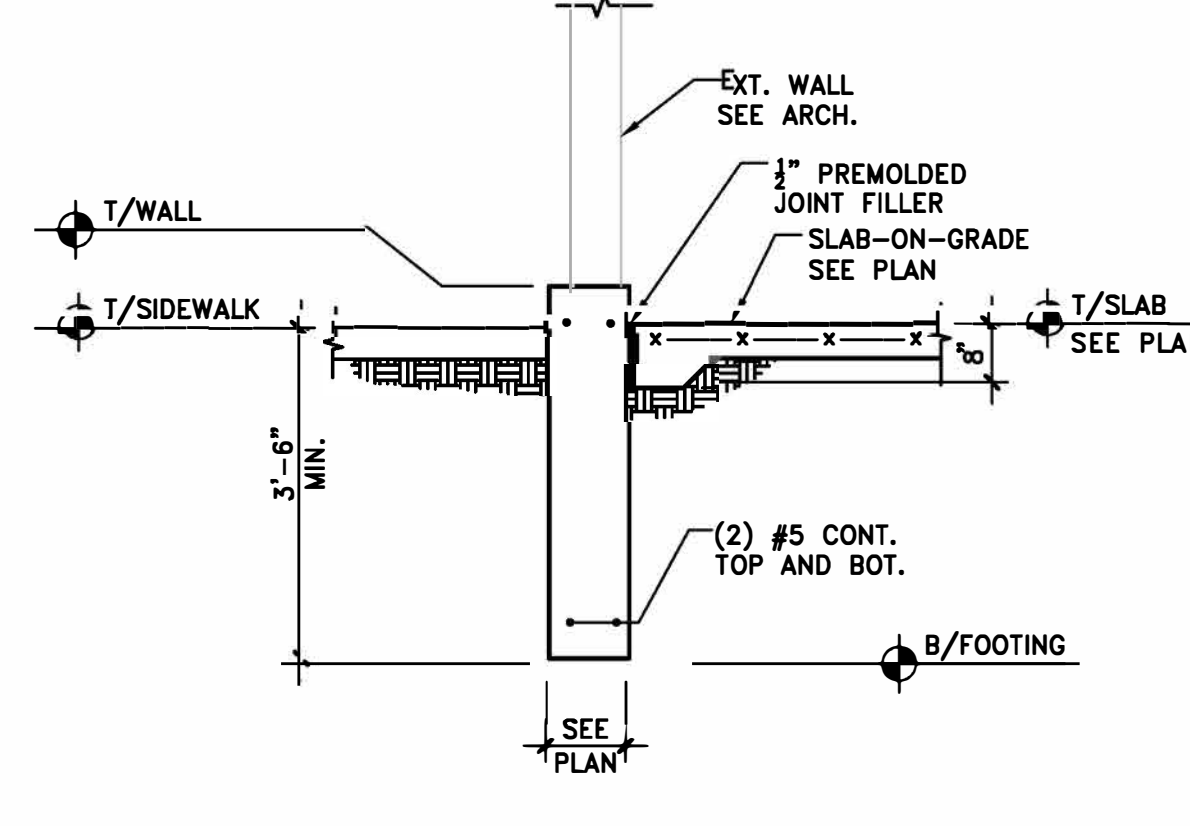
**4** TYP. FOUNDATION WALL DETAILS  
SCALE: N.T.S.



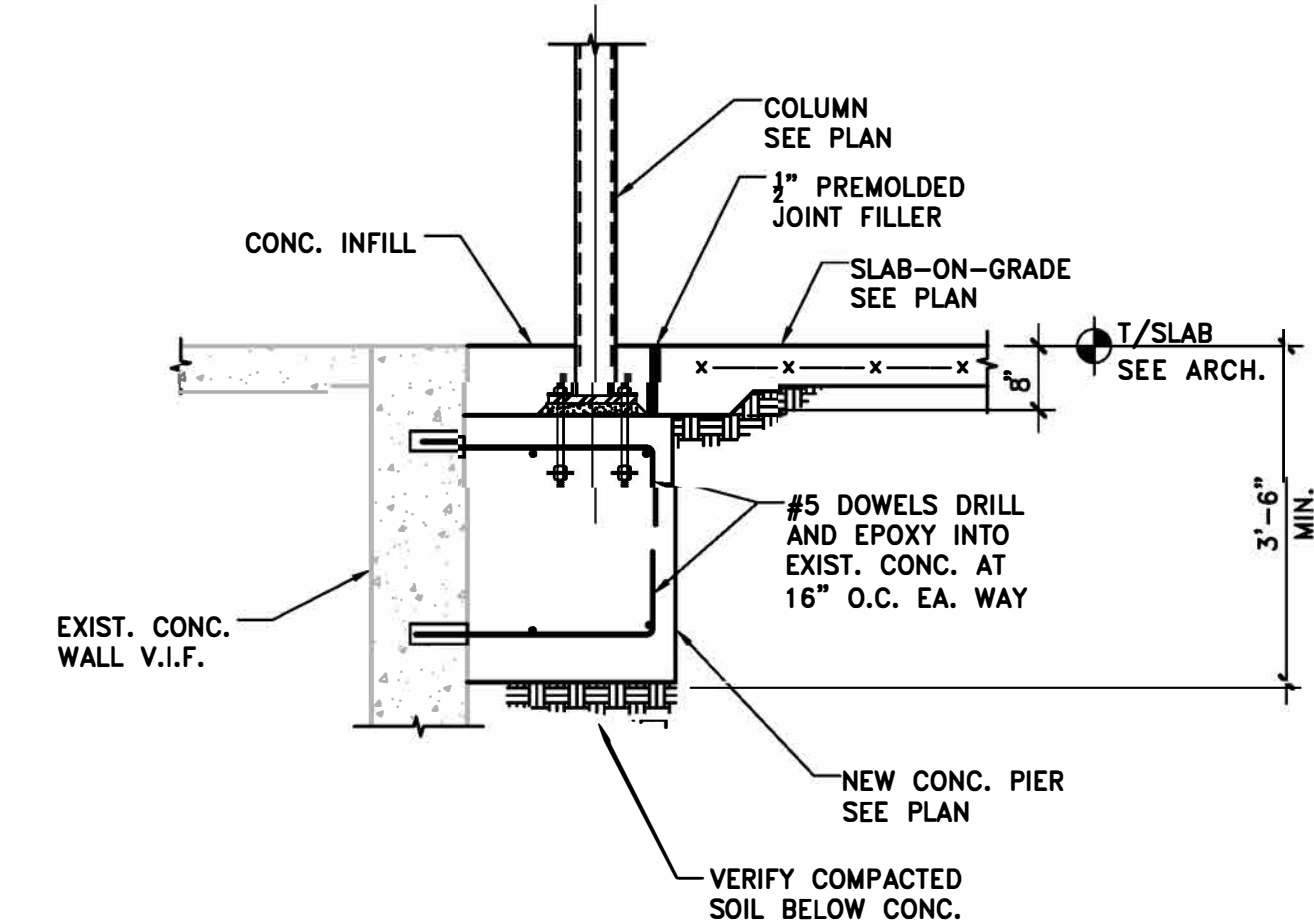
**5** TYPICAL BASE PLATE DETAIL  
NOT TO SCALE



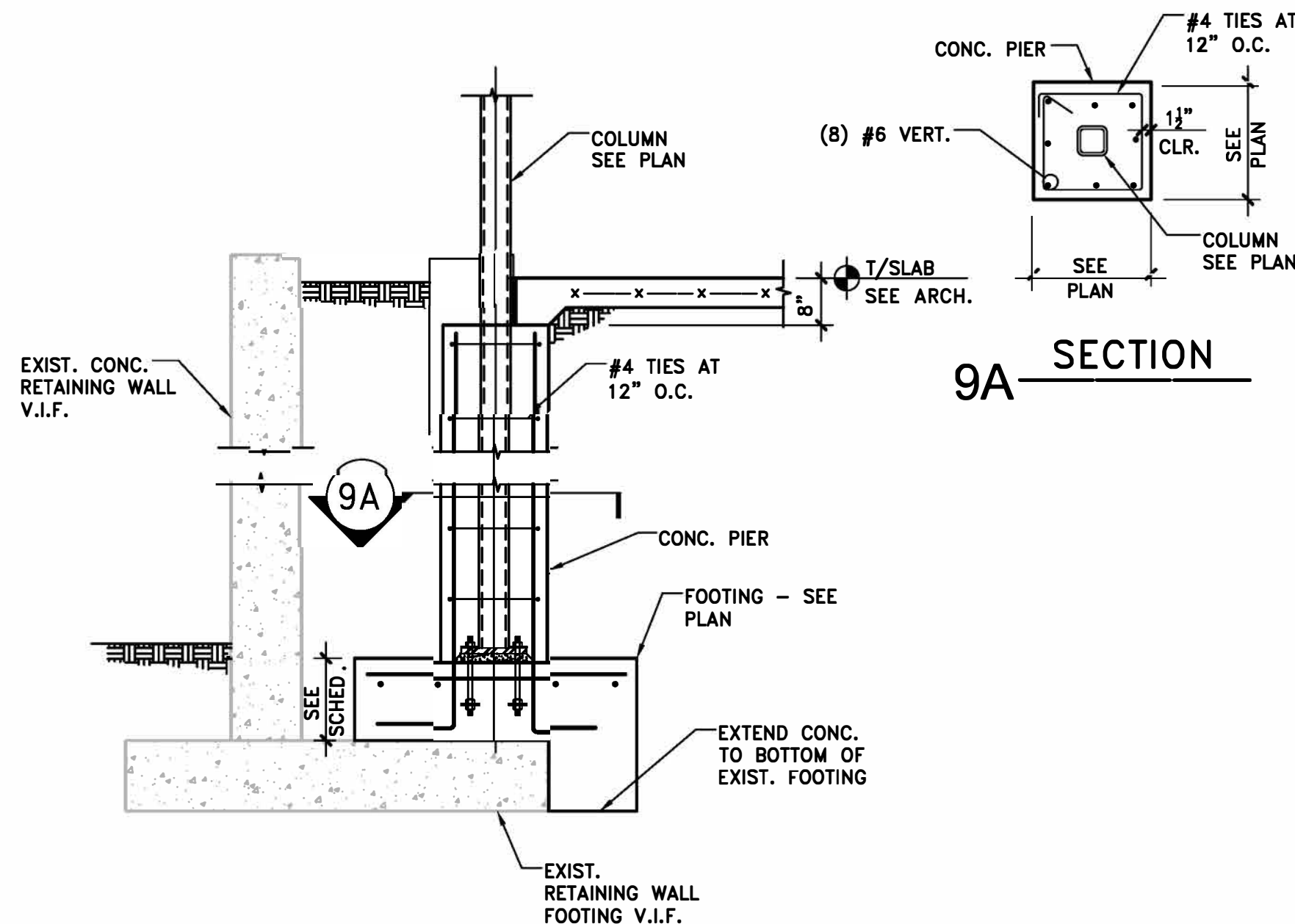
**6** SECTION AT TRENCH WALL  
SCALE: 1/2" = 1'-0"



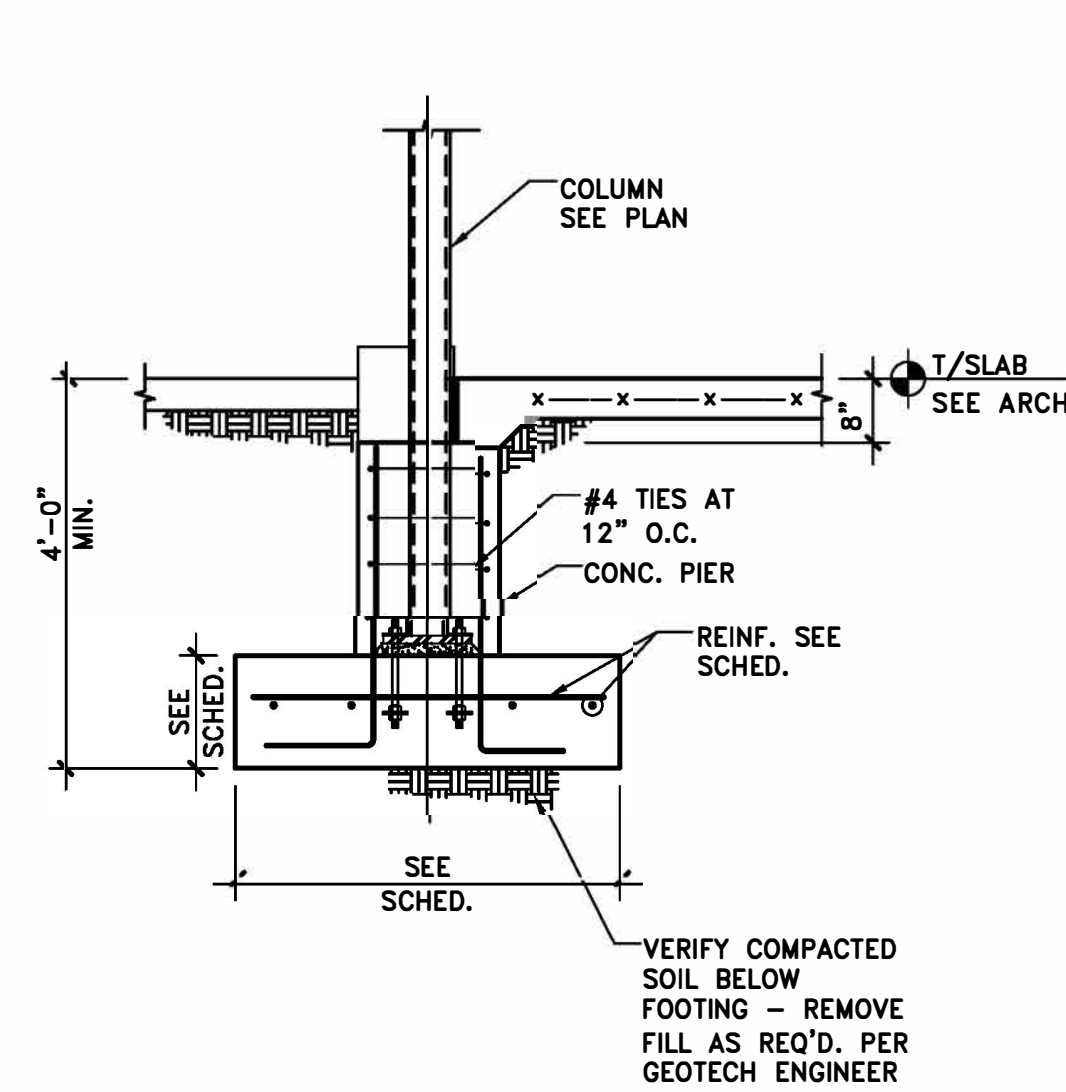
**7** SECTION AT TRENCH WALL  
SCALE: 1/2" = 1'-0"



**8** SECTION  
SCALE: 1/2" = 1'-0"



**9** TYP. SECTION AT CONCRETE ENCASED COLS. AT WING WALL  
SCALE: 1/2" = 1'-0"



**10** TYP. SECTION AT CONCRETE ENCASED COLS. AT WING WALL  
SCALE: 1/2" = 1'-0"



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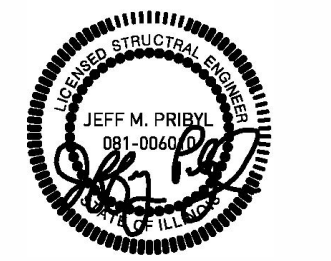
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Drawing Title

FOUNDATION  
SECTIONS AND DETAILS

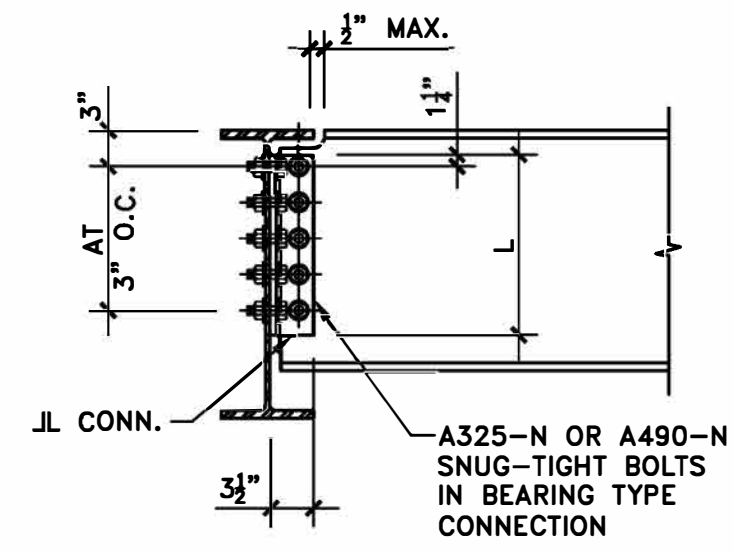
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Drawing No.

S301

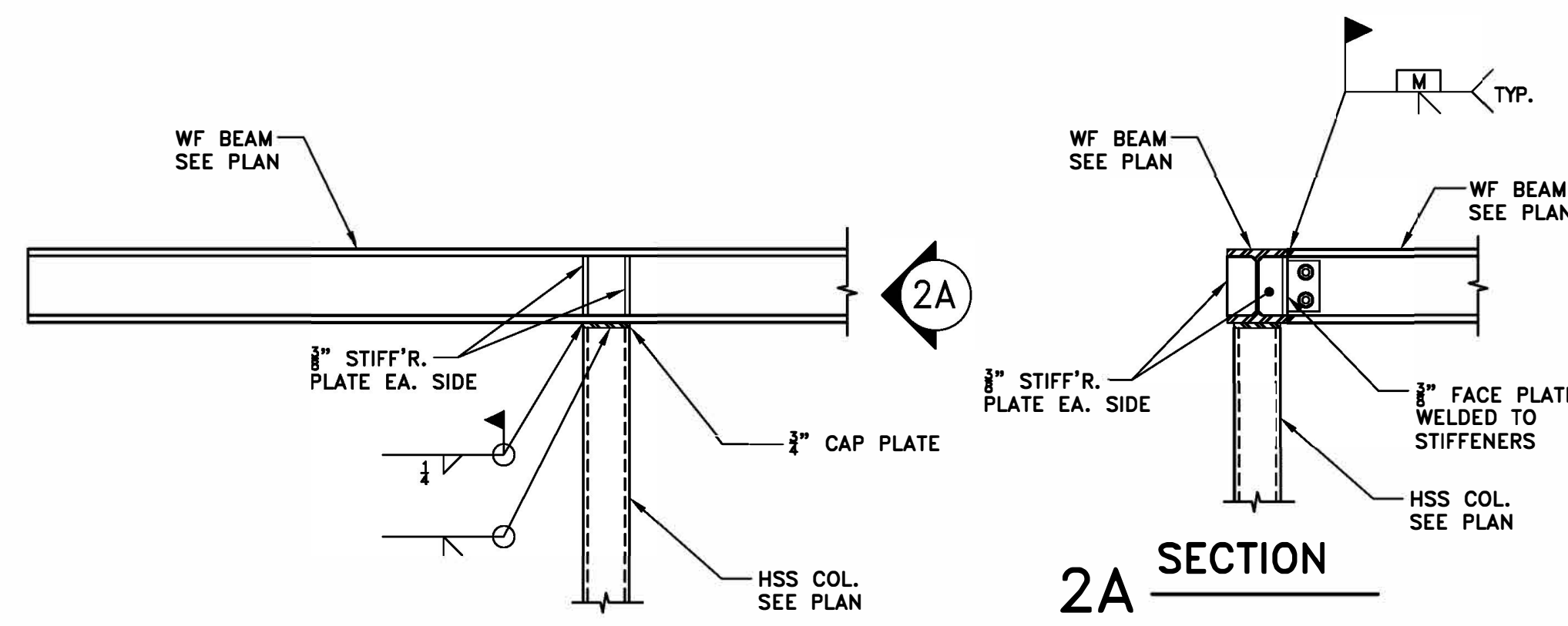


MINIMUM ALLOWABLE SHEAR CONNECTION CAPACITY (FACTORED LOADS)	
BEAM SIZE	MINIMUM CONNECTION CAPACITY (KIPS)
WB, W10	15

SHEAR CONNECTION SHALL DEVELOP 100% OF MINIMUM ALLOWABLE SHEAR CAPACITY OF THE BEAM AS PROVIDED IN THE SCHEDULE U.N.O. ON THE FRAMING PLANS

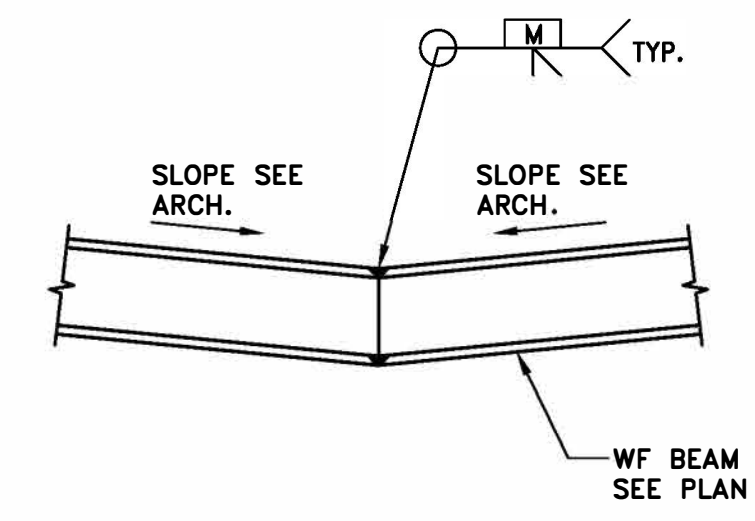
**1 TYP. BEAM TO BEAM SHEAR CONNECTION**

NOT TO SCALE



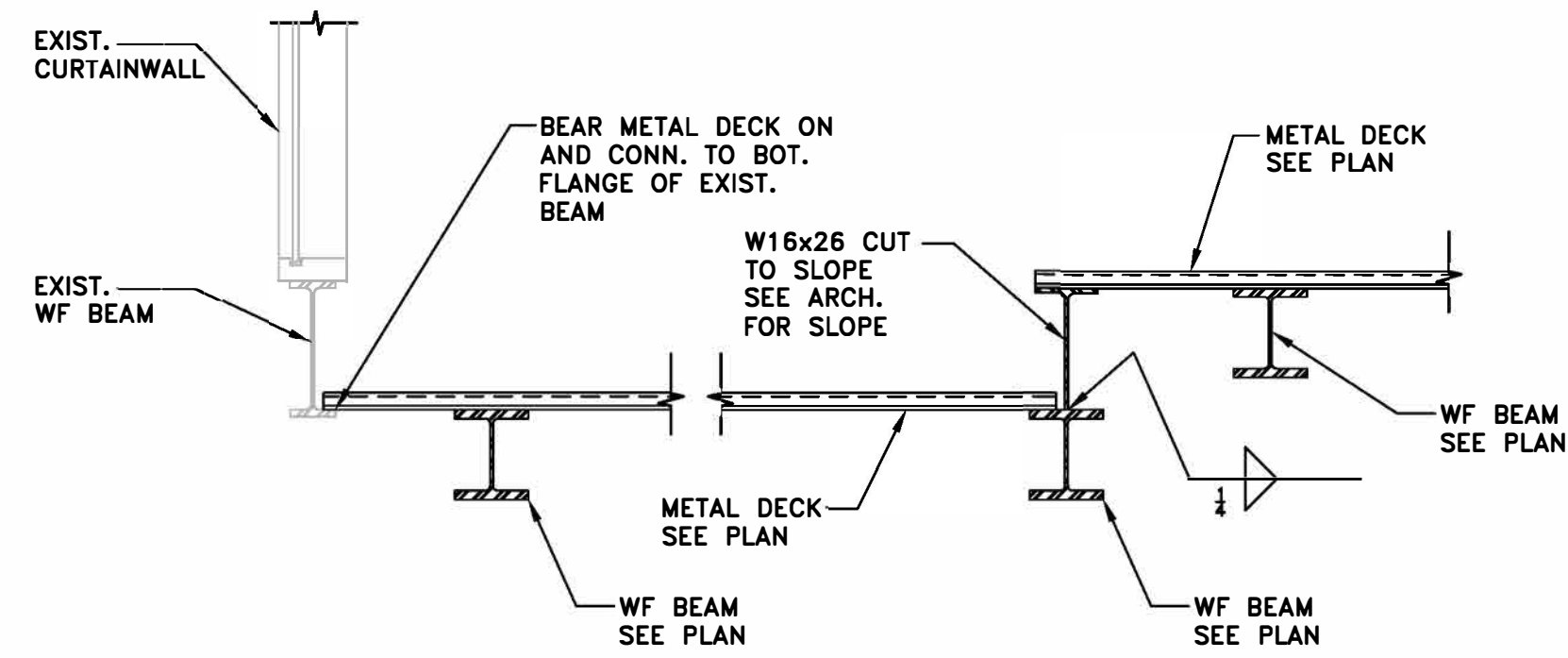
**2 SECTION**

SCALE: 3/4" = 1'-0"



**3 SECTION**

SCALE: 3/4" = 1'-0"



**4 SECTION**

SCALE: 3/4" = 1'-0"



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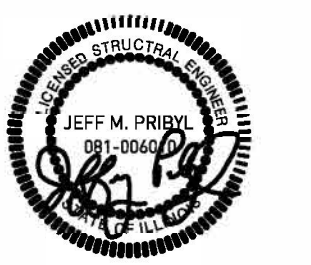
Issue Date	Title
3/23/18	75% CONSTRUCTION DOCUMENTS
4/18/18	100% CONSTRUCTION DOCUMENTS

COLLEGE OF DUPAGE  
SRC ENTRY #2  
REPLACEMENT

425 FAWELL BLVD, GLEN ELLYN,  
IL 60137

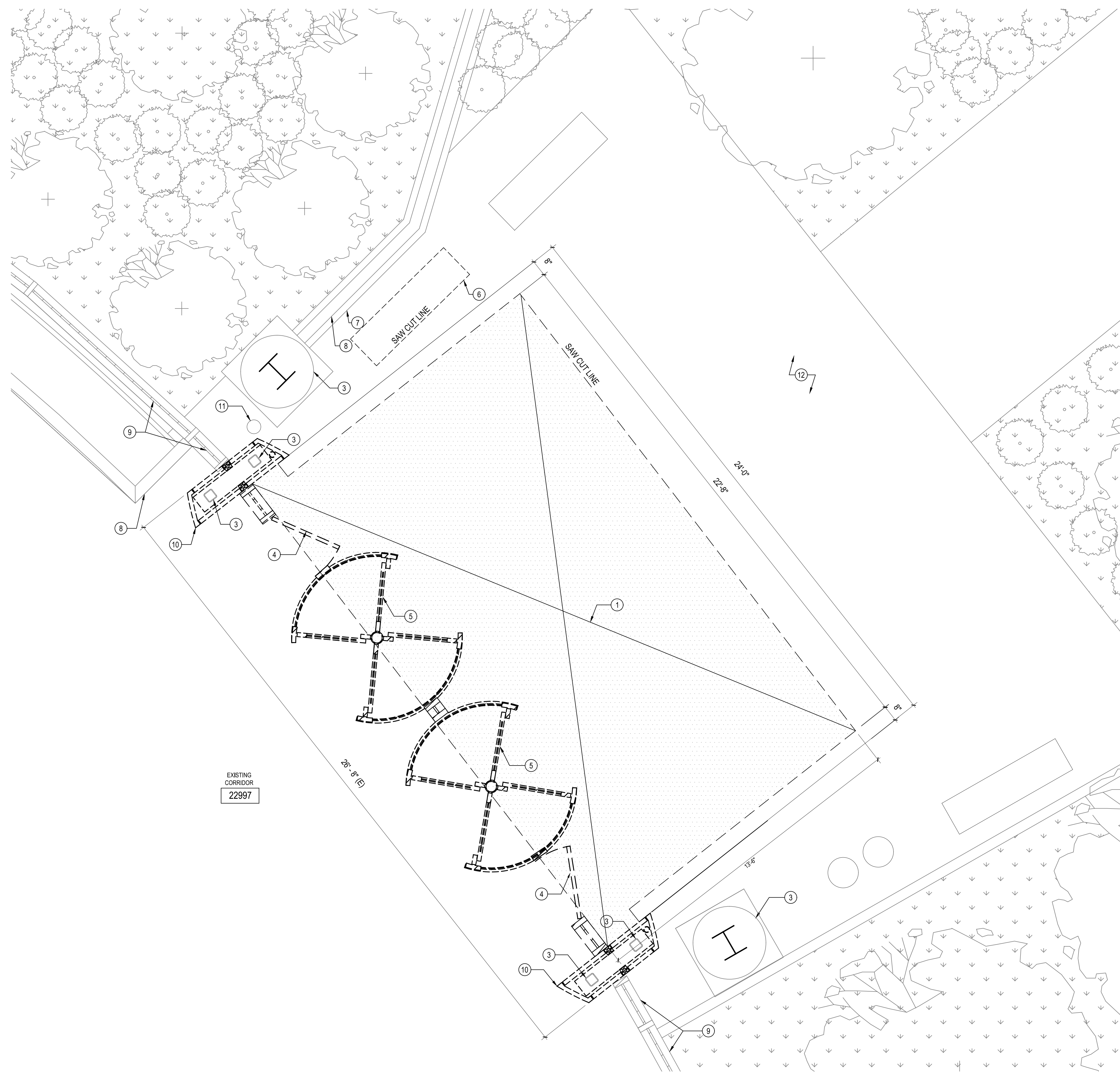
SECTIONS AND DETAILS

BE Project No.  
15044-17-10



Drawn By:  
PDK

Drawing No.  
S401



**⊗ DEMOLITION KEYNOTES**

1. SAW CUT EXISTING CONCRETE SLAB TO ACCOMMODATE NEW VESTIBULE. SEE NEW WORK PLAN AND STRUCTURAL.
2. EXISTING PLANTS AND TREES TO REMAIN. PROTECT.
3. EXISTING COLUMN TO REMAIN. PROTECT DURING CONSTRUCTION.
4. REMOVE EXISTING DOOR AND FRAME IN ITS ENTIRETY. REMOVE AND SALVAGE FOR OWNER. BOTH ADA DOOR OPERATORS FROM THE SWING DOORS. REMOVE AND SALVAGE FOR OWNER KEYED TRIM FROM THE SWING DOORS. PREPARE OPENING FOR NEW CONDITION. REFER TO NEW WORK PLANS.
5. REMOVE REVOLVING DOOR AND FRAME IN ITS ENTIRETY. REMOVE AND SALVAGE FOR OWNER THE FOUR (4) KEYED TRIM FROM THE REVOLVING DOOR. PREPARE OPENING FOR NEW VESTIBULE. REFER TO NEW WORK PLANS FOR NEW CONDITIONS.
6. REMOVE AND SALVAGE BENCH. BENCH IS CAST INTO CONCRETE. CAREFULLY CUT CONCRETE AS REQUIRED FOR REMOVAL.
7. EXISTING RETAINING WALL TO REMAIN.
8. EXISTING RAILING TO REMAIN, PROTECT DURING CONSTRUCTION.
9. EXISTING CURTAIN WALL TO REMAIN. PROTECT THROUGHOUT CONSTRUCTION AND SUPPORT AS NECESSARY.
10. REMOVE METAL PANEL, FRAMING, CMU INFILL AND INTERNAL DOWNSPOUT.
11. TEMPORARILY REROUTE DOWNSPOUT AWAY FROM OPENING DURING DEMOLITION & CONSTRUCTION OPERATIONS.
12. EXISTING WALK TO REMAIN. PROTECT DURING ALL DEMO & CONSTRUCTION OPERATIONS.



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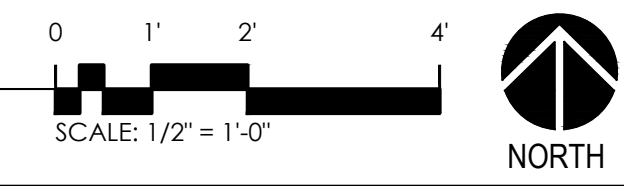
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**FIRST FLOOR  
DEMOLITION PLAN**



Expiration Date of Seal: 11-30-2018  
BE Project No.: 15044-17-10

	Drawn By: PDK
	Drawing No.: D100

**1 DEMOLITION PLAN**



**DEMO LEGEND**

-  CAMERA TO REMAIN
-  CAN LIGHT TO REMAIN

**DEMO KEYNOTES**

1. DEMOLISH EXISTING SOFFIT, ROOF, AND FRAMING TO STRUCTURAL STEEL. SEE STRUCTURAL DRAWINGS FOR SCOPE OF FRAMING DEMO. PROTECT FRAMING FOR OTHER EXISTING CEILINGS TO REMAIN. SEE ENGINEERING DRAWINGS FOR SCOPE OF DEMOLITION.
2. EXISTING RADIANT HEAT PANELS TO REMAIN.
3. DEMOLISH EXISTING GYPSUM BOARD CEILING AS REQUIRED TO INSTALL PLUMBING AND FIRE PROTECTION DRAWINGS. PATCH AND PAINT CEILING TO MATCH ADJACENT WHEN ABOVE CEILING WORK IS COMPLETE.



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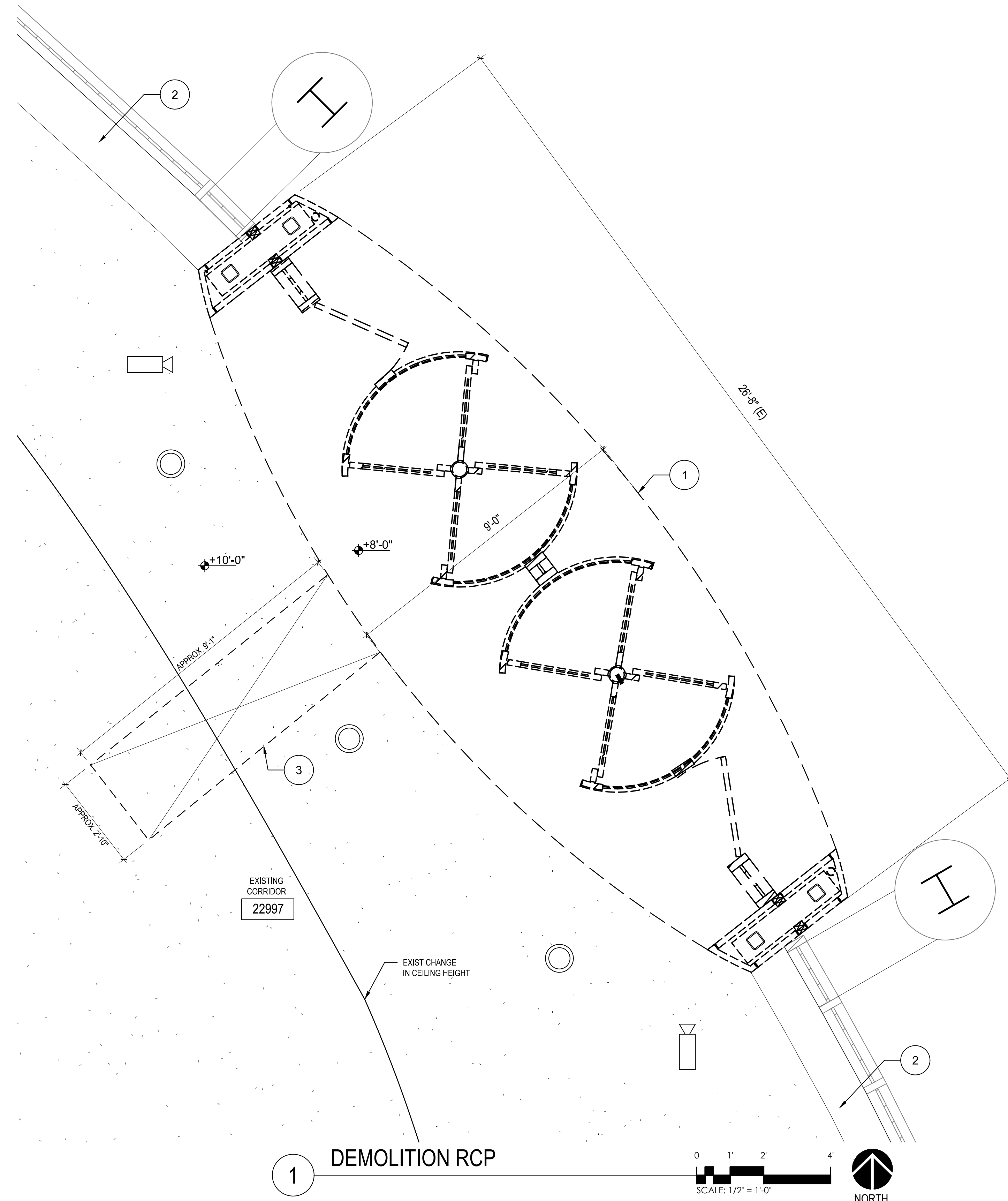
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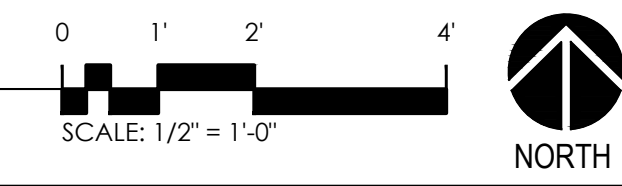
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1 DEMOLITION RCP




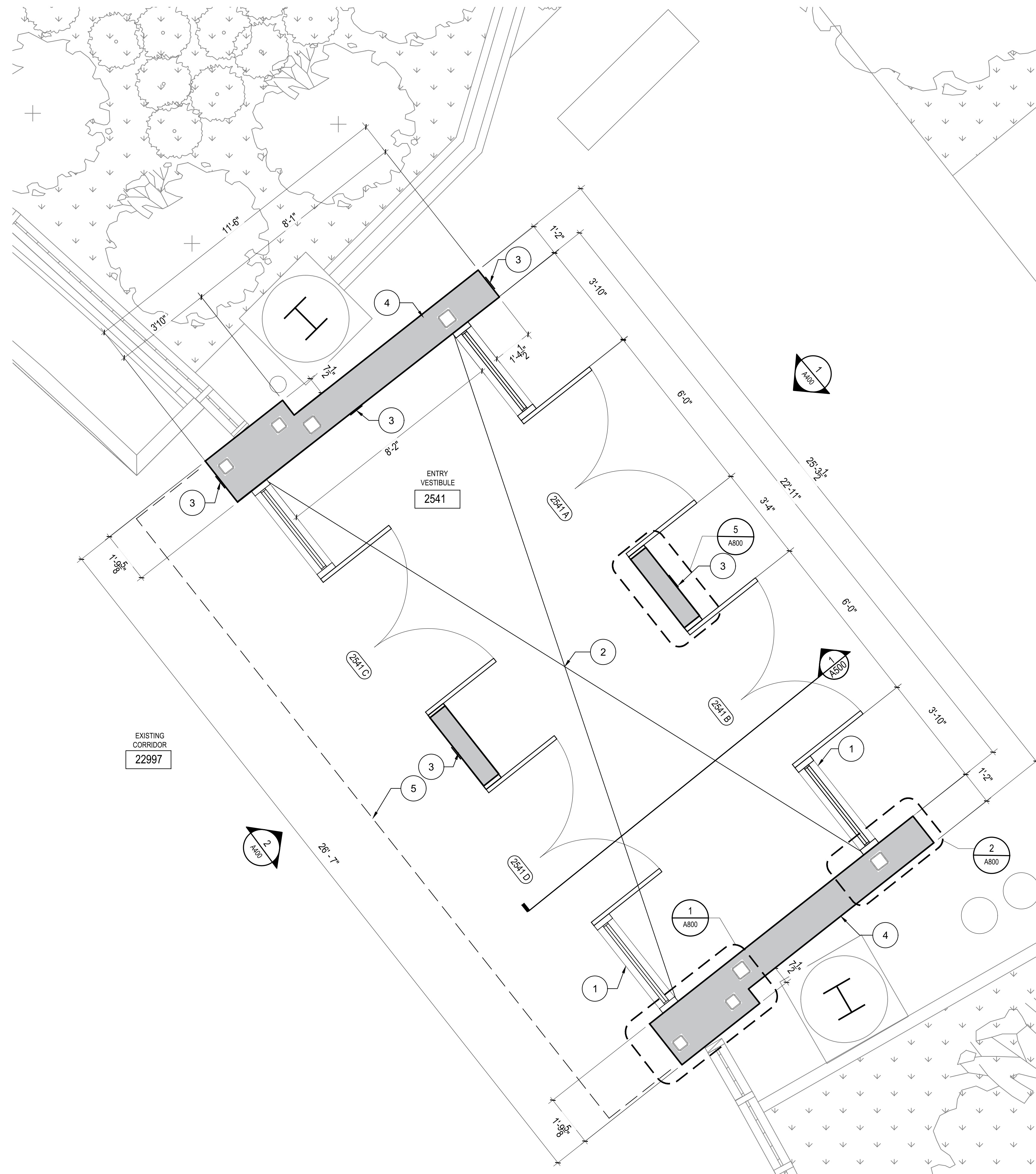
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**COLLEGE OF DUPAGE  
SRC ENTRY #2  
REPLACEMENT**

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**FIRST FLOOR DEMOLITION  
REFLECTED CEILING  
PLAN**

Expiration Date of Seal: 11-30-2018	BE Project No: 15044-17-10
	Drawn By: PDK
	Drawing No: D200



**NEW WORK KEYNOTES**

1. PROVIDE NEW STOREFRONT WITH DOORS.
2. PROVIDE NEW CONCRETE SLAB AT VESTIBULE INTERIOR. RECESS  $\frac{3}{4}$ " AND INSTALL WALK OFF MAT AT ENTIRE VESTIBULE.
3. INSTALL DOOR OPERATION PANEL PAD
4. NEW PORCELAIN ENAMEL METAL PANEL CLAD PARTITION.
5. PROVIDE NEW CARPET TO MATCH EXISTING AS REQUIRED TO PATCH FLOORING.
6. PROVIDE BOLLARD WITH DOOR OPERATING PANEL.



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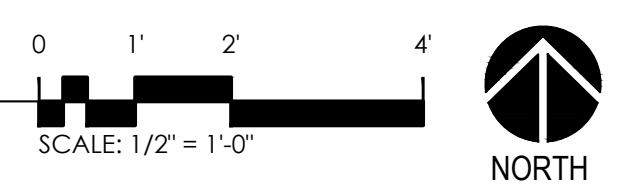
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COLLEGE OF DUPAGE  
SRC ENTRY #2  
REPLACEMENT

425 FAWELL BLVD, GLEN ELLYN,  
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**VESTIBULE PLAN**

**1 VESTIBULE PLAN**



Expiration Date of Seal: 11-30-2018

BE Project No: 15044-17-10

Drawn By: PDK

Drawing No: A100



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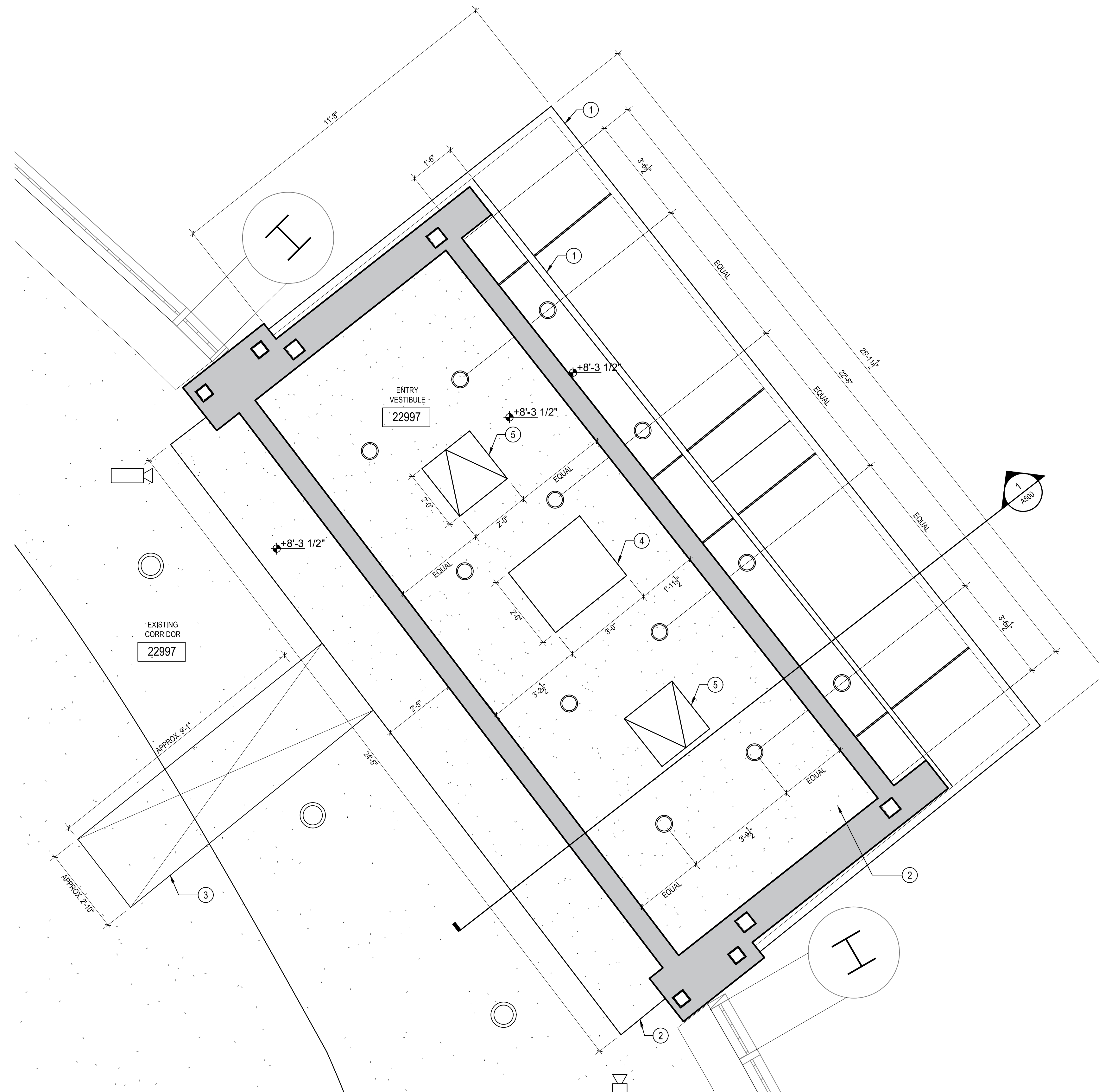
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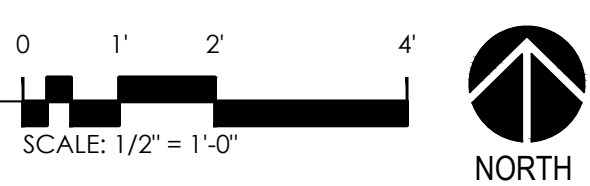
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**(X) NEW WORK KEYNOTES**

1. NEW METAL PANEL CANOPY SEE SECTION 1/A500 FOR DETAILS
2. NEW GYPSUM BOARD CEILING. SEE ENGINEERING DRAWINGS FOR EQUIPMENT REQUIREMENTS
3. PATCH AND PAINT EXIST GYPSUM BOARD CEILING TO MATCH EXISTING LEVEL OF FINISH AS REQUIRED.
4. CEILING HEATING UNIT. SEE MECHANICAL DRAWINGS.
5. ACCESS PANEL. COORDINATE LOCATION WITH UTILITIES ABOVE.



1 VESTIBULE REFLECTED CEILING PLAN



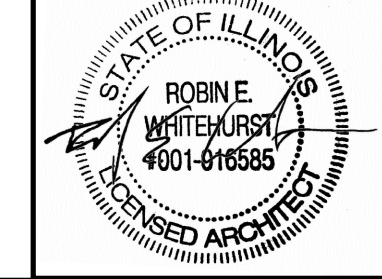
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COLLEGE OF DUPAGE  
SRC ENTRY #2  
REPLACEMENT

425 FAWELL BLVD, GLEN ELLYN,  
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VESTIBULE  
REFLECTED CEILING  
PLAN

Expiration Date of Seal: 11-30-2018 BE Project No: 15044-17-10



Drawn By: PDK  
Drawing No: A200

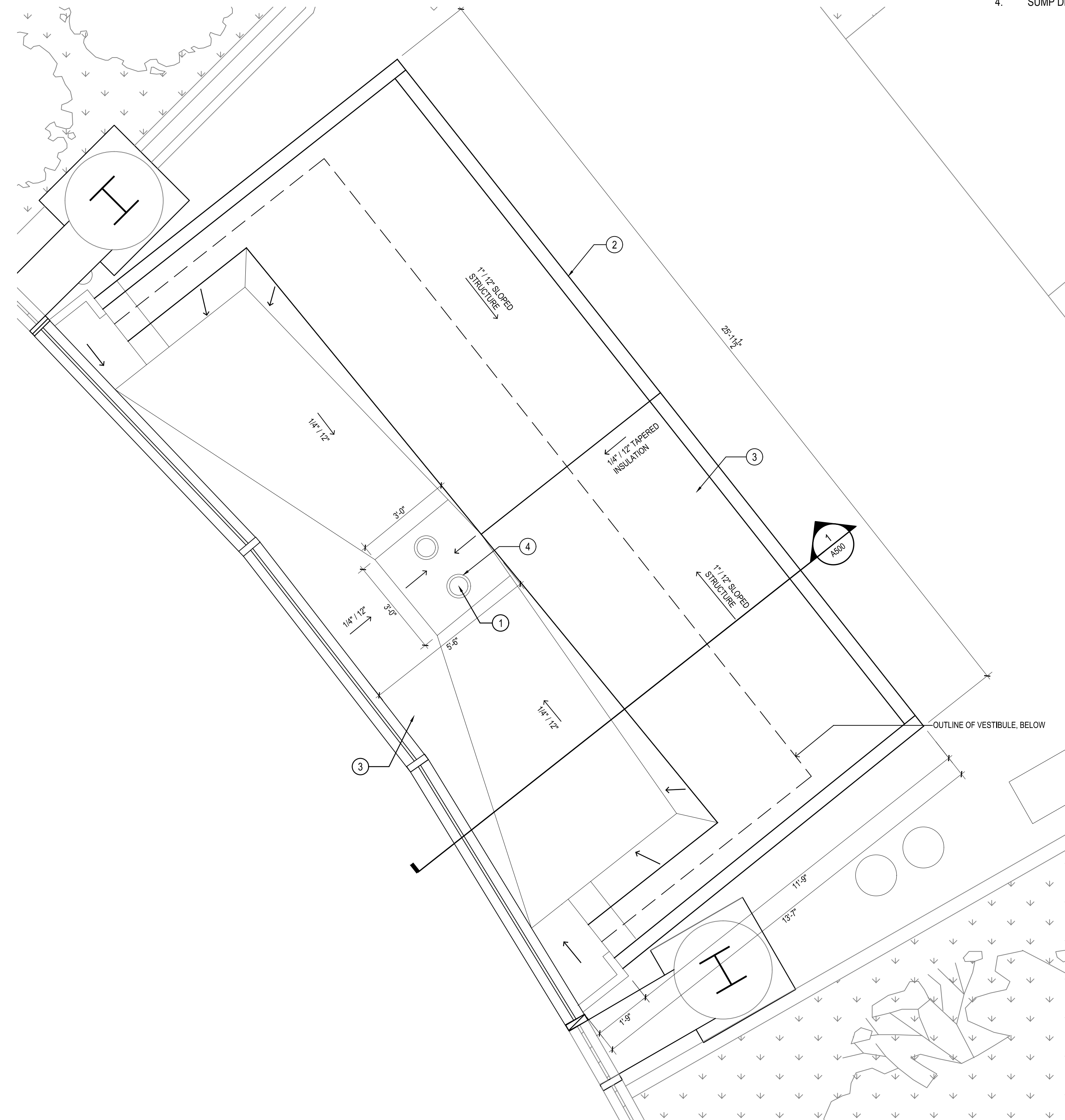


**NEW WORK NOTES**

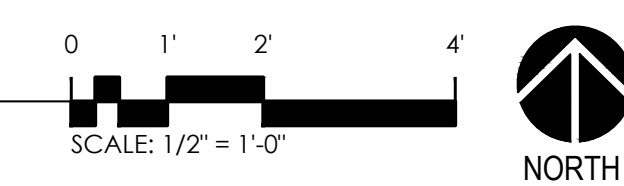
1. MINIMUM SLOPE AT ROOF TO BE  $\frac{1}{4}$ " PER FOOT.

**(X) ROOF PLAN KEYNOTES**

1. ROOF DRAIN AND INTERNAL LEADER, SEE PLUMBING DRAWINGS FOR ROUTING.
2. PROVIDE TWO PIECE METAL FASCIA AT PERIMETER OF ROOF TO MATCH METAL PANEL IN FINISH.
3. LOW SLOPE ROOF WITH EPDM MEMBRANE. PROVIDE TAPERED INSULATION AS REQUIRED TO PROVIDE MIN  $\frac{1}{4}$ " PER FOOT SLOPE TO DRAIN AND A SMOOTH TRANSITION BETWEEN AREAS OF ROOF. PROVIDE FLASHING AT EDGE AND PENETRATIONS AS REQUIRED TO MAINTAIN CONTINUOUS WATER TIGHT ASSEMBLY.
4. SUMP DRAIN 2" BELOW ROOF.



1 VESTIBULE ROOF PLAN



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VESTIBULE ROOF PLAN

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	Drawing No. A300



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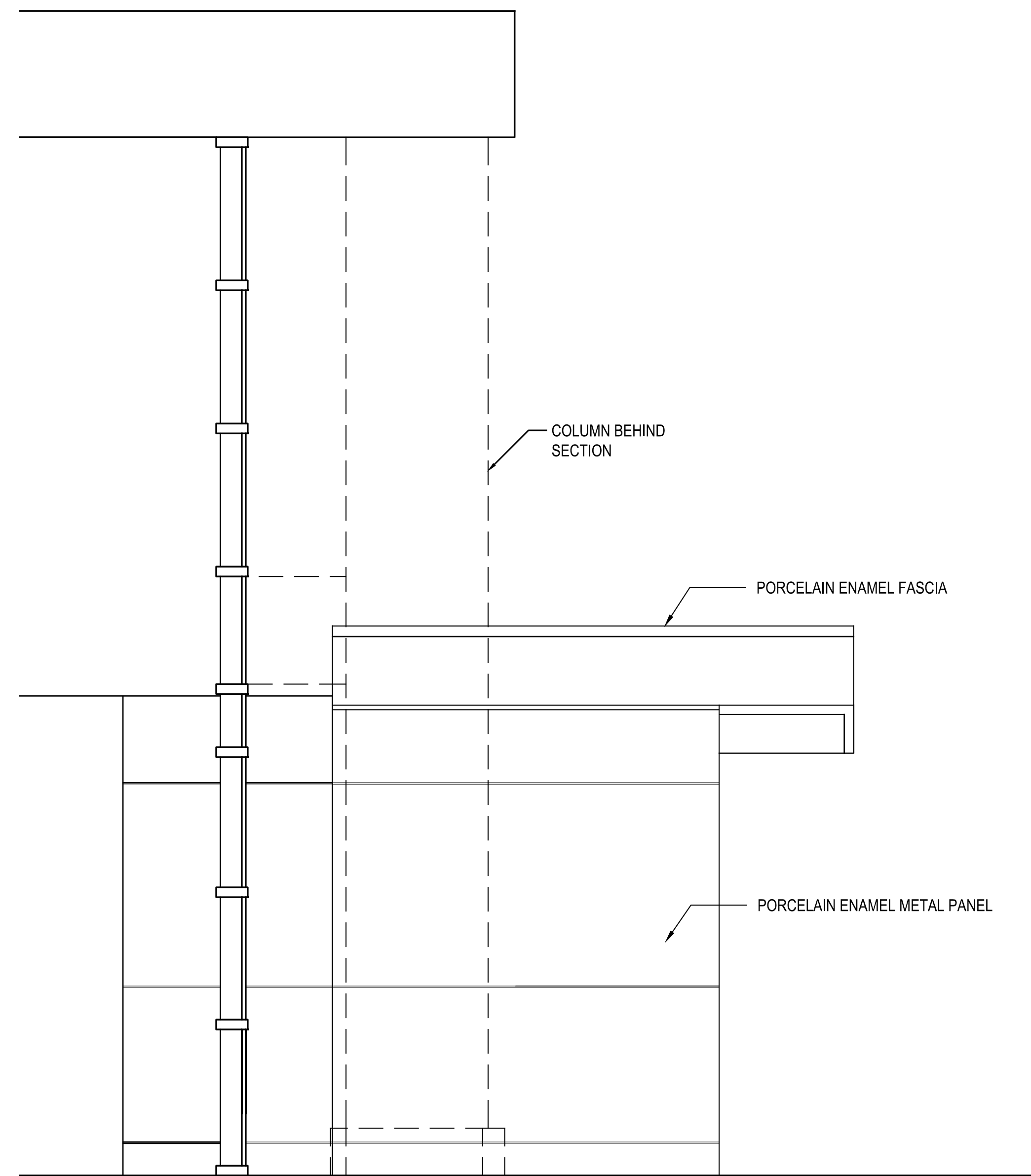
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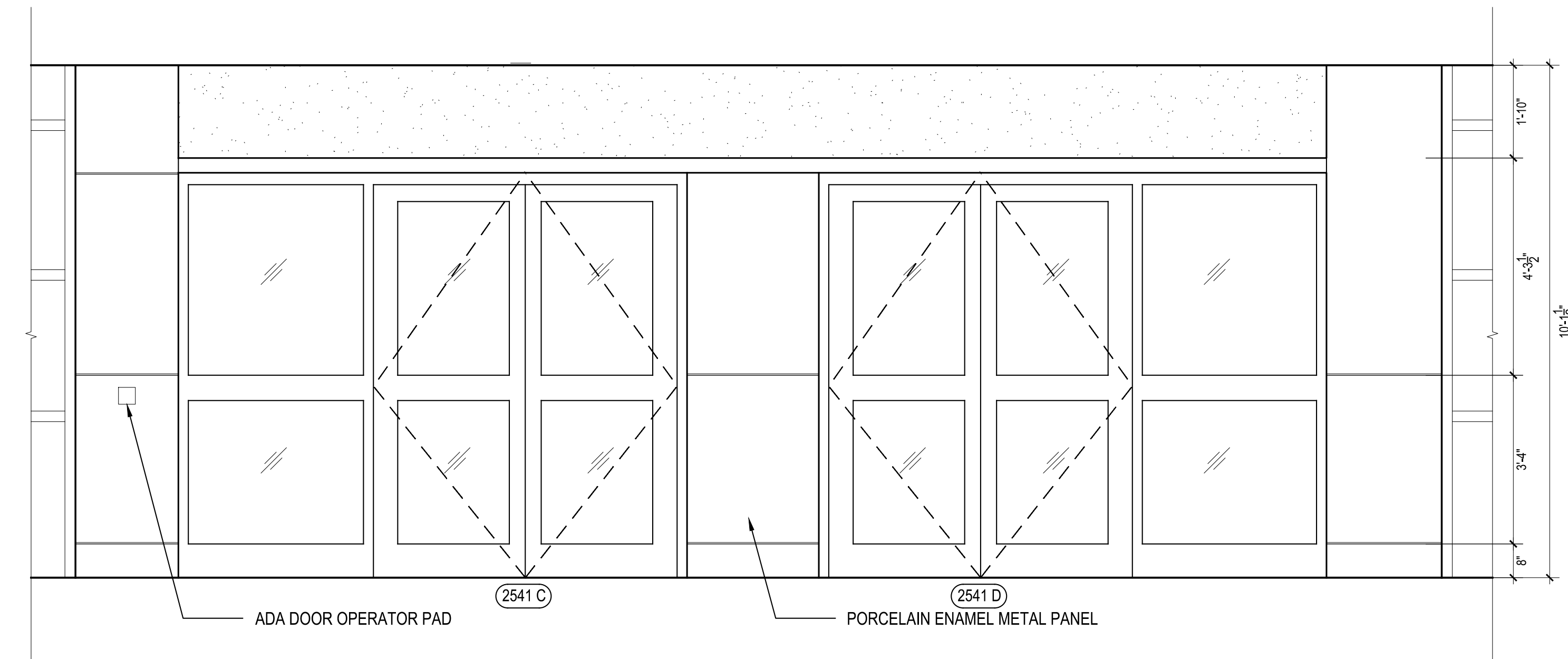
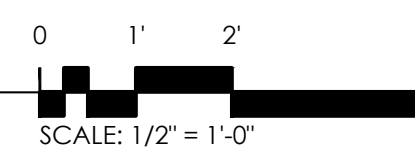
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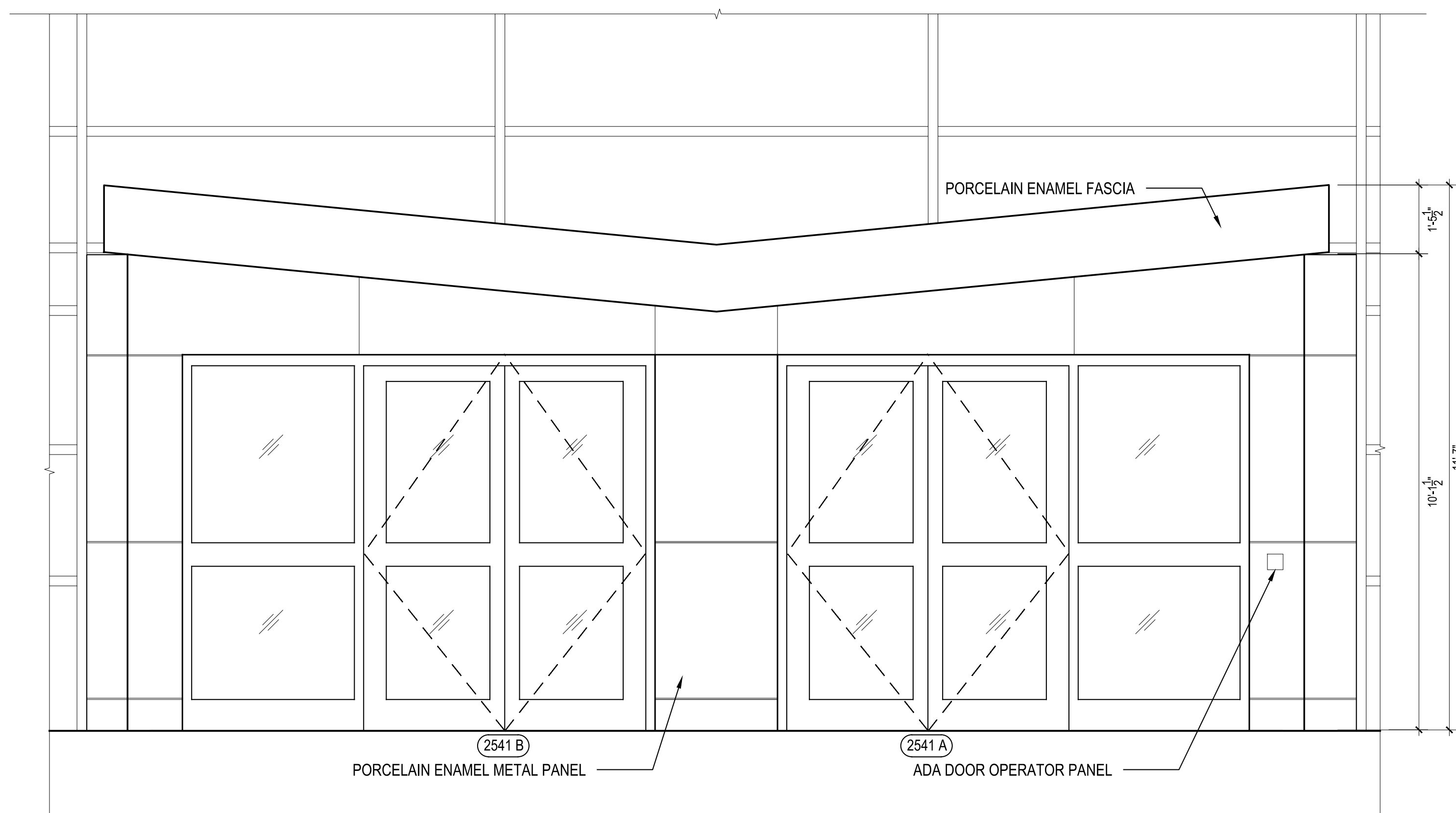
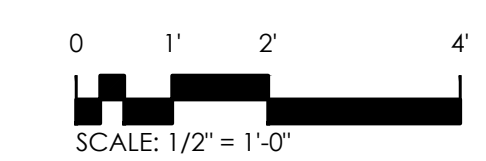
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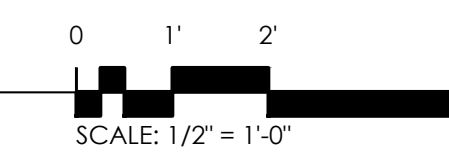
3 SIDE ELEVATION



2 INTERIOR ELEVATION



1 EXTERIOR ELEVATION

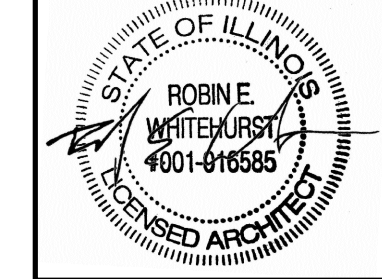


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REPLACEMENT  
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VESTIBULE  
ELEVATIONS

Expiration Date of Seal: 11-30-2018  
Project No: 15044-17-10



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Drawing No: A400



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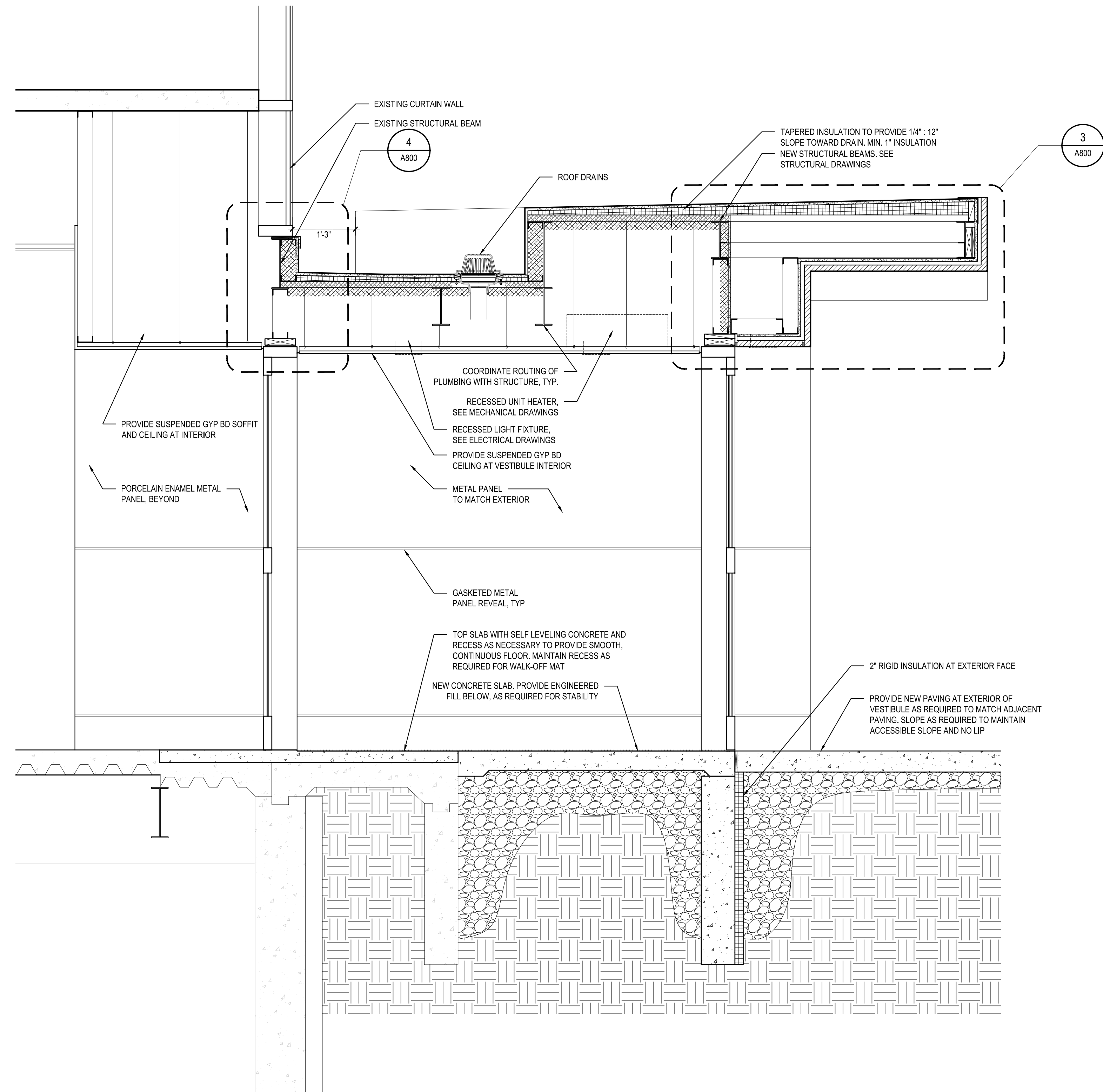
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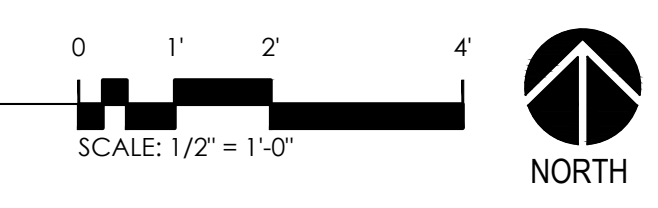
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1 VESTIBULE SECTION



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VESTIBULE SECTION

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401-616585  
LICENSED ARCHITECT

Drawn By: PDK  
Drawing No.: A500



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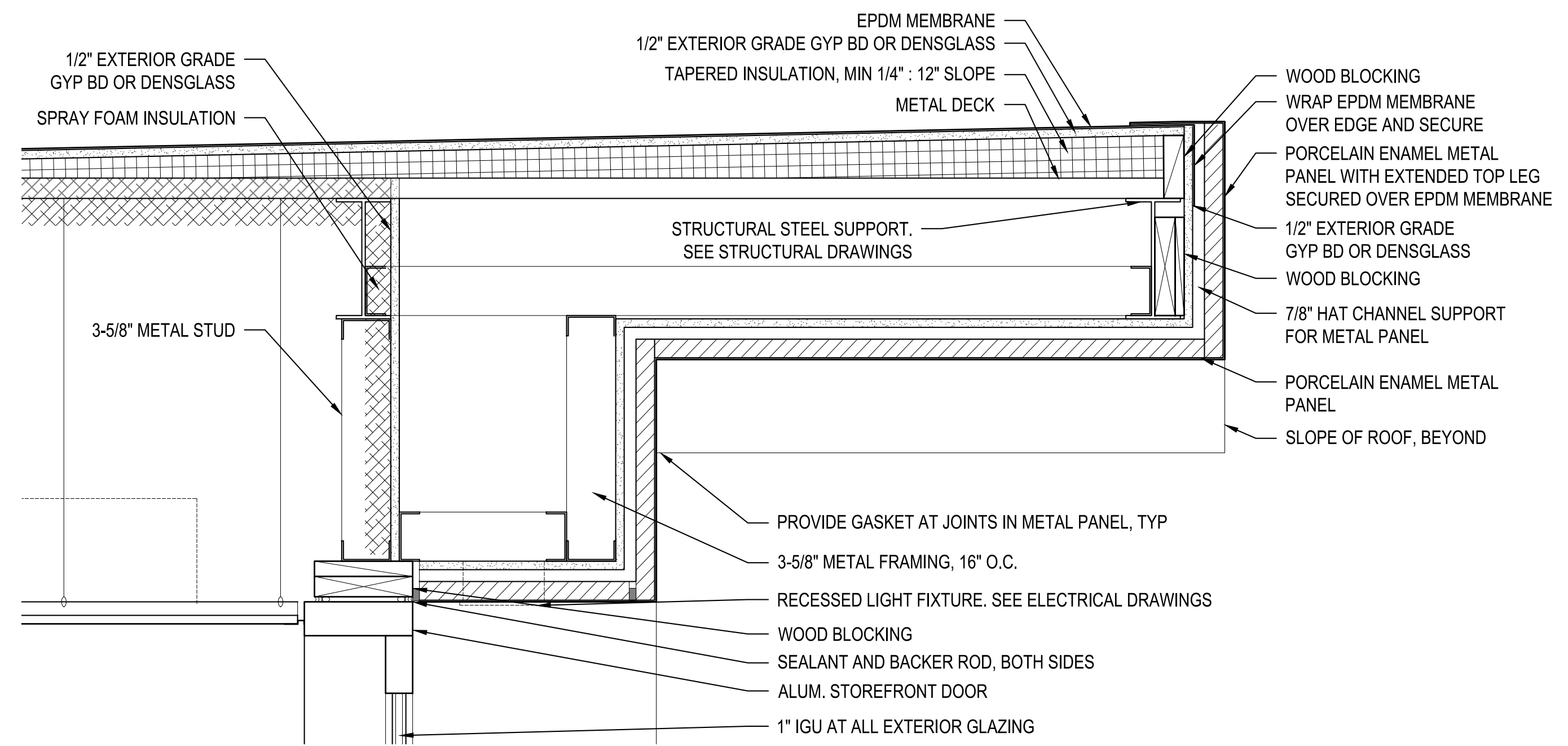
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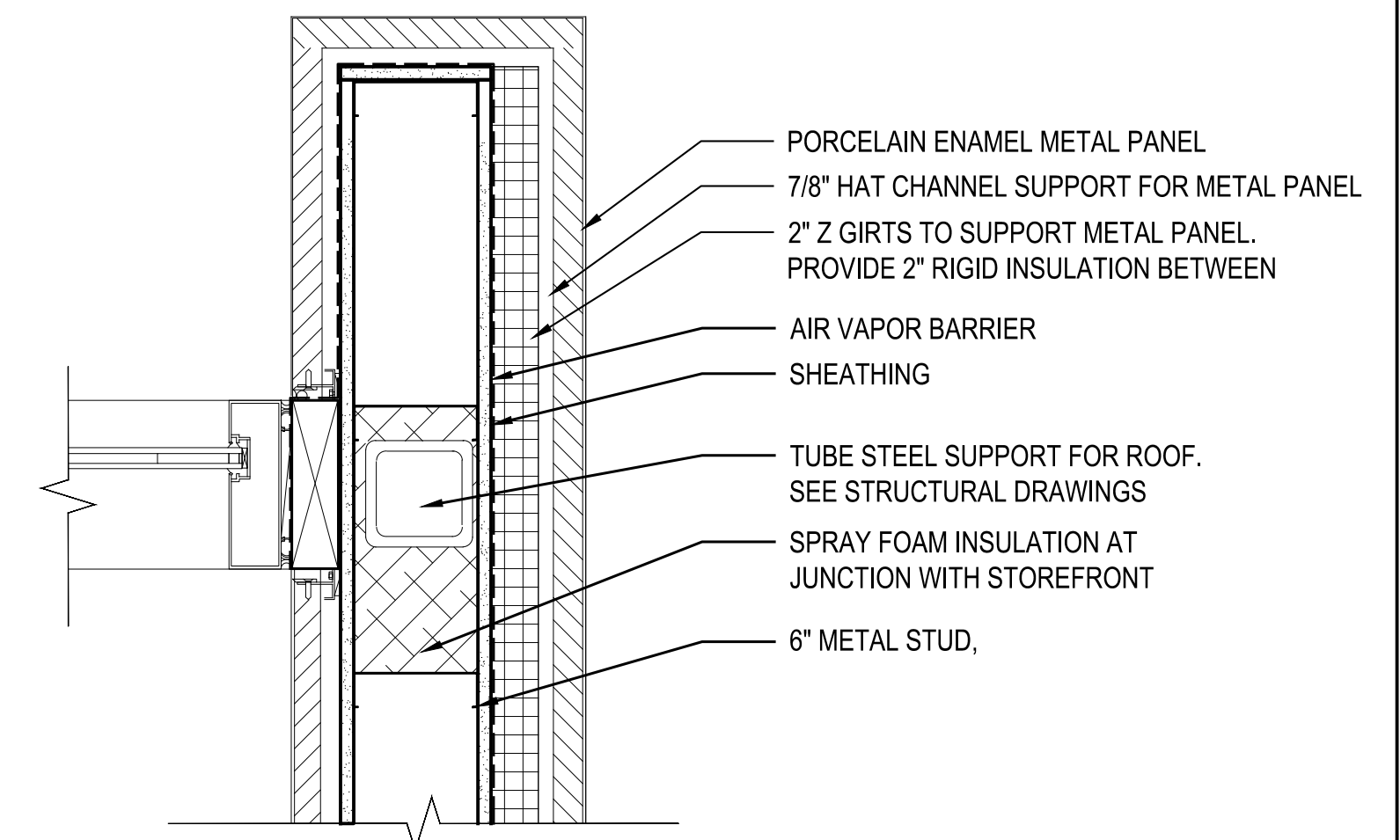
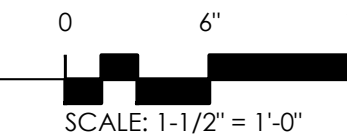
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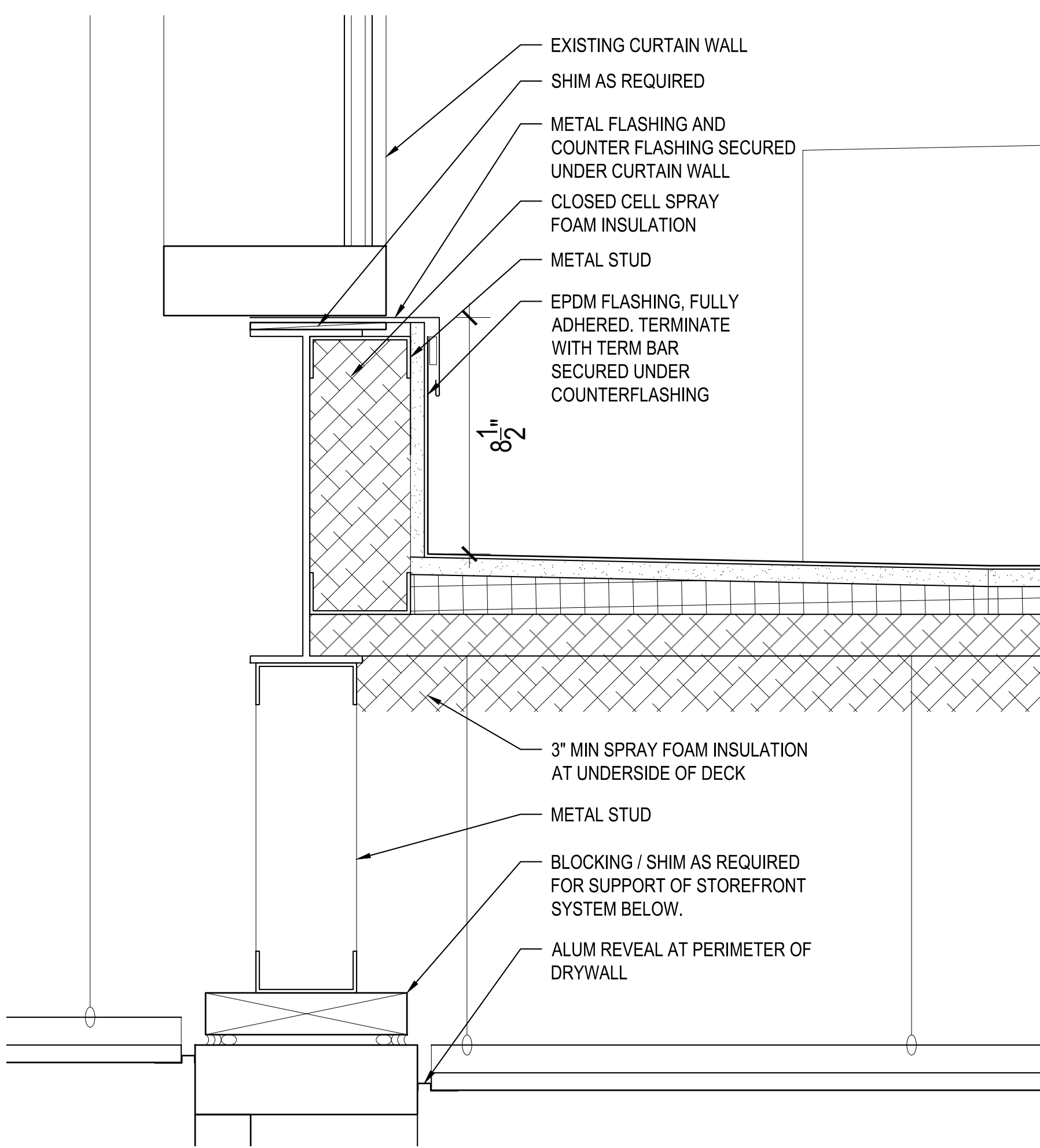
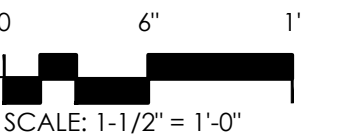
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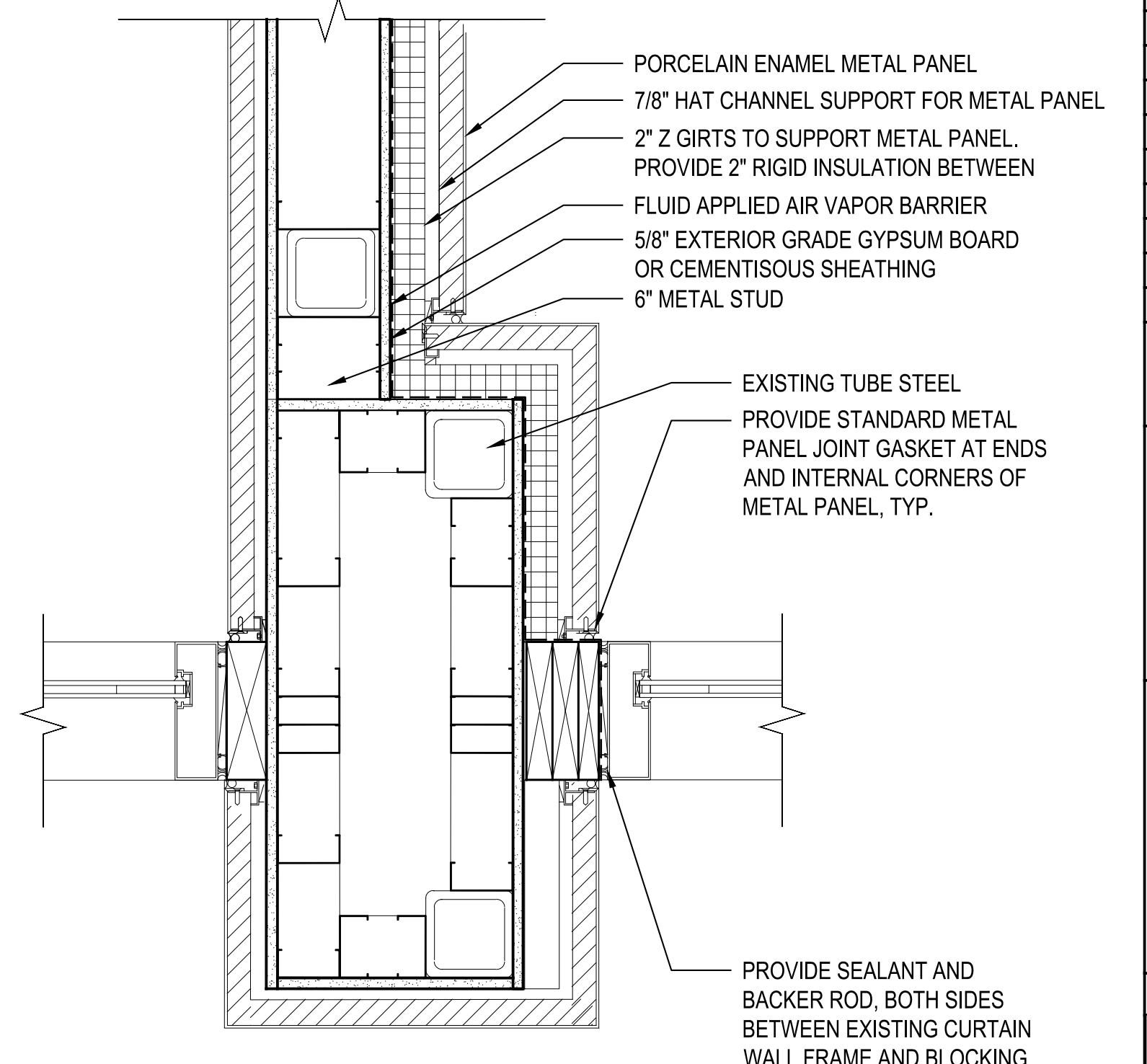
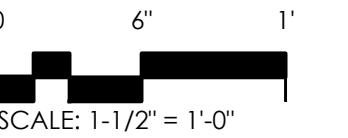
3 ROOF EDGE DETAIL



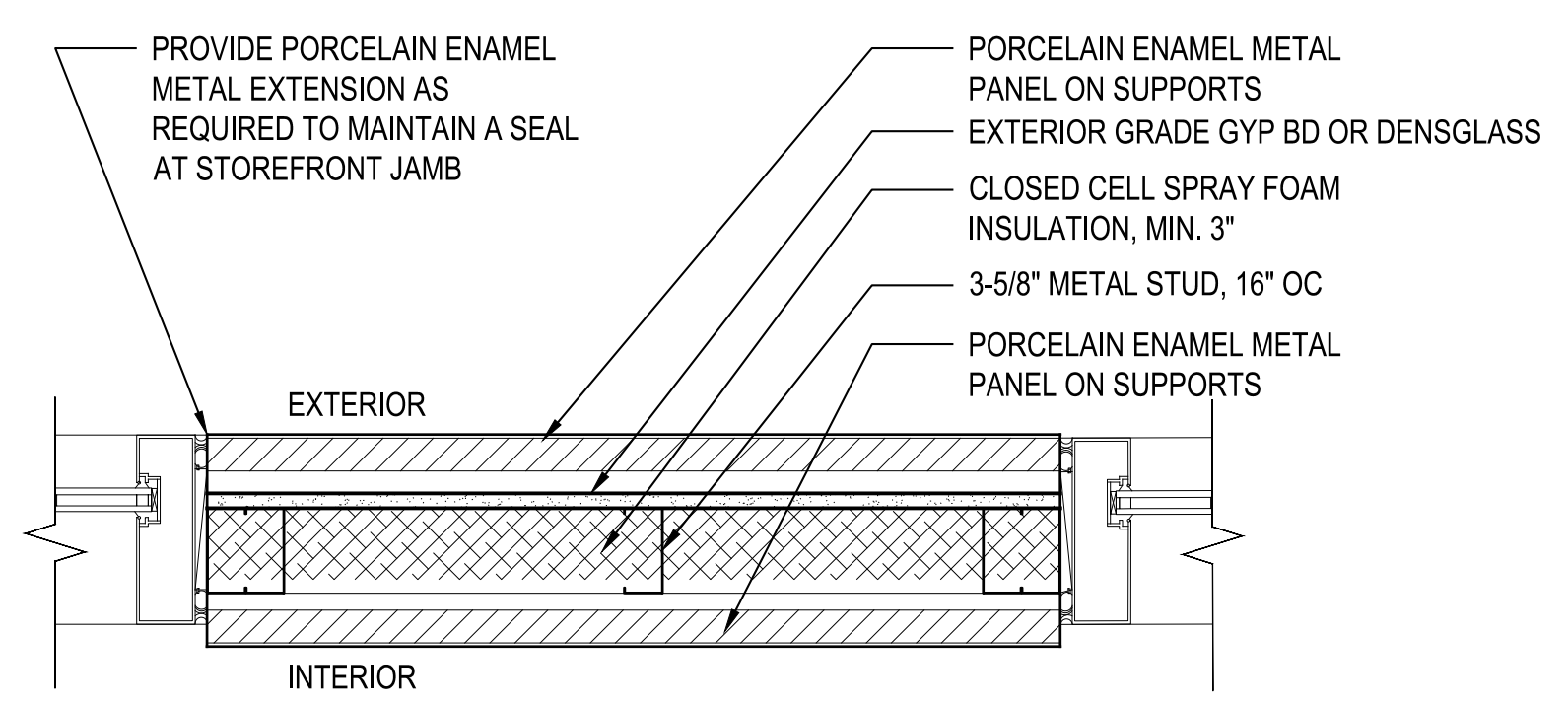
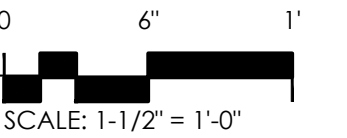
2 WALL ASSEMBLY PLAN DETAIL



4 ROOF TO CURTAIN WALL DETAIL

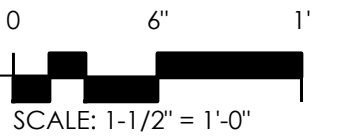


1 WALL ASSEMBLY PLAN DETAIL



NOTE:  
SIMILAR WALL AT INTERIOR DOES NOT REQUIRE INSULATION AND CONTAINS AN EXISTING COLUMN

5 WALL ASSEMBLY PLAN DETAIL



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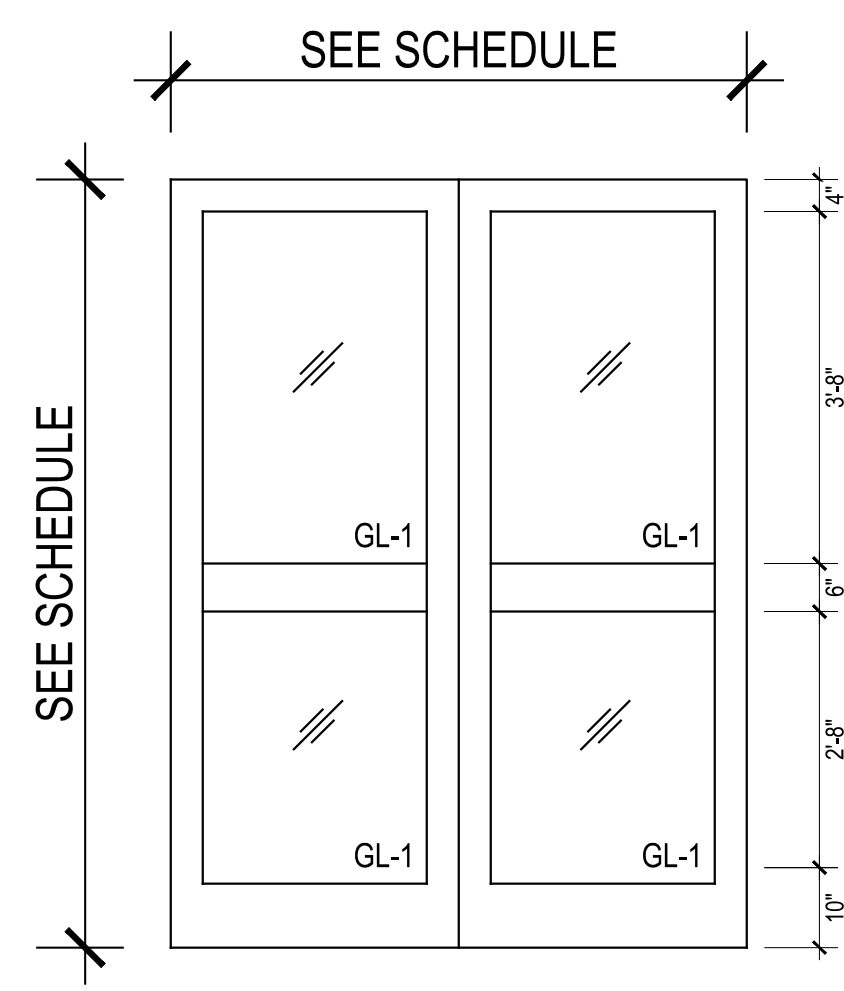
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Drawing Title  
**DETAILS**

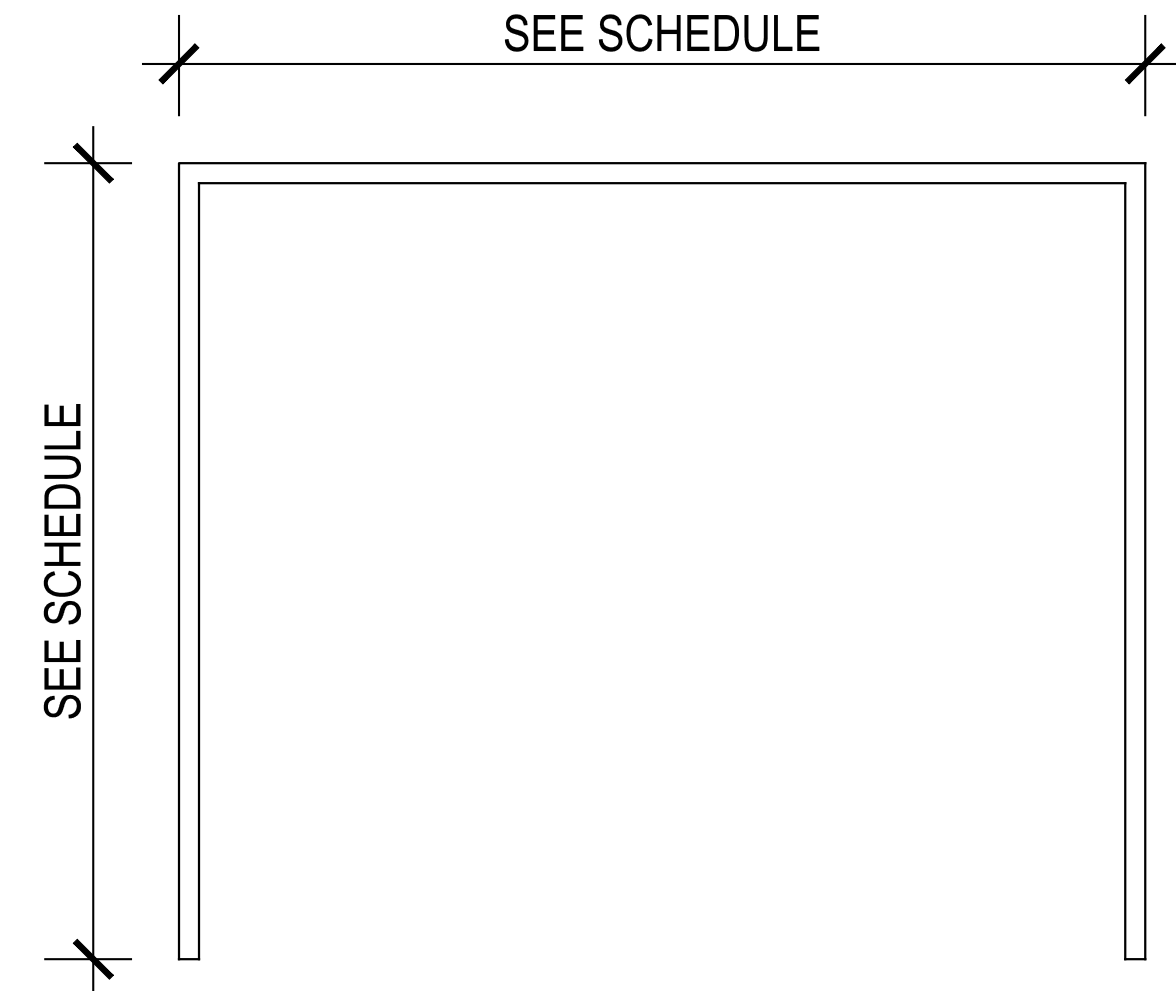
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ROBIN E. WHITEHURST  
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LICENSED ARCHITECT

Drawn By: PDK  
Drawing No: A800



**A**  
**DOOR TYPE**



**A**  
**FRAME TYPE**

ROOM FINISH SCHEDULE										
ROOM NUMBER	ROOM NAME	AREA	FLOOR FINISH	WALL BASE	WALL FINISH				CEILING FINISH	COMMENTS
					NORTH	SOUTH	EAST	WEST		
2541	ENTRY VESTIBULE	188	WM-1	WB-1	MP-1	MP-1	MP-1	PT-1		

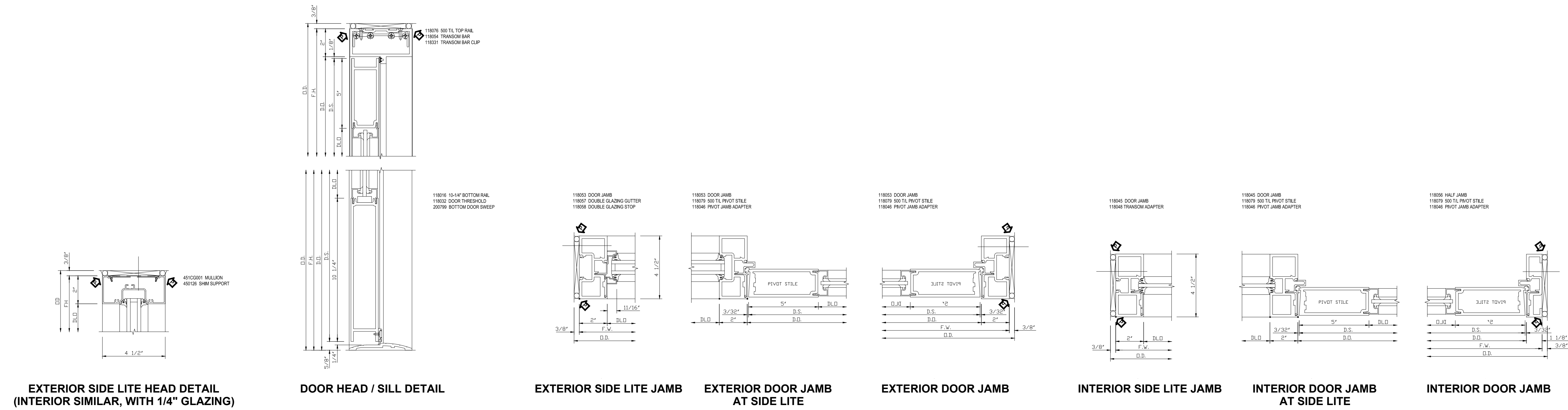
  

MATERIALS LEGEND				
MATERIAL TYPE / CODE	MATERIAL DESCRIPTION	MATERIAL MANUFACTURER BASIS OF DESIGN	MANUFACTURER MODEL, SIZE & COLOR	MATERIAL REMARKS
WM-1	WALK OFF MAT	MANNINGTON	BUFFINGTON II, EBONY EARTH 1508	
CPT-1	CARPET TILE	EXISTING	EXISTING	EXISTING CARPET TO BE REUSED.
CPT-2	CARPET TILE	NEW		
PT-1	PAINT		TO MATCH EXISTING	STANDARD CEILING PAINT
WB-1	VINYL WALL BASE	JOHNSONITE	TO MATCH EXISTING	NEW WALL BASE TO MATCH EXISTING.
MP-1	PORCELAIN ENAMEL METAL PANEL			

NOTE: ALL INTERIOR WORK OUTSIDE OF NEW VESTIBULE TO MATCH EXISTING ADJACENT FINISHES. PATCH, REPAIR AND / OR PAINT AS NECESSARY TO PROVIDE LEVEL OF FINISH MATCHING EXISTING.

DOOR SCHEDULE													
DOOR NO.	ROOM NO.	ROOM NAME	DOOR				FRAME			HARDWARE		REMARKS	
			WIDTH	HEIGHT	THICKNESS	MATERIAL	FINISH	TYPE	RATING	MATERIAL	FINISH		TYPE
2541A	2541	ENTRY VESTIBULE	6'-0"	8'-0"	2"	ALUM.	-	A	-	ALUM.	-	A	1, 3
2541B	2541	ENTRY VESTIBULE	6'-0"	8'-0"	2"	ALUM.	-	A	-	ALUM.	-	A	2, 3
2541C	2541	ENTRY VESTIBULE	6'-0"	8'-0"	2"	ALUM.	-	A	-	ALUM.	-	A	3, 2, 3
2541D	2541	ENTRY VESTIBULE	6'-0"	8'-0"	2"	ALUM.	-	A	-	ALUM.	-	A	4, 2, 3

- REMARKS:
- GLAZING IN LITES TO BE GL-1
  - GLAZING IN LITES TO BE GL-2
  - ALL DOOR AND FRAMES TO BE BRIGHT WHITE TO MATCH EXISTING CURTAIN WALL FRAMING.



**1** **DOOR AND SIDE LITE DETAILS**

SCALE: 3" = 1'-0"



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**COLLEGE OF DUPAGE  
SRC ENTRY #2  
REPLACEMENT**  
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IL 60137

**FINISH SCHEDULE  
DOOR SCHEDULE  
DOOR DETAILS**

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BE Project No: 15044-17-10

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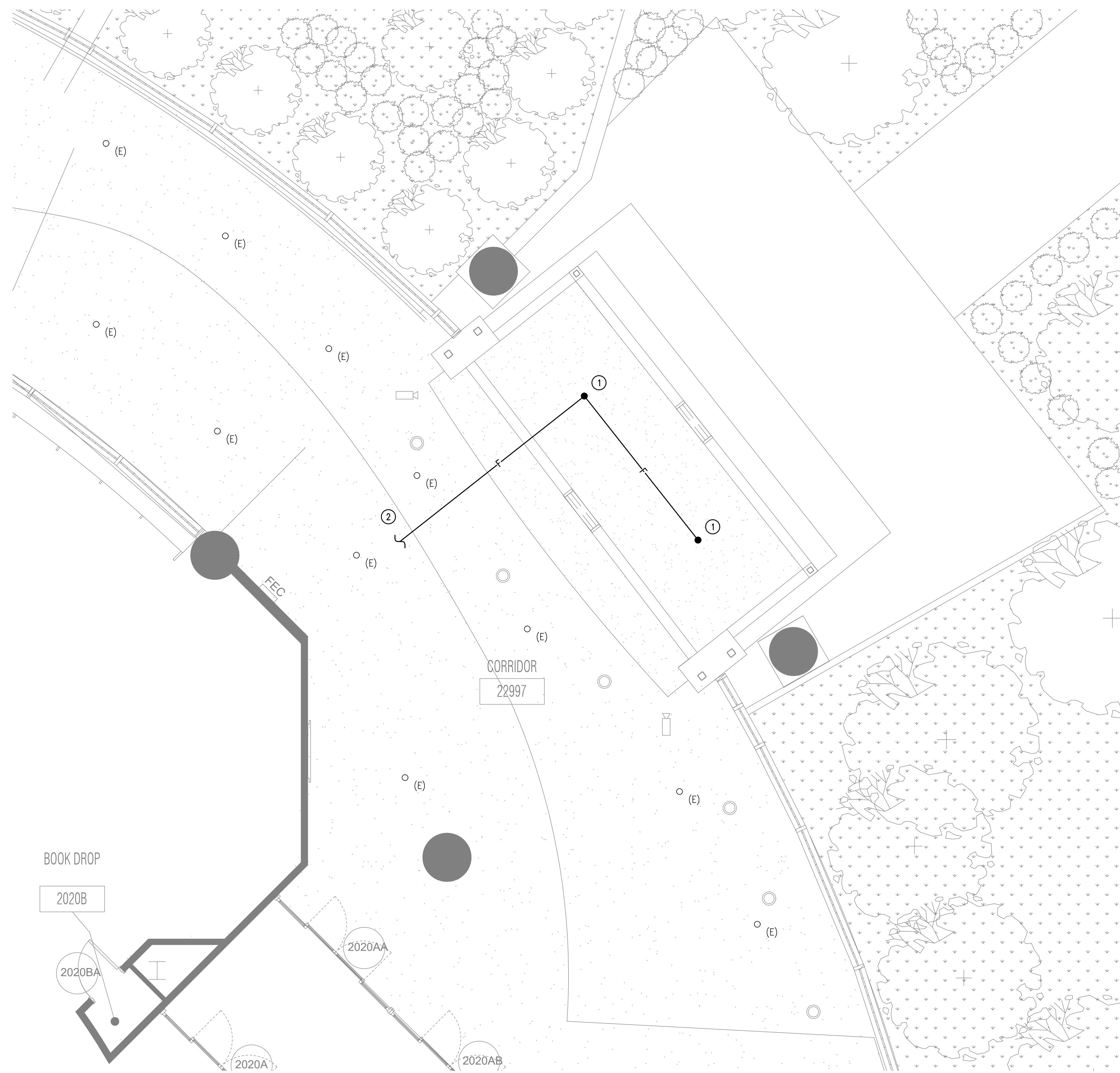
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**FIRE PROTECTION KEYNOTES:**

1. PROVIDE CONCEALED SPRINKLER HEAD AND ESCUTCHEON IN GYPSUM CEILING. PROVIDE FIRE PROTECTION PIPING AND CONNECT TO EXISTING.
2. FIELD VERIFY EXACT LOCATION OF EXISTING FIRE PROTECTION MAIN. CONNECT NEW BRANCH PIPING TO EXISTING MAIN.

**FIRE PROTECTION GENERAL NOTES:**

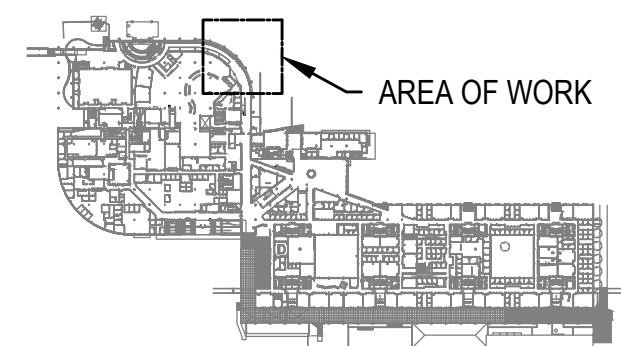
1. COORDINATE SPRINKLER SERVICE SHUTDOWN WITH COLLEGE AT LEAST 48 HOURS IN ADVANCE.

**FIRE PROTECTION COVERAGE RATE:**

VESTIBULE: 185 SQ. FT.  
2 SPRINKLER HEADS  
92.5 SQ. FT./HEAD

---

MINIMUM REQUIRED COVERAGE:  
225 SQ. FT./HEAD



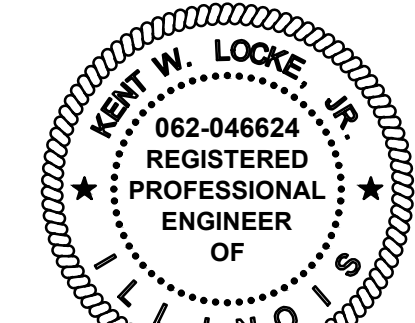
KEY PLAN  
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Issue Date	Title
4/18/18	100% CONSTRUCTION DOCUMENTS

COLLEGE OF DUPAGE  
SRC ENTRY #2  
REPLACEMENT

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IL 60137

Drawing Title  
**FIRE PROTECTION  
NEW WORK PLAN**



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1 FIRE PROTECTION NEW WORK PLAN  
SCALE: 1/2" = 1'  
NORTH

EE Project No:	15044-17-10
Drawn By:	PDK
Drawing No.:	FP100



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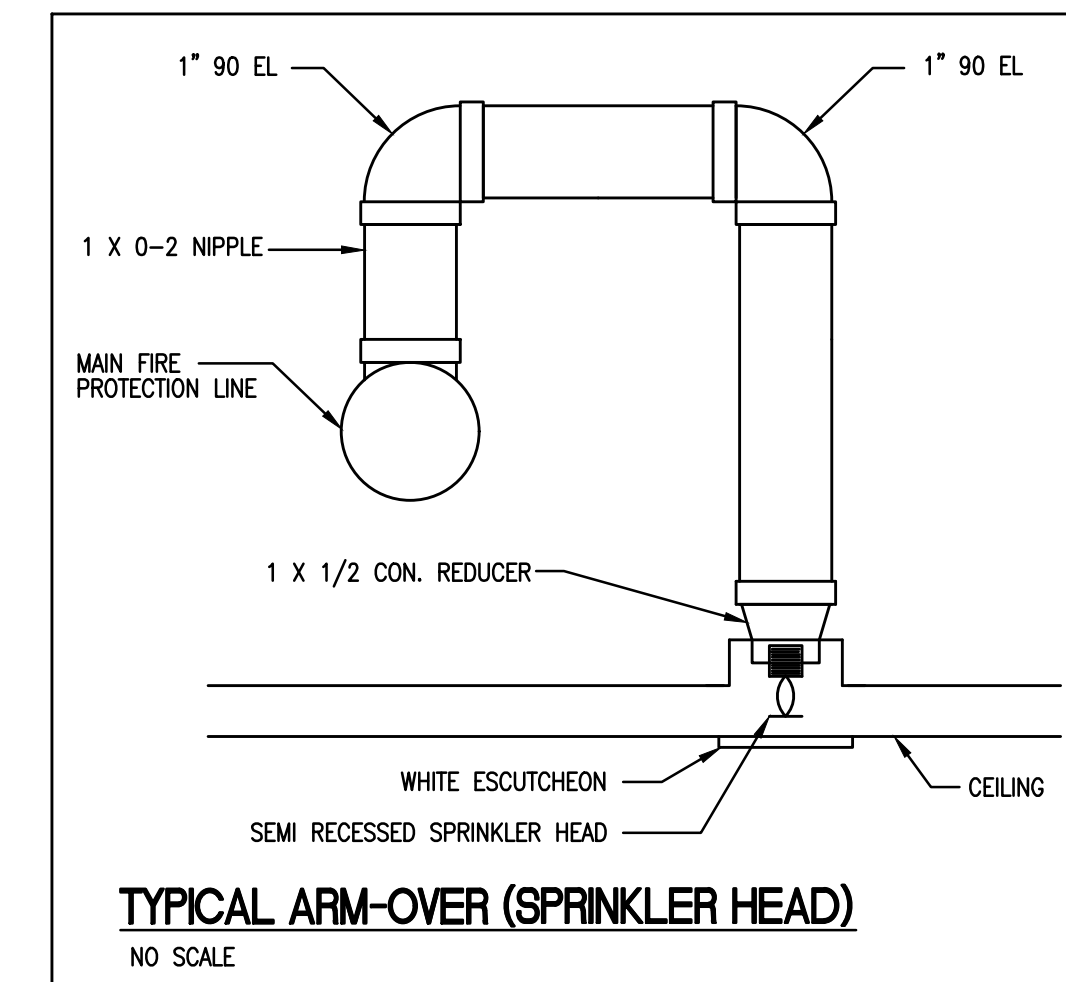
**FIRE PROTECTION NOTES:**

AREAS SHOWN: LIGHT HAZARD, 0.10 GPM OVER 1,500 SQ. FEET  
LINE PIPING - SCHEDULE 40 STEEL PIPE, STANDARD CAST IRON FITTINGS  
MAIN PIPING - SCHEDULE 10 STEEL PIPE, GROOVED FITTINGS, WELDED OUTLETS, HANGERS - 3/8" THREADED ROD, CLAMP TO STRUCTURE, UNISTRUT TRAPEZE AS REQUIRED,  
PROVIDE SCHEDULE 40 PVC SLEEVES AT WALL PENETRATIONS AND SEAL  
HYDROSTATICALLY TEST COMPLETED SYSTEM AT 200 PSI FOR 2 HOURS. ALARM WIRING AND CENTRAL SUPERVISION TO BE PROVIDED BY E.C. PROVIDE 115 VOLT DEVICES.

1. ALL AREAS ARE CLASSIFIED AS LIGHT HAZARD.
2. ALL SPRINKLER HEADS WILL REQUIRE WORK IN NEW CEILING AREAS. PROTECT FROM BREAKAGE DURING CONSTRUCTION.
3. COORDINATE WITH ARCHITECTURAL PLANS TO VERIFY NEW CEILING AREAS.
4. EXTEND BRANCH PIPING TO NEW SPRINKLER PIPING LOCATIONS. FIELD VERIFY LOCATIONS OF PIPING WITH EXISTING CONDITIONS.
5. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING COVERAGE THAT COMPLIES WITH NFPA 13. PROVIDE REVISED HYDRAULIC CALCULATIONS AND SHOP DRAWINGS. SHOP DRAWINGS SHALL DEMONSTRATE LOCATIONS PIPING WITH CLEAR DIFFERENTIATION BETWEEN NEW AND EXISTING PIPING. ALL CALCULATIONS BY LICENSED FIRE PROTECTION ENGINEER OR NICET LEVEL III CERTIFIED DESIGNER.
6. NEW SUPPORTS SHALL BE INDEPENDENT OF ALL OTHER TRADES.
7. COORDINATE PIPE ROUTING, SPRINKLER LOCATION AND WORK SCHEDULE WITH OTHER TRADES.
8. TEST NEW PIPING WITH AIR PRIOR TO FILLING WITH WATER.

**FIRE PROTECTION LEGEND**

- CONCEALED SPRINKLER HEAD WITH WHITE ESCUTCHEONS TYP. TYCO OR EQUAL
- ⊕ CONNECT NEW TO EXISTING
- F- NEW PIPING
- E- EXISTING PIPING
- PIPE DOWN
- PIPE UP
- (E) EXISTING
- DEMO PIPING
- DEMO SPRINKLER HEAD

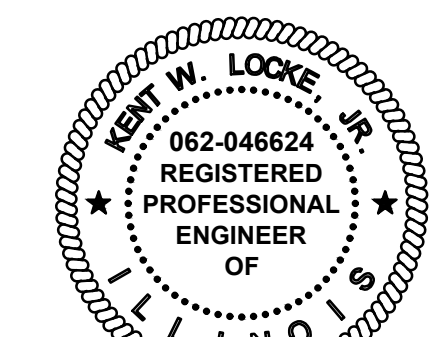


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**FIRE PROTECTION  
NOTES SYMBOLS  
AND DETAILS**



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EE Project No:  
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Drawn By: PDK

Drawing No:  
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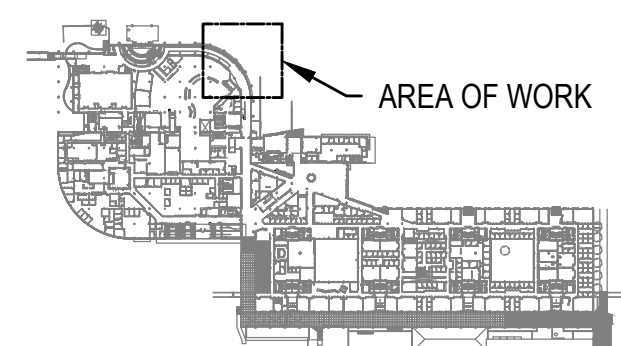
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Drawing Title  
**PLUMBING  
DEMOLITION PLAN**

EE Project No:  
15044-17-10

Drawn By: PDK

Drawing No:  
PD100

DEMOLITION KEYNOTES:	
①	REMOVE EXISTING ROOF DRAIN.
②	REMOVE EXISTING STORM DRAINAGE PIPING FROM ROOF DRAIN TO EXISTING 3" VERTICAL RISER. TEMPORARILY CAP VERTICAL RISER.



1 PLUMBING DEMOLITION PLAN

SCALE: 1/4" = 1'

0 2' 4' 8'

NORTH

KENT W. LOCKE, JR.  
062-046624  
REGISTERED PROFESSIONAL ENGINEER OF ILLINOIS

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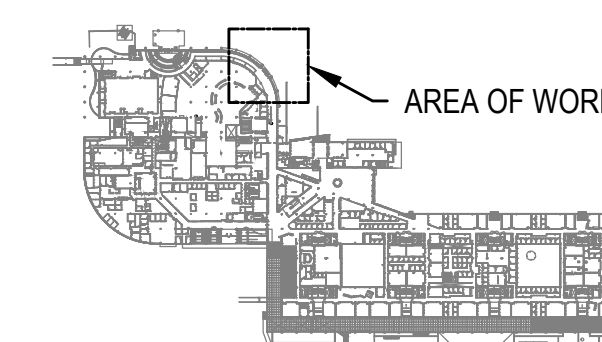
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Drawing Title

PLUMBING NEW  
WORK PLAN



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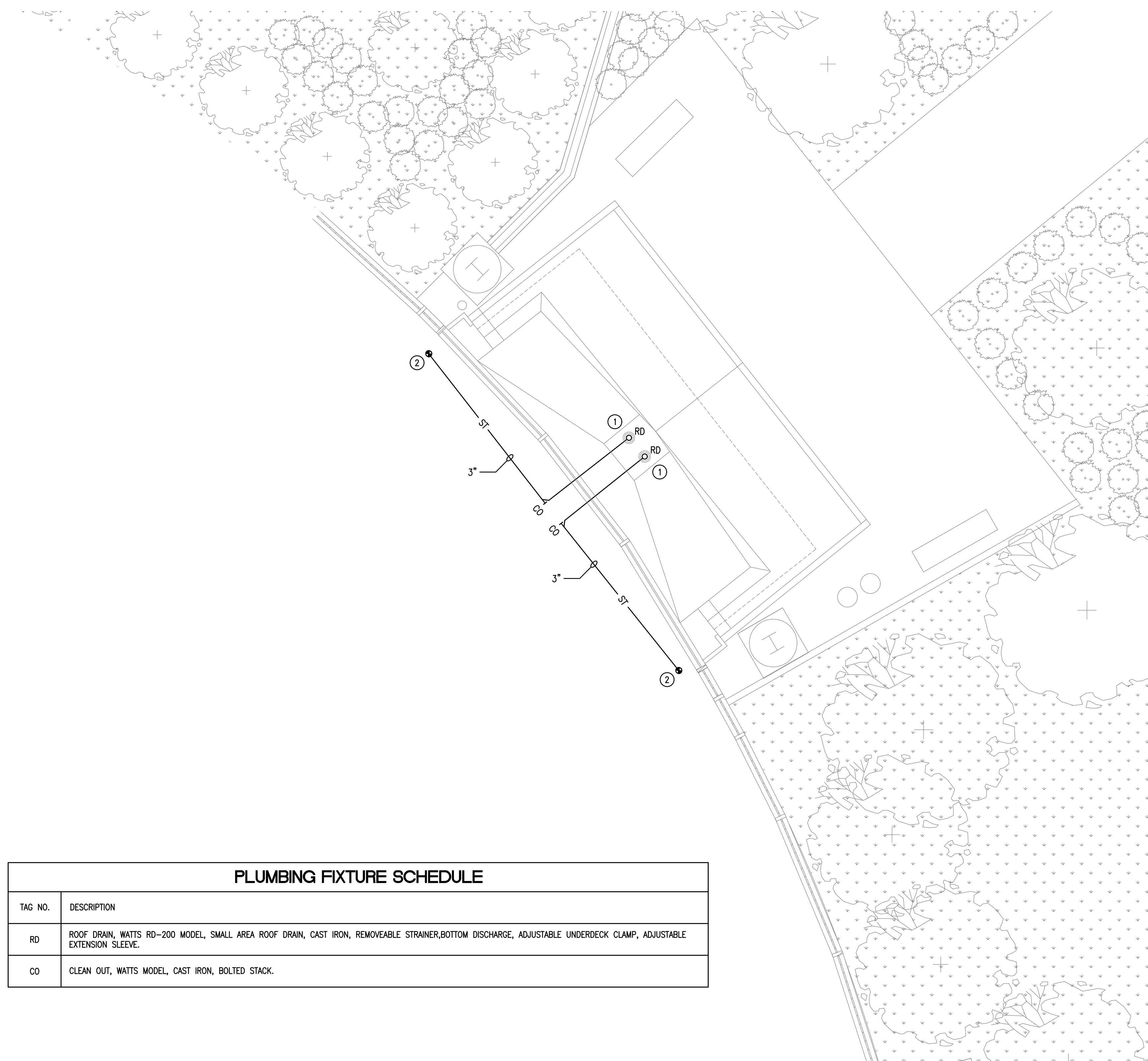
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Drawing No.

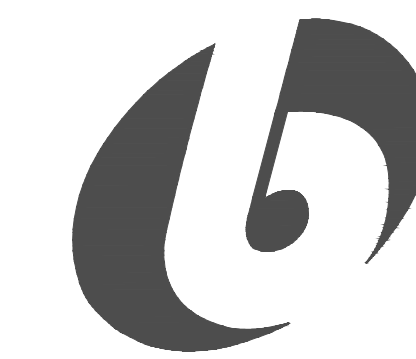
P100



HEATING KEYNOTES:	
①	PROVIDE ROOF DRAIN IN NEW ROOF. FLASH ROOF PENETRATION PER MANUFACTURER'S RECOMMENDATION. COORDINATE WITH ROOFING CONTRACTOR.
②	PROVIDE NEW STORM DRAINAGE PIPING. CONNECT TO EXISTING 3" VERTICAL RISER. PROVIDE CLEANOUTS IN HORIZONTAL PIPING FOR MAINTENANCE.

PLUMBING FIXTURE SCHEDULE	
TAG NO.	DESCRIPTION
RD	ROOF DRAIN, WATTS RD-200 MODEL, SMALL AREA ROOF DRAIN, CAST IRON, REMOVEABLE STRAINER,BOTTOM DISCHARGE, ADJUSTABLE UNDERDECK CLAMP, ADJUSTABLE EXTENSION SLEEVE.
CO	CLEAN OUT, WATTS MODEL, CAST IRON, BOLTED STACK.

1 PLUMBING NEW WORK PLAN  
SCALE: 1/4" = 1'  
NORTH



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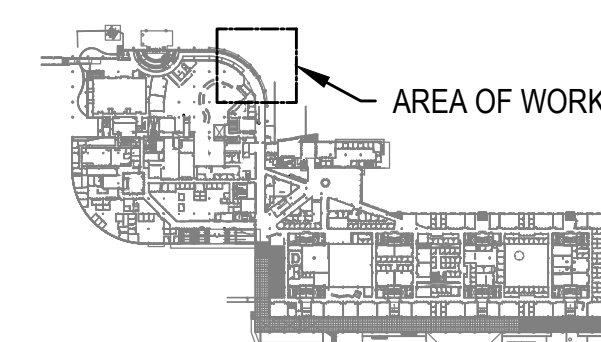
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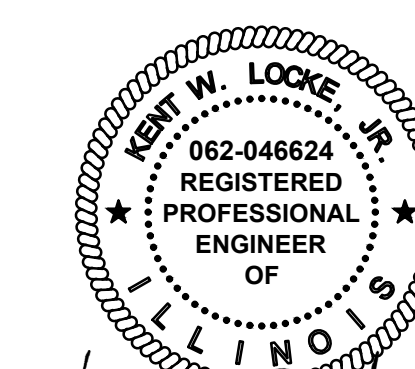
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COLLEGE OF DUPAGE  
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HEATING NEW  
WORK PLAN

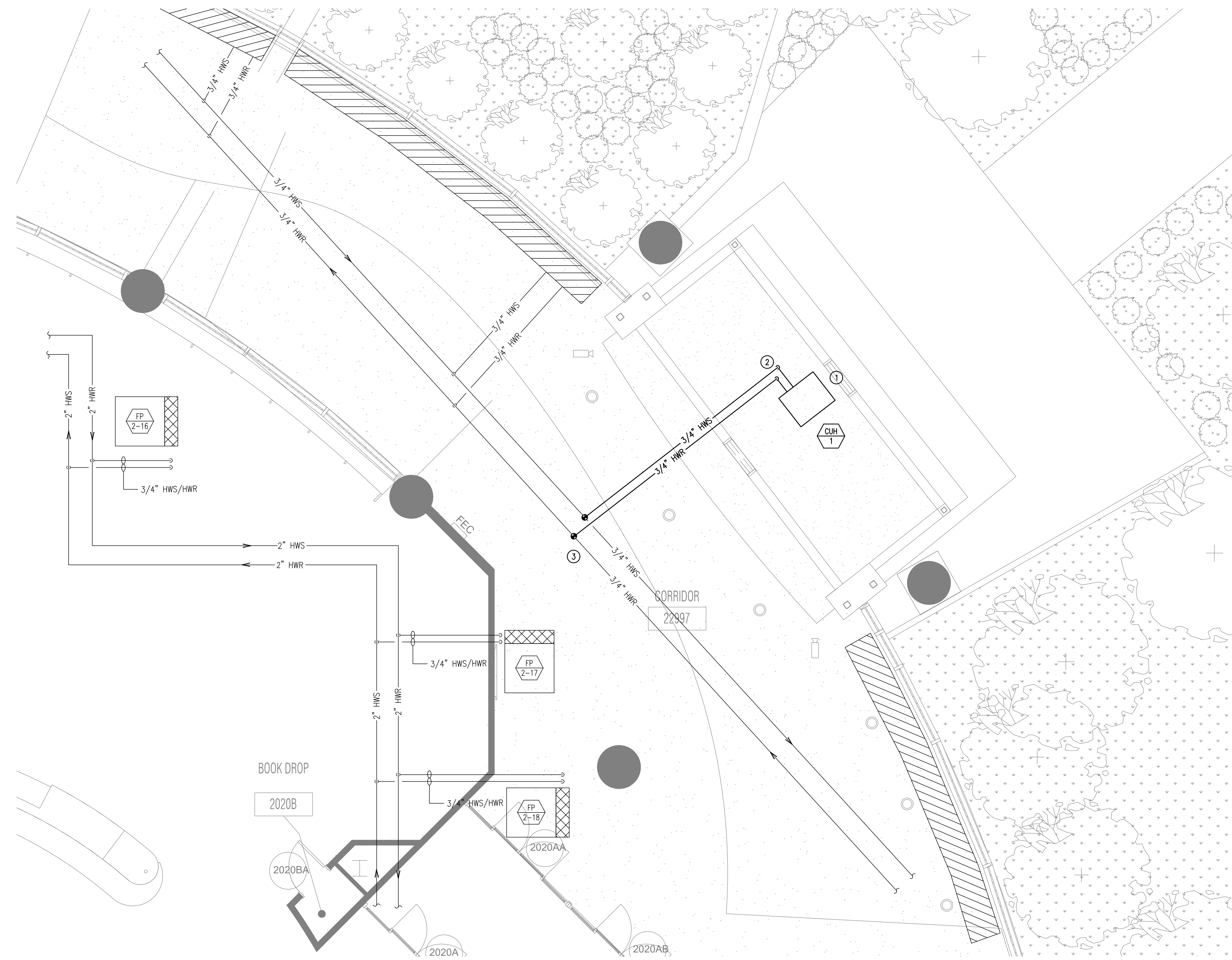


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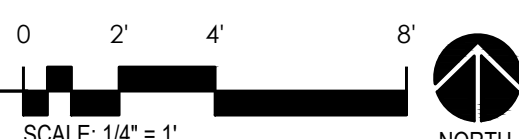
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- HEATING KEYNOTES:**
1. PROVIDE HORIZONTAL RECESSED CABINET UNIT HEATER. MOUNT IN GYPSUM CEILING. COORDINATE EXACT LOCATION WITH G.C. COORDINATE ELECTRICAL REQUIREMENTS WITH E.C.
  2. PROVIDE COPPER PIPING AND INSULATION. COORDINATE EXACT PIPE ROUTING WITH G.C. AND REMOVAL OF EXISTING GYPSUM CEILING.
  3. CONNECT TO EXISTING HWS/HWR PIPING. INSULATE NEW CONNECTION.

- HEATING GENERAL NOTES:**
1. PROVIDE TESTING AND BALANCING FOR HYDRONIC SYSTEMS. CONTRACTOR SHALL SUBMIT TAB REPORT TO THE VILLAGE PRIOR TO FINAL INSPECTION.
  2. COORDINATE HYDRONIC HEATING SERVICE SHUTDOWN WITH COLLEGE AT LEAST 48 HOURS IN ADVANCE.
  3. CONNECT CABINET UNIT HEATER CONTROLS TO EXISTING BAS. COORDINATE WITH COLLEGE'S HONEYWELL REP. MATT SZYDLOWSKI. 847-391-3140. MATT.SZYDLOWSKI@HONEYWELL.COM

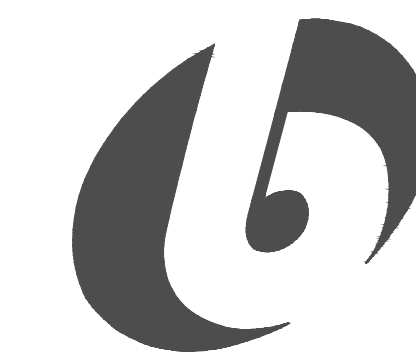


1 HEATING NEW WORK PLAN



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Drawing No.	H100



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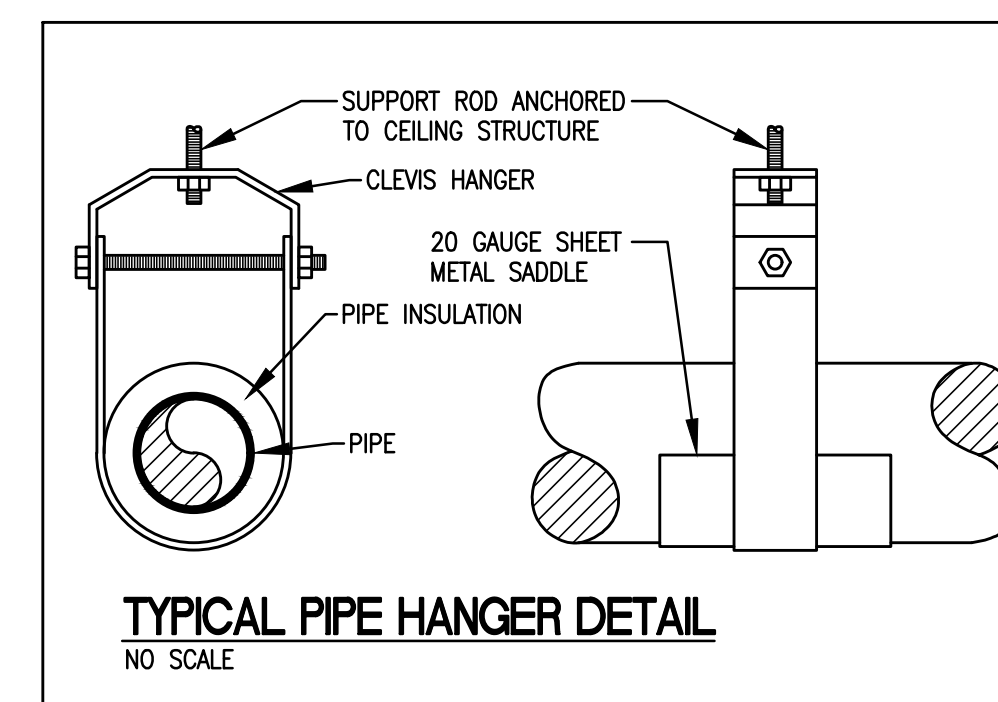
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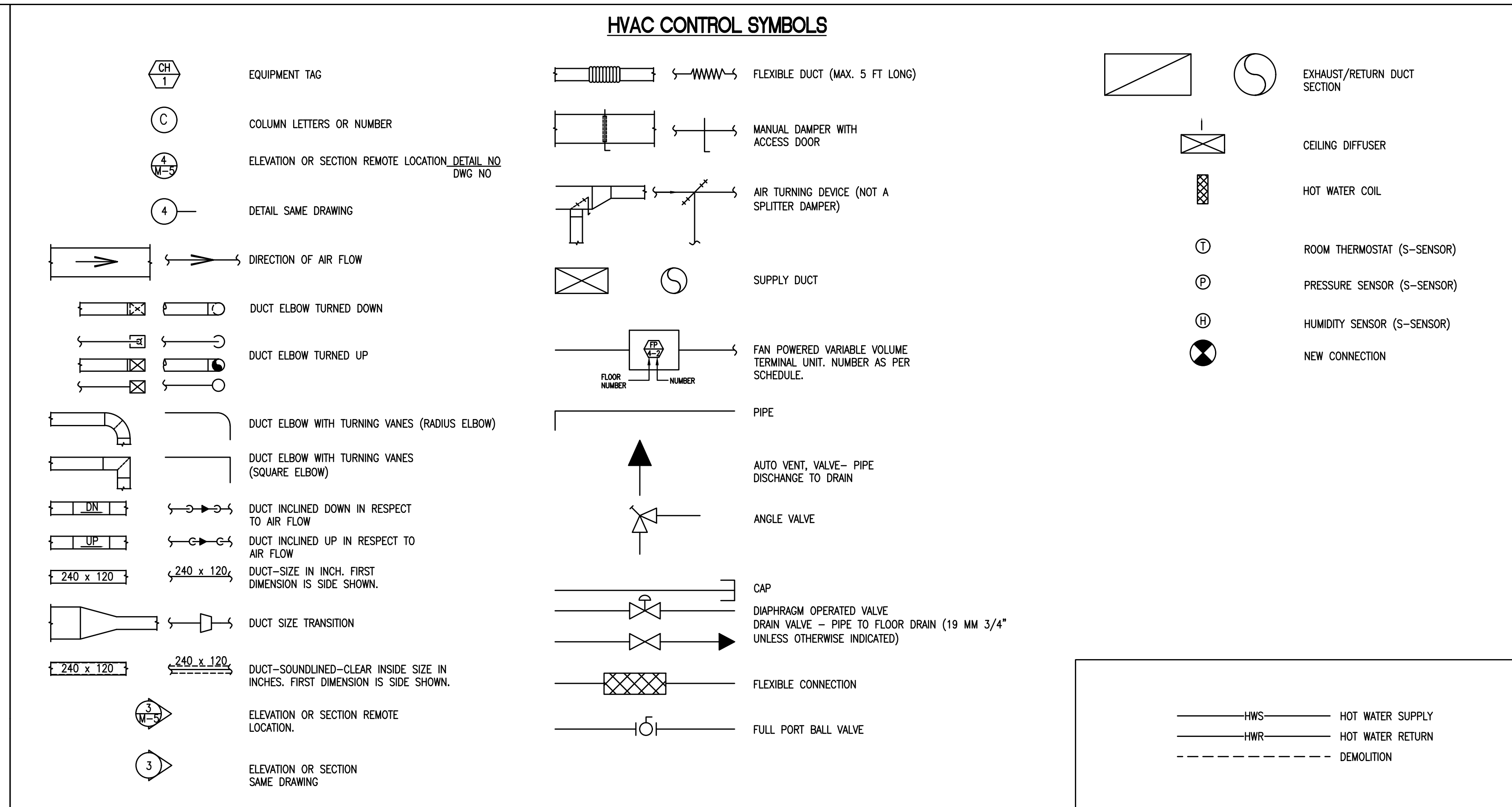
CABINET HEATER SCHEDULE																
TAG NO.	LOCATION	TYPE	FAN			AIR TEMPERATURE °F		MIN. MBH	WATER TEMPERATURE °F		MAX. P.D. FT. H <sub>2</sub> O	GPM	MOTOR			REMARKS
			APPROX CFM @ 70°F	E.S.P. INCHES H <sub>2</sub> O	RPM	ENT.	LVG		ENT.	LVG			WATTS	HP	VOLT	
1	VESTIBULE	HORZ.	230	-	-	65	-	19.6	180	-	10.5	1.3	60	-	115/1	TRANE - FFE

1 PROVIDE PROVIDE HORIZONTAL CEILING RECESSED UNIT, BOTTOM STAMPED OUTLET AND INLET LOUVER, WITH LH PIPE CONNECTIONS, FACTORY-INSTALLED PIPING PACKAGES, FRONT & BACK COLLARS, 3 ROW COIL, HINGED ACCESS COVER, MANUAL AIR VENT, 1" THROWAWAY FILTER, BALL VALVE & CIRCUIT SETTER, DDC CONNECTION, WIRELESS ZONE SENSOR, FUSED DISCONNECT SWITCH.



### SYMBOLS + ABBREVIATIONS

AD ACCESS DOOR	HTG HEATING
BOD BOTTOM OF DUCT	HU HUMIDIFIER
BTU BRITISH THERMAL UNIT	IN INCH
BTUH BRITISH THERMAL UNITS PER HOUR	INSUL INSULATION
CC COOLING COIL	KW KILOWATT
CCP CENTRAL CONTROL PANEL	KWH KILOWATT HOUR
CCW COUNTER CLOCKWISE	LAT LEAVING AIR TEMPERATURE
CH CABINET HEATER UNIT	LOV INTAKE OR EXHAUST LOUVER
CHWS CHILLED WATER SUPPLY	LP LOCAL PANEL
CHWR CHILLED WATER RETURN	LWT LEAVING WATER TEMPERATURE
CFM CUBIC FEET PER MINUTE	MAT MIXED AIR TEMPERATURE
CG CEILING GRILLE	MBH THOUSANDS BRITISH THERMAL UNITS PER HOUR
CI CAST IRON	MAN. MANUAL
CL CENTER LINE	MAX. MAXIMUM
CLG CEILING	MIN. MINIMUM
C.O. CLEAN OUT	N.C. NORMALLY CLOSED
CONC CONCRETE	NIC NOT IN CONTRACT
CW CLOCKWISE	NO NUMBER
DB DECIBEL	N.O. NORMALLY OPEN
DBT DRY BULB TEMPERATURE	NTS NOT TO SCALE
DIFF DIFFUSER	OA OUTSIDE AIR
DWG DRAWING	P PUMP
EAT ENTERING AIR TEMPERATURE	PΔ PRESSURE DIFFERENCE
EFT EFFICIENCY	1 PH SINGLE PHASE
EL ELEVATION	3 PH THREE PHASE
ETR EXISTING TO REMAIN	PNU PNEUMATIC
EWT ENTERING WATER TEMPERATURE	PRESS PRESSURE
F FILTER	PS PIPE SUPPORT
°F DEGREES FAHRENHEIT	PSIA POUNDS PER SQUARE INCH ABSOLUTE
FC FAN COIL UNIT	PSIG POUNDS PER SQUARE INCH GAUGE
FD FIRE DAMPER	RH RELATIVE HUMIDITY
FL FLOOR	RPM REVOLUTIONS PER MINUTE
FLGD FLANGED	RM ROOM
FLEX FLEXIBLE	SP STATIC PRESSURE
FMD FLOW MEASURING DEVICE	SPEC SPECIFICATION
FPM FEET PER MINUTE	STD STANDARD
FS FLOW SWITCH	TC TIME CLOCK
FT FOOT	TSP TOTAL STATIC PRESSURE
GA GAGE OR GAUGE	TYP TYPICAL
GPD GALLONS PER DAY	W WATT
GPH GALLONS PER HOUR	W/ WITH
GPM GALLONS PER MINUTE	WB WET BULB TEMPERATURE
GR GRILLE	WC WATER COLUMN
HC HEATING COIL	
HP HORSEPOWER	



Date	Title
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COLLEGE OF DUPAGE  
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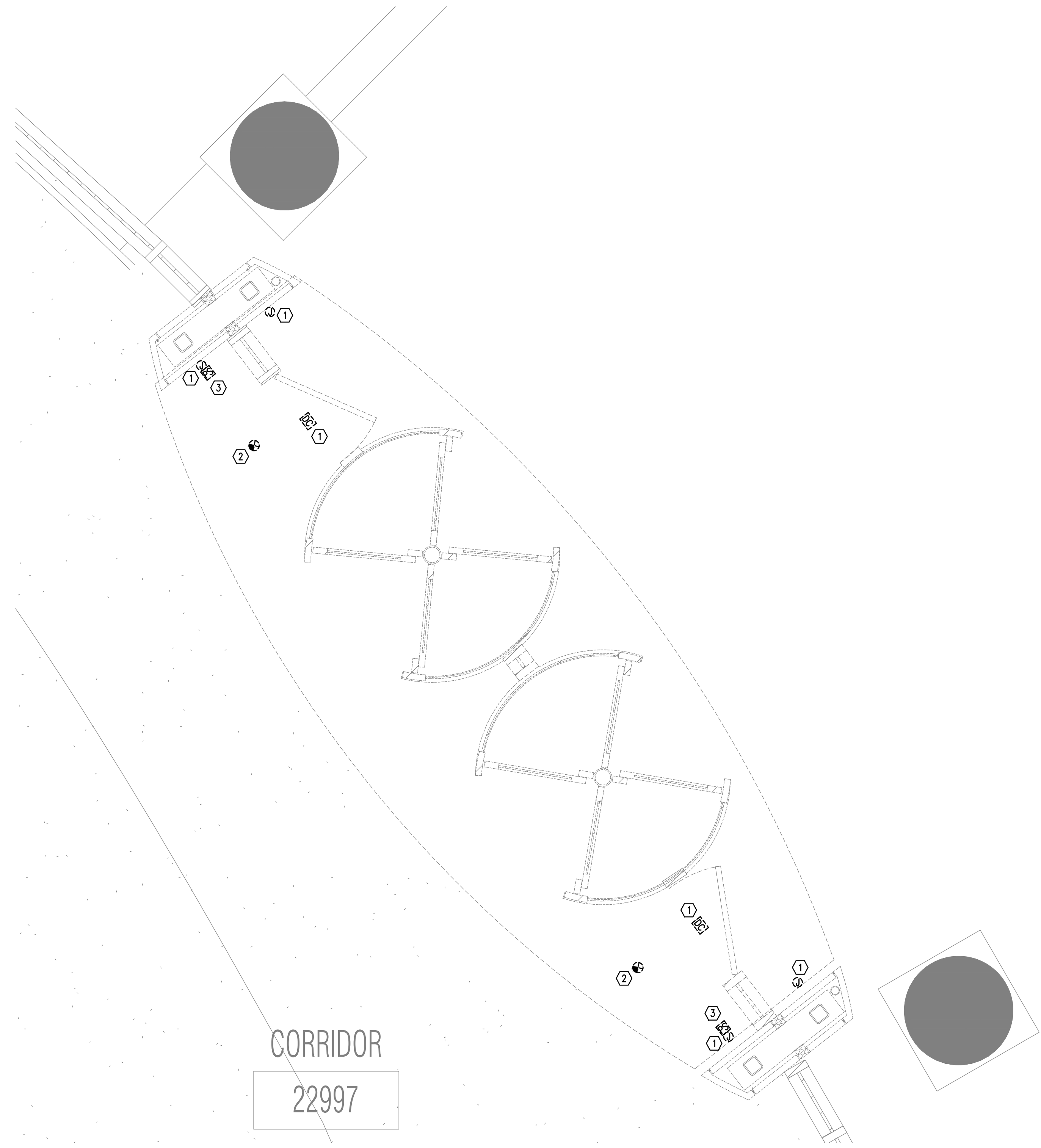
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ABBREVIATIONS  
AND SCHEDULE

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Drawn By: PDK

Drawing No: H200



1 POWER AND SYSTEM DEMOLITION PLAN  
 SCALE: 1/2" = 1'  
 NORTH

**GENERAL SHEET NOTES**

1. REFER TO GENERAL DEMOLITION NOTES ON SHEET E000. COORDINATE DEMOLITION WORK WITH OTHER TRADES.
2. ALL FIRE ALARM WORK (DEMOLITION/NEW WORK) SHALL BE DONE BY A COD-APPROVED FIRE ALARM CONTRACTOR. ELECTRICAL CONTRACTOR SHALL ARRANGE AND PAY FOR THE COD-APPROVED FIRE ALARM CONTRACTOR TO DO ALL THE FIRE ALARM WORK. COORDINATE WORK WITH THE BUILDING ENGINEER. ALL FIRE ALARM WORK SHALL COMPLY WITH LOCAL CODES AND COD STANDARDS. PROVIDE COMPLETE PROGRAMMING.

**DEMOLITION KEY NOTES**

- ① DISCONNECT AND REMOVE POWER FROM THE EXISTING PUSH BUTTON DOOR SYSTEM. COORDINATE DEMOLITION WITH NEW WORK PLAN. WHERE FEASIBLE, REUSE EXISTING CONDUIT. SECURE BRANCH CIRCUIT WIRING TO BE REUSED/EXTENDED.
- ② DISCONNECT, REMOVE, AND SALVAGE EXISTING EXIT SIGN. WHERE FEASIBLE, REUSE EXISTING CONDUIT. SECURE EXIT SIGN BRANCH CIRCUIT WIRING TO BE REUSED/EXTENDED.
- ③ DISCONNECT, REMOVE, AND SALVAGE EXISTING MANUAL PULL STATION. WHERE FEASIBLE, REUSE EXISTING FIRE ALARM CONDUIT. SECURE FIRE ALARM WIRING TO BE REUSED/EXTENDED.



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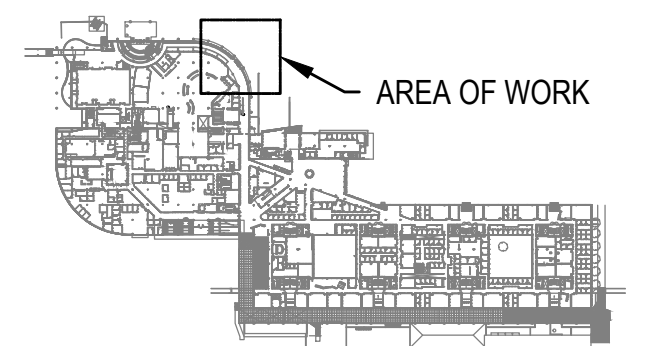
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KEY PLAN  
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POWER AND  
 SYSTEM  
 DEMOLITION PLAN

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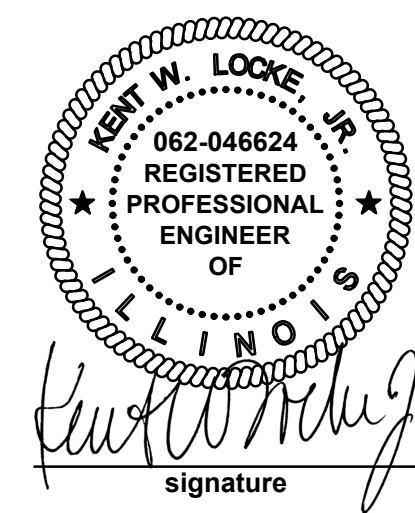
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ELECTRICAL NOTES,  
SYMBOLS AND  
ABBREVIATIONS

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### LIGHTING FIXTURE SCHEDULE

TYPE	LAMP QTY.	LAMP TYPE	MOUNTING	VOLTAGE	WATTS	MANUFACTURER AND MODEL	DESCRIPTION
F1	1	N/A	LED	UNV	13.6	LITHONIA LIGHTING: WF6 SERIES	RECESSED LED DOWNLIGHT, MATTE WHITE FINISH, 1200 LUMENS.

### SYMBOLS

- ☐ DUPLICATION 20A RECEPTACLE, MOUNTED AT 18" AFF U.N.O.
- ☐ DUPLICATION 20A RECEPTACLE, MOUNTED 6" ABOVE COUNTER
- ☐ DUPLICATION 20A RECEPTACLE WITH TWO USB CHARGER PORT, MOUNTED 18" ABOVE COUNTER
- ☐ DUPLICATION 20A GFI RECEPTACLE, MOUNTED 18" AFF U.N.O.
- ☐ DUPLICATION 20A GFI RECEPTACLE, MOUNTED 6" ABOVE COUNTER
- ☐ QUADPLEX 20A RECEPTACLE, MOUNTED 18" AFF U.N.O.
- ☐ SPECIAL USE RECEPTACLE, 208V, 1φ, 3W SIZED AS INDICATED OR AS REQUIRED
- ☐ SPECIAL USE RECEPTACLE, 208V, 3φ, 4W SIZED AS INDICATED OR AS REQUIRED
- ☐ FLUSH MOUNTED FLOOR BOX, WITH DEVICES AS INDICATED
- ☐ DUPLICATION 20A RECEPTACLE, CEILING-MOUNTED
- ☐ DUPLICATION 20A SWITCHED RECEPTACLE, MOUNTED AT 18" AFF U.N.O.
- ☐ WALL MOUNTED JUNCTION BOX, SIZED AS REQUIRED (4"x4" MIN.)
- ☐ JUNCTION BOX, SIZED AS REQUIRED
- ☐ FLEXIBLE METAL CONDUIT CONNECTION (WHIP)
- ☐ MOTOR CONNECTION, 1φ OR 3φ AS INDICATED
- ☐ PANEL BOARD, SIZED AS INDICATED
- ☐ NON-FUSED DISCONNECT SWITCH, SIZED AS INDICATED OR AS REQUIRED
- ☐ FUSED DISCONNECT SWITCH, SIZED AS INDICATED OR AS REQUIRED
- ☐ VOICE/DATA OUTLET, MOUNTED AT 18" AFF U.N.O. PROVIDE 4x4 JUNCTION BOX WITH 3/4" STUBBED INTO ACCESSIBLE CEILING SPACE. DEVICES AND WIRING BY OTHERS.
- ☐ VOICE OUTLET, MOUNTED AT 18" AFF U.N.O. PROVIDE 4x4 JUNCTION BOX WITH 3/4" STUBBED INTO ACCESSIBLE CEILING SPACE. DEVICES AND WIRING BY OTHERS.
- ☐ DATA OUTLET, MOUNTED AT 18" AFF U.N.O. PROVIDE 4x4 JUNCTION BOX WITH 3/4" STUBBED INTO ACCESSIBLE CEILING SPACE. DEVICES AND WIRING BY OTHERS.
- ☐ TOGGLE SWITCH, MOUNTED AT 44" AFF, U.N.O.
- ☐ KEY OPERATED TOGGLE SWITCH, MOUNTED AT 44" AFF, U.N.O.
- ☐ THERMAL OVERLOAD TOGGLE SWITCH
- ☐ TOGGLE SWITCH, DIMMABLE, MOUNTED AT 44" AFF, U.N.O. (3W DENOTES 3-WAY)
- ☐ TOGGLE SWITCH, ILLUMINATED TOGGLE OR WITH PILOT LIGHT WHEN IN "ON" POSITION
- ☐ TOGGLE SWITCH WITH INTEGRAL INFRARED OCCUPANCY SENSOR, MOUNTED AT 44" AFF, U.N.O. HUBBELL #LHIR SERIES
- ☐ TOGGLE SWITCH WITH INTEGRAL DUAL-TECHNOLOGY OCCUPANCY SENSOR, MOUNTED AT 44" AFF, U.N.O. HUBBELL #LHDT SERIES
- ☐ TOGGLE SWITCH WITH INTEGRAL ULTRASONIC OCCUPANCY SENSOR, MOUNTED AT 44" AFF, U.N.O. HUBBELL #LHUS SERIES
- ☐ 3-WAY TOGGLE SWITCH, MOUNTED AT 44" AFF, U.N.O.
- ☐ TOGGLE SWITCH, DIMMABLE, MOUNTED AT 44" AFF, U.N.O.
- ☐ 360° CEILING MOUNTED INFRARED OCCUPANCY SENSOR HUBBELL #OMNI-IR SERIES WITH UV-PP POWER PACK
- ☐ 360° CEILING MOUNTED DUAL-TECHNOLOGY OCCUPANCY SENSOR HUBBELL #OMNI-DT SERIES WITH UV-PP POWER PACK
- ☐ 360° CEILING MOUNTED ULTRASONIC OCCUPANCY SENSOR HUBBELL #OMNI-US SERIES WITH UV-PP POWER PACK RELAY POWER PACK
- ☐ LOW VOLTAGE THERMOSTAT (BY OTHERS), 4x4 BOX JUNCTION BOX WITH 3/4" CONDUIT STUBBED INTO ACCESSIBLE CEILING SPACE. COORDINATE LOCATIONS & BOX SIZE WITH MECHANICAL CONTRACTOR.
- ☐ DUAL-ACTION MANUAL PULL STATION, MOUNTED AT 44" AFF
- ☐ CEILING MOUNTED PHOTO-ELECTRIC SMOKE DETECTOR
- ☐ CEILING MOUNTED HEAT DETECTOR
- ☐ DUCT MOUNTED SMOKE DETECTOR, INSTALLED PER NFPA REQUIREMENTS
- ☐ FAN SHUTDOWN RELAY
- ☐ AUDIO-VISUAL DEVICE, MOUNTED AT 80" AFF, CANDELA RATING AS REQUIRED
- ☐ VISUAL DEVICE, MOUNTED AT 80" AFF, CANDELA RATING AS REQUIRED
- ☐ FIRE ALARM ANNUNCIATOR PANEL
- ☐ FLOW SWITCH
- ☐ TAMPER SWITCH
- INDICATES COMPONENT TO BE REMOVED
- INDICATES EXISTING TO REMAIN
- INDICATES NEW
- ☐ WALL MOUNTED BELL, MOUNTED AS REQUIRED
- ☐ WALL MOUNTED CCTV DOME CAMERA, MOUNTED AS REQUIRED
- ☐ WALL MOUNTED INTERCOM STATION, MOUNTED AS REQUIRED
- ☐ WALL MOUNTED CLOCK, MOUNTED AS REQUIRED
- ☐ DOOR CONTACT - FLUSH TYPE
- ☐ ELECTRIC DOOR STRIKE
- ☐ VIDEO MONITOR
- ☐ WIRELESS ACCESS POINT
- ☐ CEILING MOUNTED SPEAKER
- ☐ DESK MOUNTED INTERCOM MASTER STATION
- ☐ EXIT SIGN
- ☐ DOOR CONTACT
- ☐ DAYLIGHT HARVESTING PHOTO CELL
- ☐ KNOX BOX
- ☐ EMERGENCY LIGHT FIXTURE

### GENERAL DEMOLITION NOTES:

- EXISTING ELECTRICAL SYSTEMS SHOWN ON THE DRAWINGS ARE BASED ON VISUAL INSPECTION AND EXISTING DRAWINGS BUT, THEY MAY NOT REFLECT THE EXISTING CONDITION IN EVERY CASE. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO STARTING WORK AND VERIFY EXISTING CONDITIONS.
- THE BUILDING WHERE THE WORK TO BE DONE IS IN USE. SCHEDULE ANY DISCONNECTING AND RECONNECTIONS WITH THE CONTRACTING OFFICER, AT LEAST SEVENTY TWO (72) HOURS NOTICE IS REQUIRED. ARRANGE WORK SO AS NOT TO INTERRUPT ANY ELECTRICAL POWER, TELEPHONE, FIRE, COMMUNICATION, AND OTHER SYSTEMS DURING NORMAL WORKING HOURS.
  - WHERE CORE DRILLING AND CUTTING OF FLOOR OR WALLS IS REQUIRED, USE METAL DETECTORS OR OTHER APPROVED DEVICES TO DETERMINE AND AVOID INTERFERENCE WITH EXISTING CONCEALED CONDUITS & PIPES.
  - USE GREAT DILIGENCE AND CARE IN DISCONNECTING VARIOUS SYSTEMS. RECONNECT SYSTEMS THAT SERVE ADJACENT AREAS OR FLOOR ABOVE OR BELOW IF SUCH SYSTEMS HAVE BEEN DISRUPTED DURING DEMOLITION WORK. EXTEND CONDUIT & WIRING AS REQUIRED TO MAINTAIN OPERATION WHEN REMOVING EQUIPMENT OR DEVICES.
  - COORDINATE ALL DEMOLITION WORK WITH OTHER TRADES AS REQUIRED.
- ELECTRICAL ITEMS REMOVED AND NOT TO BE REUSED OR RELOCATED SUCH AS LIGHTING FIXTURES (LUMINAIRES), SWITCHES, RECEPTACLES, BREAKERS, WIRE, ETC. REMAIN THE PROPERTY OF THE OWNER AND THE OWNER SHALL HAVE THE RIGHTS OF FIRST REFUSAL.
- ALL CONDUITS WHERE ELECTRICAL ITEMS ARE BEING REMOVED AND NOT TO BE REUSED SHALL HAVE ALL WIRING REMOVED BACK TO THE SOURCE OR FEEDER JUNCTION BOX SERVING THE DEVICE AND STUBS SHALL BE PLUGGED FLUSH WITH FLOOR, CEILING SLABS, OR WALLS. ALL EXPOSED CONDUITS AND FITTINGS, INCLUDING ABOVE DROP CEILING, WHICH ARE NOT GOING TO BE REUSED SHALL BE REMOVED UNLESS OTHERWISE NOTED.
- WHERE EXISTING EQUIPMENT, DEVICES AND FIXTURES ARE TO REMAIN BUT ARE AFFECTED BY NEW WORK SUCH AS, BUT NOT LIMITED TO, REMOVAL OF WALLS, RECONDITIONING OF WALLS AND CEILING, DISCONNECT THESE ITEMS AND ADD EXTENSION RINGS, CLEAN AND REINSTALL SAME IN LINE WITH NEW WALLS AND CEILING. PROVIDE ALL NECESSARY MATERIALS AND LABOR AND REWIRE IN ACCORDANCE WITH PRESENT CODE REQUIREMENTS.
- LAMPS THAT CONTAIN MERCURY AND BALLASTS MANUFACTURED PRIOR TO 1980 THAT CONTAINS PCBs SHALL BE DISPOSED OF BY FEDERAL OR STATED E.P.A. APPROVED METHOD AND IN ACCORDANCE WITH SPECIFICATIONS.
- EXISTING FIRE ALARM SYSTEM IS TO BE EXTENDED, EXERCISE GREAT CARE IN SECURING CIRCUIT(S) DURING DEMOLITION STAGE. ALL FIRE ALARM WORKS (DEMOLITION/NEW WORK) SHALL BE DONE BY A CODE-APPROVED FIRE ALARM CONTRACTOR. ELECTRICAL CONTRACTOR SHALL ARRANGE AND PAY FOR THE CODE-APPROVED FIRE ALARM CONTRACTOR (WHOSE CONTACT INFORMATION APPEARS BELOW) TO DO ALL THE FIRE ALARM WORK. JAMES McCOLLAM COMMERCIAL ALARM SYSTEMS, LLC (630) 832-2844 WORK (847) 553-7994 MOBILE jmcollam@cosystemllc.com

### GENERAL NOTES:

- PAY FOR & OBTAIN ALL REQUIRED LICENSES, INSURANCES, PERMITS & SATISFY NECESSARY ORDINANCES TO UNDERTAKE & EXECUTE THE WORK UNDER THIS CONTRACT.
- CONTRACTOR TO FAMILIARIZE HIMSELF WITH THE EXISTING SITE CONDITIONS, CONDITIONS OF CONTRACT, THE SCOPE OF WORK & THE INTENT OF DESIGN BEFORE SUBMITTING A BID. REQUESTS FOR EXTRA PAYMENTS WILL NOT BE APPROVED AFTER CONTRACT AWARD. CONTRACTOR MUST VERIFY ALL BRANCH CIRCUITS AND ENSURE THAT THEY MEET NATIONAL AND LOCAL CODE REQUIREMENTS. SHOULD ANY DISCREPANCY BE IDENTIFIED, HE MUST BRING IT TO THE ATTENTION OF THE CONTRACTING OFFICER.
- ALL WORK SHALL BE PERFORMED IN COMPLIANCE WITH REQUIREMENTS OF THE LOCAL CODE AUTHORITY & OTHER CODES, STANDARDS & REGULATIONS REFERENCED BY SUCH AUTHORITY. IN CASE OF CONFLICT BETWEEN TWO CODES, THE REQUIREMENT OF THE LOCAL AUTHORITY SHALL BE FINAL.
- COORDINATE ELECTRICAL INSTALLATION WITH WORK BY OTHER TRADES BEFORE STARTING WORK. PERFORM ALL WORK IN COOPERATION WITH LANDLORD, G.C. & OTHER TRADES.
- ALL NEW MATERIAL/EQUIPMENT SHALL BE, U.L. LISTED, WITHOUT DEFECT OR DAMAGE AND SHALL BE A STANDARD PRODUCT OF A MANUFACTURER WITH A WELL KNOWN BRAND NAME, U.N.O. WIRING DEVICES SHALL BE SPECIFICATION GRADE. FINISH OF ALL ITEMS INSTALLED IN FINISHED AREAS SHALL BE PER ARCHITECT.
- ELECTRICAL DRAWINGS ARE SCHEMATIC IN NATURE. THEY DO NOT INTEND TO SHOW EVERY DETAIL, LOCATION, SIZE, ROUTE ETC. FURNISH ALL MATERIAL, EQUIPMENT, INCIDENTALS & SERVICES TO PROVIDE A SATISFACTORY, COMPLETE & OPERATIONAL INSTALLATION IN CONFORMANCE WITH THE INTENT OF THE DESIGN. REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONAL ACCURACY.
- PROVIDE TEMPORARY ELECTRICAL SERVICE, IF NECESSARY, PER G.C. TO PROVIDE LIGHTING & POWER FOR USE BY ALL TRADES DURING CONSTRUCTION.
- ARCHITECT MAY REVIEW SUBMITTAL OF AN ALTERNATE PRODUCT PROVIDED IT HIGHLIGHTS ALL THE FEATURES & DATA TO CLEARLY ILLUSTRATE THAT IT IS A BONAFIDE EQUIVALENT PRODUCT IN MAKE & PERFORMANCE BEFORE BIDS ARE SCHEDULED TO BE OPENED.
- ALL ENCLOSURES SHALL BE NEMA-1, IN GENERAL, U.N.O. GFCI RECEPTACLES SHALL BE USED IF SPECIFIED OR CODE REQUIRED. WIRING DEVICES SHALL BE SPECIFICATION GRADE. NAME PLATES SHALL BE PHENOLIC, WHITE LETTERS ON BLACK BACKGROUND, SECURED WITH SCREWS ON THE ENCLOSURES.
- USE MINIMUM 3/4" EMT. USE COMPRESSION FITTINGS. USE TYPE THWN, COPPER WIRE IN MINIMUM #12 AWG FOR BRANCH CCTS & #14 FOR CONTROLS. FLEXIBLE CONDUIT SHALL BE LIQUID-TIGHT. WHERE RUNS EXCEED 75', MINIMUM CONDUCTOR SIZE SHALL BE INCREASED TO #10 AWG.
- SEAL PENETRATIONS THROUGH VAPOR & FIRE BARRIERS CAUSED BY THE ELECTRICAL WORK WITH U.L. LISTED SEALS TO RETAIN THE INTEGRITY OF THE RESPECTIVE BARRIERS.
- INSTALLATION IN CEILING SPACE SHALL BE SUPPORTED FROM THE STRUCTURAL STEEL & NOT BY THE DROPPED CEILING MEMBERS. CONDUITS SHALL RUN SNUG UNDER STRUCTURAL CEILING EITHER PARALLEL OR PERPENDICULAR TO THE CEILING, COLUMNS & STRAIGHT WALLS. INSTALL PULL BOXES PER CODE. INSTALL PULL-LINES IN EMPTY RACEWAYS & CAP THEM.
- INSTALLATION SHALL BE PERFORMED IN A MANNER CONSISTENT WITH INDUSTRY STANDARD FOR GOOD WORKMANSHIP. PROVIDE NECESSARY CUTTING, PATCHING, & CLEANING FOR ELECTRICAL WORK TO LEAVE THE AREA READY FOR FINAL FINISH BY OTHERS.
- PROGRESS YOUR WORK IN TIMELY MANNER TO ENABLE THE OWNER TO FINISH THE WORK PER SCHEDULE. SAFEGUARD YOUR WORK & SUPPLIES. MAINTAIN ORDERLY & NEAT OPERATION. REMOVE DEBRIS GENERATED FROM YOUR WORK PER G.C. & OWNER. LEAVE THE SITE IN CLEAN, MOVE-IN CONDITION AT ACCEPTANCE.
- ORGANIZE ALL WARRANTIES, GUARANTEES & PRODUCT LITERATURE IN A FILE AND HAND OVER THESE TO THE OWNER AT THE TIME OF ACCEPTANCE. PROVIDE FULL & UNCONDITIONAL GUARANTEE OF YOUR WORK (MATERIAL PLUS LABOR) FOR A PERIOD OF 24 MONTHS FROM ACCEPTANCE. REFER TO ARCHITECT'S REQUIREMENTS FOR 'WARRANTIES & GUARANTEES' AND 'PROJECT CLOSE-OUT'.
- EXISTING FIRE ALARM SYSTEM IS TO BE EXTENDED AND INTERFACED WITH NEW WORK. PROVIDE ALL MATERIALS, DEVICES, COMPONENTS AS REQUIRED SO THAT THE EXISTING AND NEW SYSTEM SHALL BE PROPERLY INTERFACED AND FUNCTION AS ONE SYSTEM.

### ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR	NIC	NOT IN CONTRACT
AMP OR A	AMPERE	NL	NIGHT LIGHT
BDF	BUILDING DISTRIBUTION FACILITY	NTS	NOT TO SCALE
CCT(S)	CIRCUIT(S)	PH OR ∅	PHASE
CLG	CEILING	POE	POWER OVER ETHERNET
COD	COLLEGE OF DUPAGE	RECEP	RECEPTACLE
D	DIMMER	XFMR	TRANSFORMER
DISC	DISCONNECT	TC	TELECOMMUNICATIONS CLOSET
DWG	DRAWING	TYP	TYPICAL
EC	ELECTRICAL CONTRACTOR	U.N.O.	UNLESS NOTED OTHERWISE
ELECT	ELECTRICAL	V	VOLT
EM	EMERGENCY	W	WATT OR WIRE
EXIST	EXISTING	WP	WEATHERPROOF
FA	FIRE ALARM	X	DENOTES EXISTING COMPONENT TO REMAIN, NO CHANGES
FLA	FULL LOAD AMPERE		
GC OR G.C.	GENERAL CONTRACTOR	XRN	DENOTES EXISTING COMPONENT TO BE REPLACED WITH NEW
GFI OR GFCI	GROUND FAULT CIRCUIT INTERRUPTER		
GRD	GROUND, GROUNDING	XR	DENOTES EXISTING COMPONENTS TO BE REMOVED
HP	HORSEPOWER		
JB	JUNCTION BOX	XRI	DENOTES EXISTING COMPONENTS TO BE REMOVED & REINSTALL IN SAME LOCATION
KVA	KILOVOLT AMPERE		
KW	KILOWATT	XRR	DENOTES EXISTING TO BE REMOVED AND RELOCATED
MC	MECHANICAL CONTRACTOR	N	DENOTES NEW COMPONENTS TO REPLACE EXISTING
MEP	MECHANICAL, ELECTRICAL, PLUMBING		
MFR	MANUFACTURER	XN	DENOTES EXISTING COMPONENT SHOWN IN NEW LOCATION
MIN	MINIMUM		



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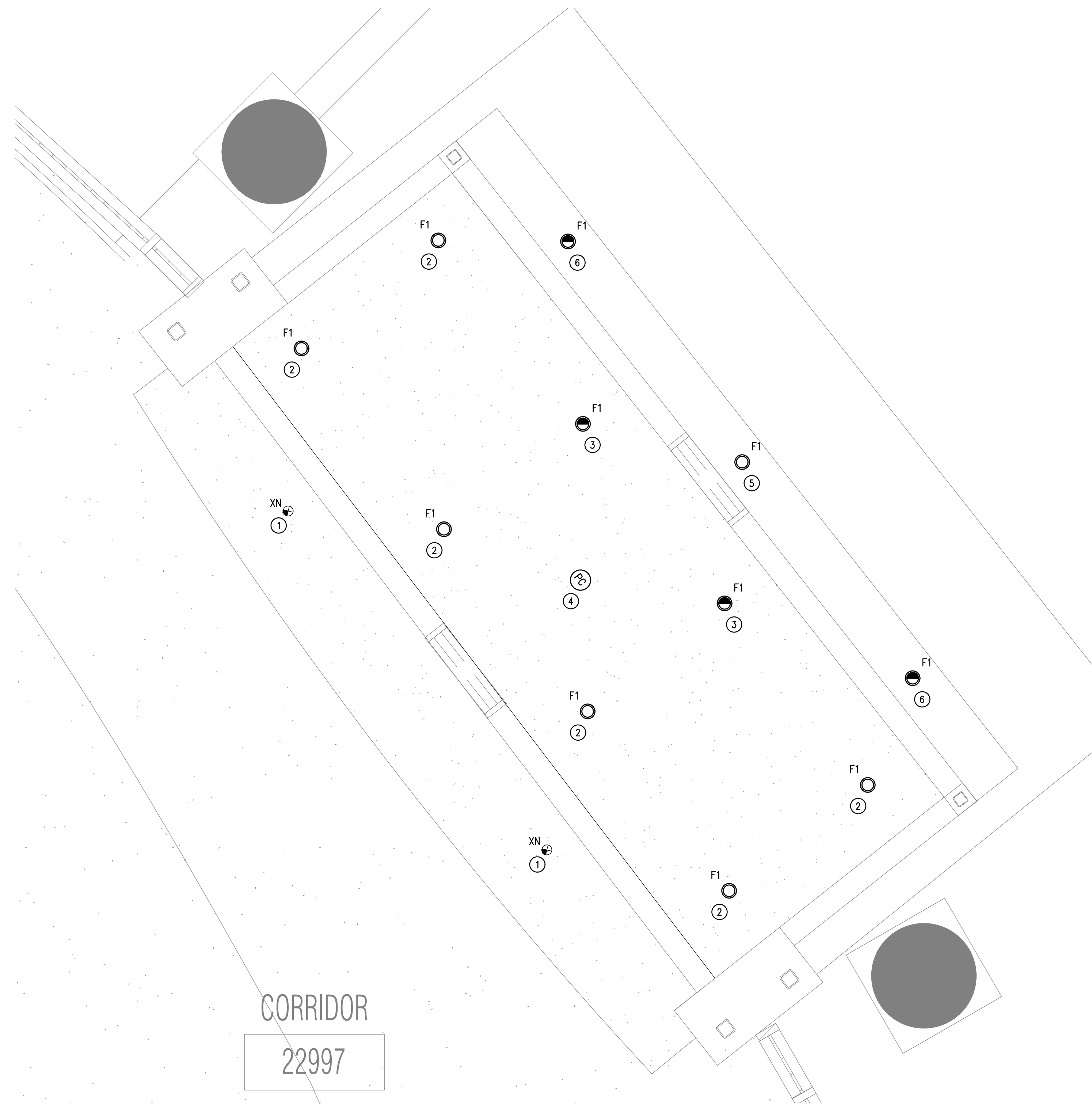
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GENERAL SHEET NOTES

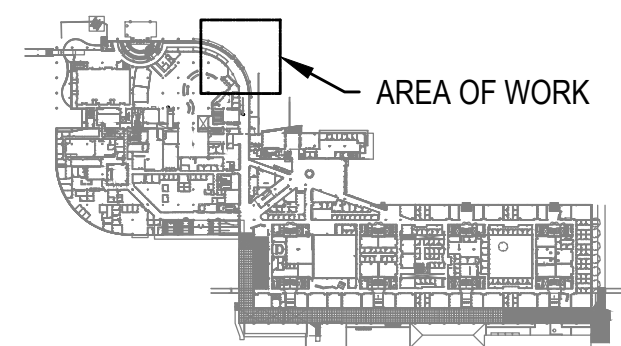
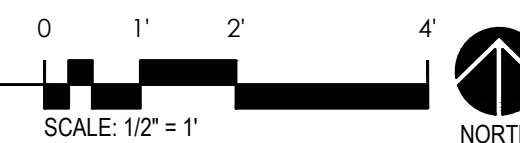
- COORDINATE WITH ARCHITECTURAL AND MECHANICAL FOR THE INSTALLATION OF ALL LIGHT FIXTURES. VERIFY CEILING HEIGHT AND METHODS OF MOUNTING THE FIXTURES IN THE FIELD. PROVIDE ACCESSORIES AS REQUIRED.
- PROVIDE SEPARATE NEUTRAL CONDUCTOR FOR EACH CIRCUIT. SHARED NEUTRAL ON BRANCH CIRCUITS IS NOT PERMITTED.
- ALL WIRING FOR EMERGENCY CIRCUITS SHALL BE MINIMUM #10 AWG COPPER. EMERGENCY CIRCUITS SHALL BE ROUTED SEPARATELY FROM NORMALS CIRCUITS WITH DEDICATED NEUTRALS.

ELECTRICAL NEW WORK KEY NOTES

- REINSTALL EXISTING SALVAGED EXIT SIGN AS SHOWN, FIELD COORDINATE EXACT LOCATION. CLEAN AND RELAMP/REFURBISH EXISTING EXIT SIGN PRIOR TO REINSTALLATION. CONNECT TO EXISTING EXIT SIGN BRANCH CIRCUIT SERVING THE AREA. PROVIDE CONDUIT AND WIRING AS REQUIRED.
- FURNISH AND INSTALL NEW LIGHT FIXTURE AS SCHEDULED. CONNECT TO EXISTING LIGHTING BRANCH CIRCUIT SERVING THE AREA AND WIRE TO THE EXISTING AREA LIGHTING CONTROLS VIA NEW CEILING MOUNTED DAYLIGHT HARVESTING SENSOR. EC TO FIELD VERIFY EXISTING LIGHTING BRANCH CIRCUIT. EXTEND CIRCUIT AND PROVIDE CONDUIT AND WIRING AS REQUIRED.
- FURNISH AND INSTALL NEW LIGHT FIXTURE AS SCHEDULED. CONNECT TO EXISTING EMERGENCY LIGHTING BRANCH CIRCUIT SERVING THE AREA. EC TO FIELD VERIFY EXISTING EMERGENCY LIGHTING BRANCH CIRCUIT. EXTEND CIRCUIT AND PROVIDE CONDUIT AND WIRING AS REQUIRED.
- FURNISH AND INSTALL NEW CEILING MOUNTED DAYLIGHT HARVESTING SENSOR (BY LEVITON #PCC1D-W OR A COD APPROVED EQUAL) PER MANUFACTURER'S REQUIREMENTS. FURNISH AND INSTALL NEW CONDUIT AND LIGHTING CONTROL WIRING TO EXISTING LOCAL AREA LIGHTING CONTROLS.
- FURNISH AND INSTALL NEW LIGHT FIXTURE AS SCHEDULED. CONNECT TO EXISTING EXTERIOR LIGHTING BRANCH CIRCUIT SERVING THE AREA AND WIRE TO THE EXISTING EXTERIOR AREA LIGHTING CONTROLS. EC TO FIELD VERIFY EXISTING LIGHTING BRANCH CIRCUIT. EXTEND CIRCUIT AND PROVIDE CONDUIT AND WIRING AS REQUIRED.
- FURNISH AND INSTALL NEW LIGHT FIXTURE AS SCHEDULED. CONNECT TO EXISTING EXTERIOR EMERGENCY LIGHTING BRANCH CIRCUIT. EXTEND CIRCUIT AND PROVIDE CONDUIT AND WIRING AS REQUIRED.



1 LIGHTING NEW WORK PLAN



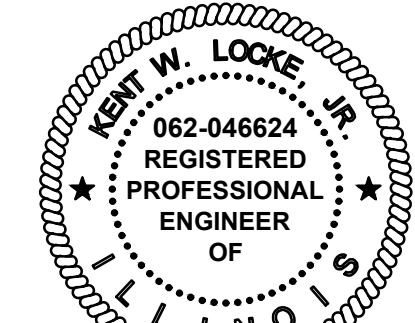
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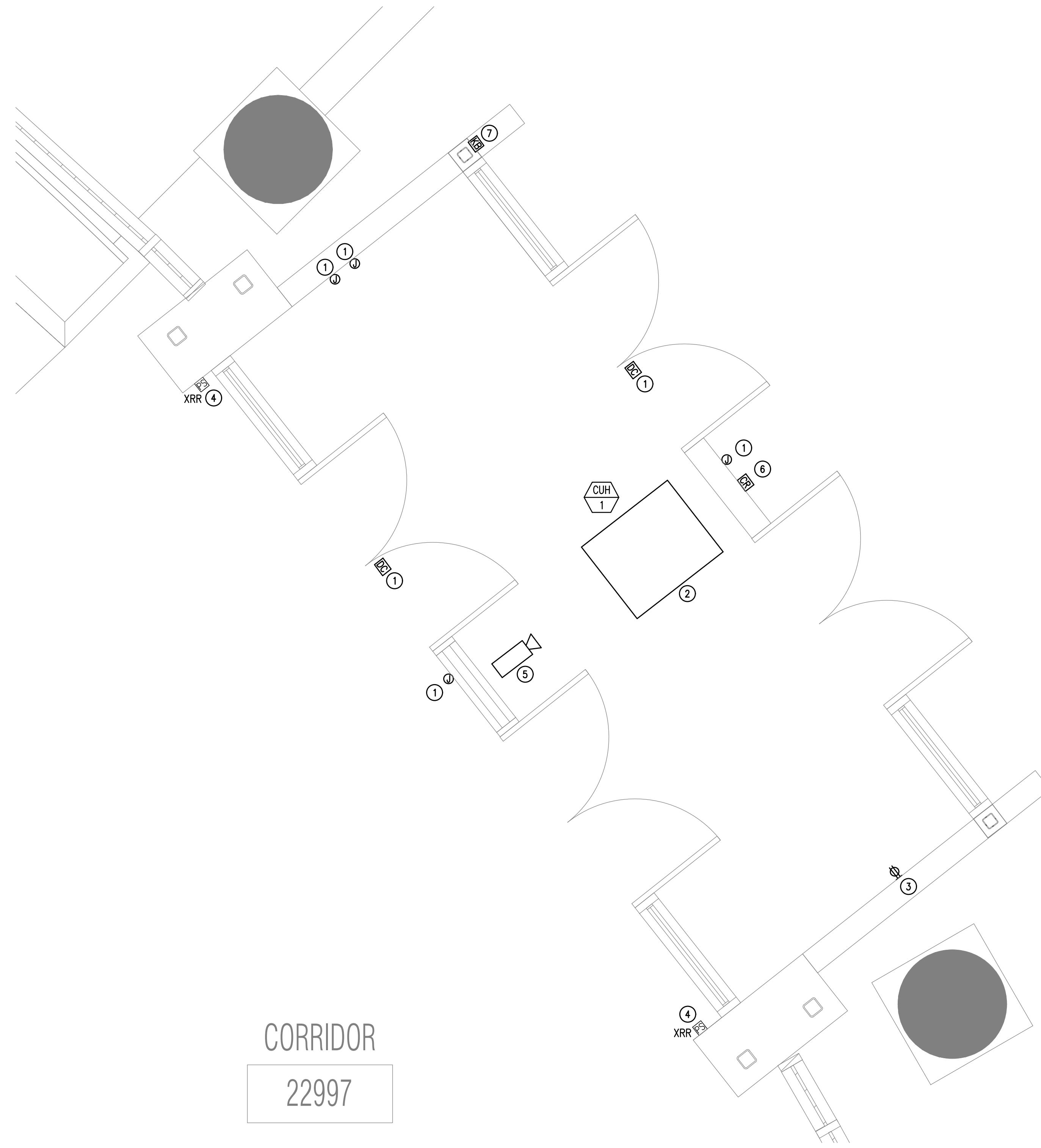
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LIGHTING NEW  
WORK PLAN



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1 POWER AND SYSTEM NEW WORK PLAN

SCALE: 1/2" = 1'

NORTH

**GENERAL SHEET NOTES**

1. FIELD COORDINATE EXACT LOCATION, MOUNTING HEIGHT AND CONNECTION TYPE OF ALL ELECTRICAL DEVICES, PROVIDE ALL AS REQUIRED.
2. PROVIDE SEPARATE NEUTRAL CONDUCTOR FOR EACH CIRCUIT. SHARED NEUTRALS ON BRANCH CIRCUITS IS NOT PERMITTED.
3. PROVIDE LABEL ON ALL POWER AND DATA OUTLETS PER COD STANDARD DESIGN GUIDELINES. E.C. SHALL UPDATE PANEL DIRECTORIES OF ALL PANELS AFFECTED BY DEMOLITION AND NEW WORK PER COD STANDARDS AND NEC 408.4 AT THE COMPLETION OF WORK.
4. ALL FIRE ALARM WORK (DEMOLITION/NEW WORK) SHALL BE DONE BY A COD-APPROVED FIRE ALARM CONTRACTOR. ELECTRICAL CONTRACTOR SHALL ARRANGE AND PAY FOR THE COD-APPROVED FIRE ALARM CONTRACTOR TO DO ALL THE FIRE ALARM WORK. COORDINATE WORK WITH THE BUILDING ENGINEER. ALL FIRE ALARM WORK SHALL COMPLY WITH LOCAL CODES AND COD STANDARDS. PROVIDE COMPLETE PROGRAMMING.
5. ALL WORK RELATED TO COMMUNICATIONS SHALL BE DONE BY ANDUIT-CERTIFIED INSTALLERS IN ACCORDANCE WITH DIVISION 27000 OF THE COD DESIGN GUIDELINES AND MUST BE COORDINATED WITH THE OWNER'S IT DEPARTMENT.

**ELECTRICAL NEW WORK KEY NOTES**

- 1 PROVIDE ALL RACEWAYS, JUNCTION BOXES, AND WIRING FOR THE NEW PUSH BUTTON DOOR SYSTEM. DOOR HARDWARE IS FURNISHED BY OTHER AND INSTALLED BY THE EC. REUSE EXISTING CONDUIT AND BRANCH CIRCUIT FOR THE NEW PUSH BUTTON DOOR SYSTEM. PROVIDE NEW CONDUIT, WIRING, AND ALL OTHER DEVICES AS REQUIRED FOR A COMPLETE OPERATING SYSTEM.
- 2 PROVIDE 120V POWER TO NEW CABINET UNIT HEATER FROM THE NEAREST FEASIBLE EXISTING RECEPTACLE BRANCH CIRCUIT SERVING THE AREA. DISCONNECT SWITCH IS INTEGRAL WITH THE EQUIPMENT. PROVIDE CONDUIT, WIRING, AND OTHER DEVICES AS REQUIRED FOR A COMPLETE OPERATING SYSTEM. REFER TO MECHANICAL PLANS FOR REQUIREMENTS.
- 3 FURNISH AND INSTALL NEW DUPLEX RECEPTACLE. EXTEND NEAREST EXISTING RECEPTACLE BRANCH CIRCUIT TO NEW DUPLEX RECEPTACLE. PROVIDE CONDUIT AND WIRING AS REQUIRED.
- 4 REINSTALL EXISTING SALVAGED MANUAL PULL STATION AS SHOWN, FIELD COORDINATE EXACT LOCATION. CLEAN AND REFURBISH EXISTING MANUAL PULL STATION PRIOR TO REINSTALLATION. CONNECT TO EXISTING SECURED FIRE ALARM WIRING. PROVIDE CONDUIT AND WIRING AS REQUIRED.
- 5 PROVIDE JUNCTION BOX, CONDUIT, AND AXIS #M3037-PVE CAMERA WITH (1) EXACO LICENSE (PROFESSIONAL) AND CONNECT TO NETWORK VIDEO RECORDER (NVR). PROVIDE CAT5 CABLING TO EXACO SRC-LRC NVR POE SWITCH LOCATED IN SRC 3017A. PROVIDE POE EXTENDERS AS REQUIRED. COORDINATE WITH THE UNIVERSITY AND MANUFACTURER TO PROVIDE ALL AS NECESSARY FOR A COMPLETE OPERATING SYSTEM. FIELD VERIFY EXACT LOCATION OF NVR SWITCH AND SUITABLE ROUTING.
- 6 PROVIDE ALL RACEWAYS, JUNCTION BOXES, AND WIRING FOR THE NEW CARD READER SYSTEM. CARD ACCESS EQUIPMENT IS FURNISHED BY OTHER AND INSTALLED BY THE E.C. COORDINATE WITH THE UNIVERSITY AND MANUFACTURER AND PROVIDE ALL AS NECESSARY FOR A COMPLETE OPERATING SYSTEM. FIELD VERIFY EXACT LOCATION OF EXISTING CARD ACCESS CONTROL PANEL AND SUITABLE ROUTING.
- 7 FURNISH AND INSTALL ALL WIRING CONDUIT RACEWAY JUNCTION BOX, AND HARDWARE NECESSARY TO COMPLETE INSTALLATION OF NEW PROX CARD READER SYSTEM. READER TO BE HID PROXPOINT THINLINE II. PROVIDE, INSTALL, AND INTEGRATE NEW READER INTO THE EXISTING COLLEGE DOOR ACCESS CONTROL SYSTEM. CONTRACTOR MUST BE CERTIFIED CONTINENTAL ACCESS CONTROL SYSTEMS INTEGRATOR.



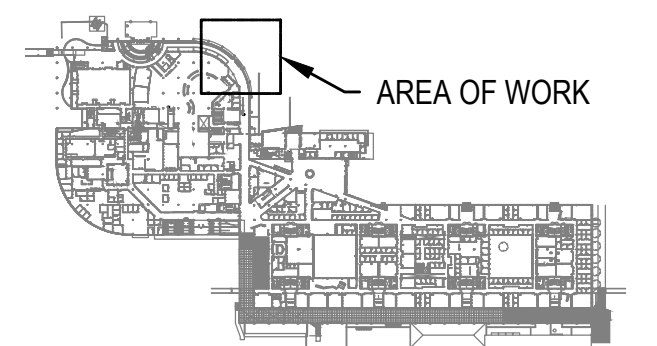
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POWER AND  
 SYSTEM NEW  
 WORK PLAN

KENT W. LOCKE, JR.  
 062-046624  
 REGISTERED  
 PROFESSIONAL  
 ENGINEER  
 OF  
 ILLINOIS

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