



PROJECT:
NSU Lincoln Hall Project
Northern State University
Aberdeen, SD 57401

ADDENDUM NO.: 2
6 pages plus attachments

DATE OF ISSUANCE:
4/23/2024

OWNER:
Northern State University
Aberdeen, SD 57401

OSE PROJECT NO. R0122-05X
CO-OP ARCHITECTURE NO. 2160

ARCHITECT:
CO-OP Architecture
1108 S Main Street #102

To all bidders and all others to whom drawings and specifications have been issued by CO-OP Architecture.

Acknowledge receipt of this addendum by listing its number and date in the bidders Form of Proposal. Failure to do so may subject bidder to disqualification. This Addendum forms a part of the Contract Documents.

It modifies them as follows:

GENERAL ITEMS:

- 1) American Rescue Plan Act (ARPA) Supplemental Conditions: Regarding Section 200.322 Domestic preferences for procurements, also see Specification Section 01 41 00 REGULATORY REQUIREMENTS.
- 2) Taxes: General Contractor to include sales and excise taxes in GC bid for Owner provided/GC installation of mechanical equipment (AHU-1G and CU-1G). The taxable value is \$94,422.00.
- 3) Green Globes: General Contractor, Subcontractors and Suppliers encouraged to submit construction materials and products to meet Green Globe energy and environmental project requirements, as applicable. Submittals to be reviewed for third-party Environmental Product Declaration (EPD), Occupant Exposure Screening Report (OESR), FSC-Certified Wood, etc. Reference: Materials, Sheet G-103.
- 4) Cutting and Patching: construction scope includes cutting and patching at existing Graham Hall and adjacent Student Center buildings, for general construction and MEP/FLS improvements. Patch to match existing construction and finishes. Install temporary openings as required to allow for new equipment access into and passage through Graham Hall. Restore existing building construction and finishes at temporary openings. Building walk-thru made available during pre-bid meeting.

APPROVED SUBSTITUTIONS:

<u>SECTION</u>	<u>ITEM</u>	<u>SPECIFIED</u>	<u>ACCEPTABLE SUBSTITUTION</u>
07 21 00	XPS Rigid Insulation Board 2.02 C (Carbon Black Board)	Dow, Owens Corning	Progressive Foam's Chrome GPS Graphite Polystyrene Rigid Board
09 54 26	Suspended Wood Ceilings (WDC-1 and WDW-2)	1100 Cross Piece Grille System by 9Wood, solid white oak.	Equivalent wood grille system by ASI Architectural, Chaska, MN, solid white oak.

REVISIONS TO SPECIFICATIONS:

- 1) SECTION 01 10 00 SUMMARY: At Section 1.01 – Omit “D. Construction Manager’s Name: McCown Gordon + Quest Construction.” There are no construction manager services this project.
- 2) SECTION 01 10 00 SUMMARY: At Section 1.01 – Revise to “The Project consists of the demolition and haul off-site of existing Briscoe Hall and existing Lincoln Hall construction complete, new “Lincoln Hall” building and site improvements, alterations and improvements of Graham Hall and Student Center.”
- 3) SECTION 02 41 00 DEMOLITION: At Section 1.01, add “B. Demolition of existing Briscoe Hall and existing Lincoln Hall construction, complete.”
- 4) SECTION 06 10 00 ROUGH CARPENTRY: Clarification 1.01 G, 2.02 C, 3.03: concealed wood blocking within stud framing to be provided and installed this Section, also includes blocking for wall-mounted handrails, cabinets and wall-mounted equipment, “headwall” patient care equipment, and Owner-provided equipment, technology, and television monitors.
- 5) SECTION 06 20 00 FINISH CARPENTRY: Clarification – match/coordinate natural white oak grain, color, and finish (WD-1 solid wood trim with interior veneer door panels, natural solid white oak WDC-1 suspended wood ceiling grille, and WDW-2 wood wall grille systems).
- 6) SECTION 07 42 13 METAL WALL PANELS: Add Section 2.02 D, Soffit Panels: LCM-1, attached.
- 7) SECTION 07 72 00 ROOF ACCESSORIES – Omit Section 1.01A Roof hatches – not included in project.
- 8) SECTION 08 31 00 ACCESS DOORS AND PANELS: Clarification – adequately provide and install access doors and panels in walls and ceilings where required to access concealed equipment and controls. GC/metal stud framing and drywall subcontractor to frame and finish openings as required for access doors and panels. See MEP for type and location of equipment, valves, and controls. Submit final size(s) and location(s) with Architect for approval, including but not limited to ceiling access panels for valves located above drywall finish ceilings and/or in drywall finish walls.
- 9) SECTION 08 83 00 MIRRORS: Add mirror specifications, including custom framed mirrors referenced on Sheets A-411 and A-412, Keynotes TA-5 and TA-5A.
- 10) SECTION 09 30 00 TILING: Section 2.03 C. Clarification – provide and install epoxy grout at toilet rooms.

NSU Lincoln Hall Project 2160 – Addendum 2, April 23, 2024

1108 S. Main St. #102 | Aberdeen, SD 57401

601 Kansas City Street #7 | Rapid City, SD 57701

440 E. 8th St #220 | Sioux Falls, SD 57103

T: (605) 725-4852

T: (605) 716-3652

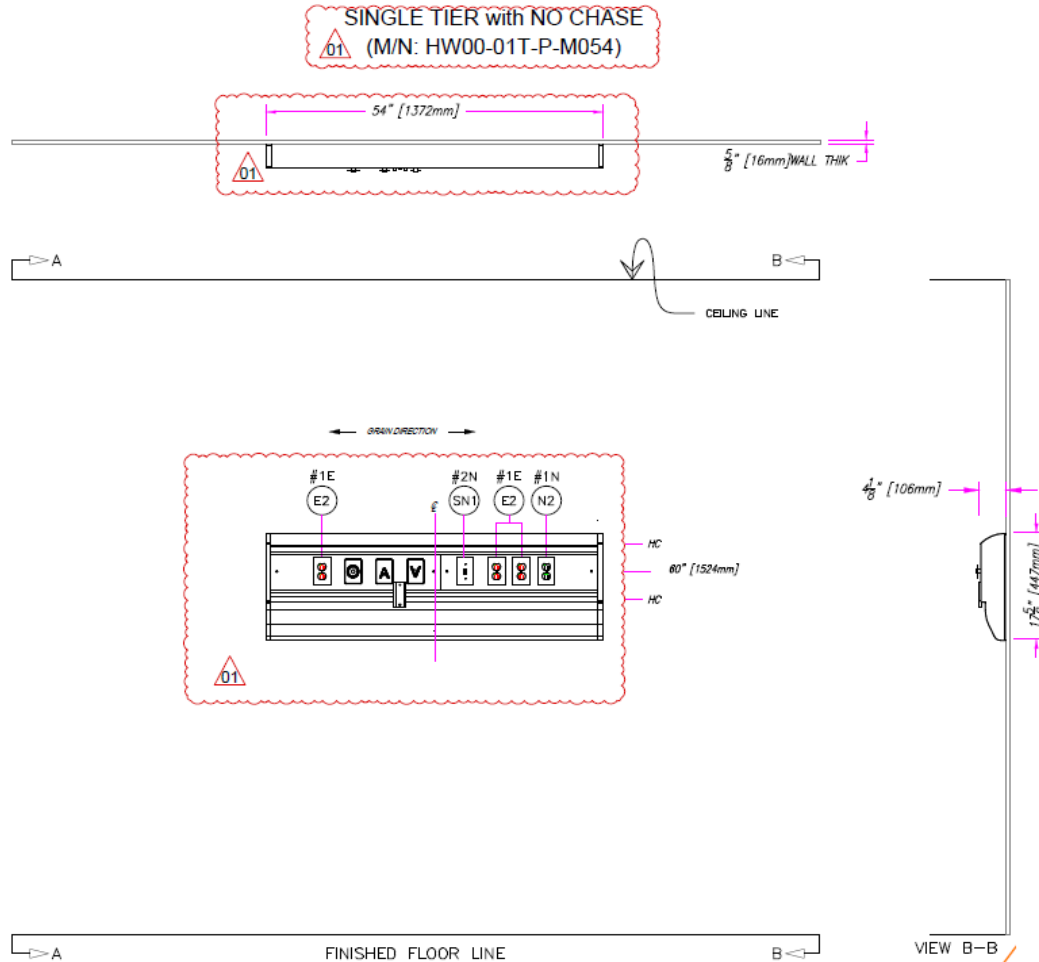
T: (605) 334-9999



- 11) SECTION 09 54 26 SUSPENDED WOOD CEILINGS
- a) Clarification - basis of design is 9 Wood's 1100 series wood grille system, solid natural white oak (no dowels) at WDC-1 and WDW-2 locations.
 - b) ASI Architectural approved equal per above.
 - c) Clarification/coordination: Ceiling Detail 9/A-701 (Keynote 6.68) - 1x6 finish board edge trim to match WDC-1 solid natural white oak grain, color, and finish.
- 12) SECTION 09 72 00 WALL COVERINGS: add wall coverings specifications, including Koroseal's Walltalkers VDB-1 visual display board covering, referenced on Finish Legend, Sheet A-501. Include tray.
- 13) SECTION 10 14 00 SIGNAGE: clarification – provide and install all required flat signs and dimensional letter signs per specification section. Contractor to submit signage package for approval including signage schedule, signage shop drawings and physical samples.
- 14) SECTION 10 22 50 GLASS OPERABLE PARTITIONS: omit – not included in project.
- 15) SECTION 10 28 00 TOILET ACCESSORIES:
- a) Owner to provide toilet room accessories for Contractor install, unless otherwise noted below.
 - b) Section 2.04 C. Combination Towel Dispenser/Waste Receptacle - omit.
 - c) Section 2.04 E. Grab Bars – Contractor to provide and install grab bars, typical.
 - d) Electric Hand dryers – GC/Electrical subcontractor to provide and install, typical.
- 16) SECTION 11 73 11 PATIENT LIFTS: GC to provide and install one (1) patient lift system complete, located at Room 227 G. Overhead structural support by GC/Steel subcontractor. See Structural information note on Sheet S301.
- 17) SECTION 14 21 00 ELECTRIC TRACTION ELEVATOR: Basis of design and specification to be Kone Inc. See product information attached for general reference. Hoist beam and pit ladder by Kone. Allow for building and system design and construction scope adjustments for Kone elevator requirements and clearances.
- Lincoln Elevator 1 (base bid):
 Kone's Monospace 300 DX
- 208-volt electrical power
 - 4,000-pound capacity
 - 60-inch elevator pit depth
 - 150 feet per minute rated speed
- Graham Elevator 2 (alternate):
 Kone's Monospace 200
- 208-volt electrical power
 - 2,500-pound capacity
 - 60-inch elevator pit depth
 - 150 feet per minute rated speed
- 18) SECTION 11 73 00 PATIENT CARE EQUIPMENT: Additional information – Equipment "E-5" Headwall with air, vacuum & power, 54 inches wide (and associated systems) to be provided and installed by General Contractor, complete. Basis of Design: Med Gas Headwall System by Amico, Majestic Series, horizontal. Reference: Sheets A-430, A-431, A-432, A-501 Equipment Schedule. See sample diagram next page.



MAJESTIC SERIES HORIZONTAL HEADWALL SYSTEM



REVISIONS TO DRAWINGS:

- 1) SHEET A-101
 - a) Room 100: Keynote 10.62 Recessed Defibrillator Cabinet, equipment provided by Owner. GC/framing and drywall subcontractor to install recessed opening for cabinet. Coordinate equipment dimensions and requirements with Architect and Owner.
 - b) Room 104: provide and install built-in 30" x 96" countertop, backsplash/trim at walls, and finished undercounter support brackets (36" o.c. maximum). Meet accessibility height and knee space clearances as required. Provide and install two (2) finish grommets. Radius at exposed corner. See additional information at Room 104, Sheet A-101 attached.
- 2) SHEET A-108 – Graham Basement Demo Plan – demo and haul existing exterior concrete stair/stoop construction adjacent to existing interior Stair 12. Coordinate plumbing as required.
- 3) SHEET A-109 – Graham Basement Floor Plan – install new exterior concrete stair construction and adequate guardrails/handrails, adjacent to existing interior Stair 12. Coordinate new drainage plumbing.

NSU Lincoln Hall Project 2160 – Addendum 2, April 23, 2024

1108 S. Main St. #102 | Aberdeen, SD 57401

601 Kansas City Street #7 | Rapid City, SD 57701

440 E. 8th St #220 | Sioux Falls, SD 57103

T: (605) 725-4852

T: (605) 716-3652

T: (605) 334-9999



- 4) SHEET A-109 – Graham Basement Floor Plan – Add: Mechanical Room 13, demo existing duct at opening (as required – coordinate with Mechanical), GC/drywall subcontractor infill existing duct wall opening with metal framing and drywall, patch to match interior and exterior sides to match. Select demo as required for new structural support at new louver openings.
- 5) SHEET A-109 – Graham Basement Floor Plan and Basement Ceiling Plan – Clarification (select metal framing, drywall, and suspended ceiling removals/demo): at toilet room adjacent to southwest corner of Missouri River Room 8 and opposite area at Student Center, GC/demo sub to install opening/select demo to allow for new MEP/FLS work. Core drill through concrete block as required – field verify conditions. New structural support at new louver openings. Coordinate with MEP/Sprinkler – see Sheet M400A.
- 6) SHEET A-109 – Graham Basement Floor Plan and Basement Ceiling Plan – Clarification (select metal framing, drywall and suspended ceiling patch): at toilet room adjacent to southwest corner of Missouri River Room 8 and at Student Center, GC/drywall and suspended ceiling subcontractors to replace/patch-to-match framing, drywall, ceilings and finishes at new MEP/FLS work. See Sheet M400A.
- 7) SHEET A-121 – Level 1 Finish Plan
 - a) Clarification: WDB-1 wood base finish at Room 100 throughout, except for RB-1 rubber base finish in Room 100 between Door 100 and Door 102. See Interior Elevation 3/A-421.
 - b) Revision: at Room 103 revise base finish from WDB-1 to RB-1.
- 8) SHEET A-122 – Level 2 Finish Plan – Clarification: WDB-1 wood base finish at Room 200 throughout, except for RB-1 rubber base finish in Room 200 between Door 201 and Door 202. See second floor wall base RB-1 label revision on Elevation 3/A-421, attached.
- 9) SHEETS A-411 & 412
 - a) Combination Towel Dispenser/Waste Receptacle – TA 3A – Omit.
 - b) Mirrors – TA-5 Framed Mirror and TA-5A Custom Mirror, both types to be custom.
 - c) Enlarged Plan 2/A-411 revised to include Room 138, see attached.
- 10) SHEET A-423 – Elevation 3 – additional information provided at Room 138 cabinetry, see attached.
- 11) SHEET A-427 – Elevation 4 - additional information provided at Room 103, see attached.
- 12) SHEET A-428 – Detail 9 Enlarged Plan: at Tiered Classroom, Room 202, see Detail 3/A-702 for partial section at platform and floor-mounted student-writing countertop assembly, attached.
- 13) SHEETS A-431 & A-432 – Keynote 10.91: clarification/add “CPU Bracket equipment provided by Owner and installed by Contractor.” See attached.
- 14) SHEET A-501 EQUIPMENT SCHEDULE
 - a) Schedule edits, see attached.
 - b) Equipment “E-5” Headwall with air, vacuum, and power, 54 inches wide, furnished and installed by General Contractor. See Specification Section 11 73 00 this Addendum 2 for more information.



15) SHEET A-501 FINISH LEGEND

- a) Omit reference to metal base finish “DM-1” and “DMB-1”.
- b) Omit reference to Interior expansion joint “EJI-1”. New exterior expansion joints to remain.
- c) At Mechanical Penthouse level, typical paint “PT-1”.
- d) At Tower level, no wall paint unless otherwise noted. Paint steel ladder.
- e) At Graham Hall alterations and patching, match existing finishes.
- f) At Student Center patching, match existing finishes.
- g) At PLAM-1, omit reference to Section 12 32 16 PLASTIC LAMINATE CABINETS. See Section 06 41 00 Architectural Wood Casework, Section 2.01B Plastic Laminate Faced Cabinets, Custom Grade.

16) SHEET A-601 EXTERIOR WALL & ROOF ASSEMBLIES

Keynotes 7.28 and 7.29: revise “mineral-wool board insulation, faced” to “EPS carbon black board at inside of masonry cavity walls” insulation where applicable.

17) SHEET A-602 PARTITION TYPES – Drawing corrections, see attached.

18) SHEET A-701, CEILING DETAIL 8: Coordination (Keynote 6.68) - 1x6 finish board edge trim to match premanufactured Section 09 54 26 WDC-1 solid natural white oak grain, color and finish.

ADDENDA ITEMS – CIVIL

See attached Civil Addendum 2, dated April 23, 2024, including cover sheet and two drawing sheets (Storm Water Prevention Plan Sheets C-107 and C-108).

ADDENDA ITEMS – LANDSCAPE

N/A

ADDENDA ITEMS – STRUCTURAL

See attached Structural Addendum 2, dated April 23, 2024, including cover sheet and four drawing sheets (S002, S101, S201 and S601).

ADDENDA ITEMS – MECHANICAL

See attached Mechanical Addendum M-2, dated April 23, 2024, one sheet.

ADDENDA ITEMS – ELECTRICAL

See attached Electrical Addendum 2, dated April 23, 2024, including cover sheet, 175 specification sheets and one drawing Sheet (E500). Technology Addendum to be provided separately.

END OF ADDENDUM 2

NSU Lincoln Hall Project 2160 – Addendum 2, April 23, 2024

1108 S. Main St. #102 | Aberdeen, SD 57401

T: (605) 725-4852

601 Kansas City Street #7 | Rapid City, SD 57701

T: (605) 716-3652

440 E. 8th St #220 | Sioux Falls, SD 57103

T: (605) 334-9999



**SECTION 074213
METAL WALL PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured metal panels for walls and soffits, with related flashings and accessory components.

1.02 RELATED REQUIREMENTS

- A. Section 019119-Commissioning of Building Enclosure (BECx): Commissioning requirements and procedures.
- B. Section 072100 - Thermal Insulation.
- C. Section 07276-Fluid-Applied Membrane Air Barriers: Membrane barrier over sheathing.
- D. Section 092116 - Gypsum Board Assemblies: Wall panel substrate.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, support clips, exposed fasteners, number of anchors, supports, reinforcement, trim, flashings, and accessories.
 - 1. Indicate panel numbering system.
 - 2. Differentiate between shop and field fabrication.
 - 3. Indicate substrates and adjacent work with which the wall system must be coordinated.
 - 4. Include large-scale details of anchorages and connecting elements.
 - 5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 3 inches.
 - 6. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
- C. Samples: Submit one samples of wall panel, 12 inch by 24 inch in size illustrating finish color, sheen, and texture.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in installing the products specified in this section with minimum three years of documented experience.

1.06 MOCK-UP

- A. Construct mock-up, 8 feet long by 4 feet wide; include panel and soffit system, glazing, attachments to building frame, associated vapor retarder and air seal materials, weep drainage system, sealants and seals, related insulation in mock-up.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off ground and protected from weather. Prevent twisting, bending, or abrasion, and provide ventilation to stored materials. Slope metal sheets to ensure drainage.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Special Warranty: Provide 2-year warranty covering water tightness and integrity of seals of wall panels. Complete forms in Owner's name and register with warrantor.
- C. Finish Warranty: Provide 20-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Wall Panels - Concealed Fasteners:
 - 1. Basis of Design: Morin Corporation; Concealed Fasteners Z-12 and F-12-S: www.morincorp.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.
- B. ***Metal Soffit Panels:***
 - 1. ***Basis of Design: Longboard Products.***
 - 2. ***Substitutions: See Section 016000 - Product Requirements.***

2.02 MANUFACTURED METAL PANELS

- A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
 - 1. Provide exterior panels, interior liner panels, soffit panels, and subgirt framing assembly.
 - 2. Design and size components to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of wall.
 - 3. Maximum Allowable Deflection of Panel: 1/90 of span.
 - 4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement within system; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
 - 5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 - 6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
 - 7. Corners: Factory-fabricated in one continuous piece with minimum 18 inch returns.
 - 8. Provide continuity of air barrier and vapor retarder seal at building enclosure elements in accordance with materials specified in Section 072500.
- B. Exterior Panels: MP-1
 - 1. Profile: Morin F-10-2.
 - 2. Material: Precoated aluminum, .032 minimum thickness.
 - 3. Panel Width: 12"
 - 4. Color: Dark Bronze.
- C. Exterior Panels: MP-2

1. Profile: Morin F-8-0
2. Material: Precoated aluminum, .032 minimum thickness.
3. Panel Width: 12"
4. Color: Dark Bronze.

D. Soffit Panels: LCM-1

1. **Profile: Longboard: V-groove, 4".**
2. **Material: 6063-T5 Extruded Aluminum**
3. **Color: As selected by Architect from manufacturer's full line.**

- E. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.
- F. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles. Provide trim to cover back-up framing where occurs- coordinate with drawings.
- G. Anchors: Galvanized steel or Stainless steel.

2.03 MATERIALS

- A. Precoated Aluminum Sheet: ASTM B209 (ASTM B209M); continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

2.04 FINISHES

- A. Exposed Surface Finish: Panel manufacturer's standard polyvinylidene fluoride (PVDF) coating, top coat over epoxy primer.

2.05 ACCESSORIES

- A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
- B. Concealed Sealants: Non-curing butyl sealant or tape sealant.
- C. Support for Cladding and Continuous Insulation: Thermal clip and rail. Basis of Design: ISO Clip by Northern Facades Ltd.
1. Clip Material: 14ga ASTM A792 Galvalume or ASTM A653 Galvanized, steel.
 2. Thermal Isolator Pad: Glass fiber reinforced polyimide.
 3. Thickness: To accommodate specified insulation. Adjustable up to plus or minus 1/2".
 4. Fasteners: Provide support system and cladding attachment fasteners as recommended by system manufacturer in accordance with requirements.
 5. Manufacturers:
 - a. Advanced Architectural Products; Green Girt. www.greengirt.com.
 - b. Knight Wall Systems; MFI System. www.knightwallsystems.com.
 6. Substitutions: See Section 016000-Product Requirements.
- D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
1. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws.
- E. Touch-up Paint: As recommended by panel manufacturer.
- F. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building framing members are ready to receive panels.
- B. Verify that weather barrier has been installed over substrate completely and correctly.

3.02 PREPARATION

- A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated.

3.03 INSTALLATION

- A. Install panels on walls and soffits in accordance with manufacturer's instructions.

- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.
- E. Lap panel ends minimum 2 inches.
- F. Provide expansion joints where indicated.
- G. Use concealed fasteners unless otherwise approved by Architect.
- H. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.04 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.05 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.
- C. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION

**SECTION 088300
MIRRORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass mirrors.
 - 1. Tempered safety glass.

1.02 REFERENCE STANDARDS

- A. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- B. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- C. GANA (GM) - GANA Glazing Manual; 2022.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Manufacturer's Certificate: Certify that mirrors, meets or exceeds specified requirements.

1.04 FIELD CONDITIONS

- A. Do not install mirrors when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.05 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Mirrors:
 - 1. Binswanger Mirror/ACI Distribution: www.binswangerglass.com/#sle.
 - 2. Lenoir Mirror Co: www.lenoirmirror.com/#sle.
 - 3. Trulite Glass and Aluminum Solutions: www.trulite.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

- A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.
- B. Mirror Glass: Clear, tempered safety glass; ASTM C1048, with copper and silver coatings, and protective overcoating.
 - 1. Thickness: 1/4 inch.
 - 2. Edges: Arrised.
 - 3. Size: As indicated on drawings.

2.03 ACCESSORIES

- A. Mirror Adhesive: Silicone pre-polymer based, chemically compatible with mirror coating and wall substrate.
 - 1. Application Temperature: Minus 35 to 140 degrees F at contact surfaces.
 - 2. Manufacturers:
 - a. Liquid Nails, a brand of PPG Architectural Coatings; LN-730 Mirror Adhesive: www.liquidnails.com/#sle.

- b. Substitutions: See Section 016000 - Product Requirements.
- B. Channel Frame: One piece, channel frame, stainless steel, Type 430, satin finish, 1/2 inch by 1/2 inch by 3/8 inch deep with 90 degree mitered corners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces of mirror frames or recesses are clean, free of obstructions, and ready for installation of mirrors.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.

3.03 INSTALLATION

- A. Install mirrors in accordance with manufacturer's recommendations.
- B. Set mirrors plumb and level, and free of optical distortion.
- C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.

3.04 CLEANING

- A. Remove labels after work is complete.
- B. Clean mirrors and adjacent surfaces.

END OF SECTION

**SECTION 097200
WALL COVERINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Wall covering.

1.02 REFERENCE STANDARDS

- A. ASTM D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems; 2020.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023b.
- C. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2020.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on wall covering and adhesive.
- C. Shop Drawings: Indicate wall elevations with seaming layout.
- D. Samples: Submit two samples of wall covering, 6 by 6 inch in size illustrating color, finish, and texture.
- E. Maintenance Data: Submit data on cleaning, touch-up, and repair of covered surfaces.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Wall Covering Materials: 10% of each color and pattern of wall covering; store where directed.
 - 3. Package and label each roll by manufacturer, color and pattern, and destination room number.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inspect roll materials at arrival on site, to verify acceptability.
- B. Protect packaged adhesive from temperature cycling and cold temperatures.
- C. Do not store roll goods on end.

1.06 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.
- B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wall Coverings: See Finish Legend & Schedule

2.02 WALL COVERINGS

- A. General Requirements:
 - 1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.

2. Chemical and Stain Resistance: No visible staining or discoloration and no damage to surface texture when tested in accordance with ASTM D1308.
- B. Wall Covering - Type WC-1: Non-woven backing, pigmented vinyl with matte, projectable, dry erase film, embossed with a bi-directional lenticular pattern roll stock, conforming to the following:
1. Basis of Design: Nu-Vu-Rite Walltalkers by Koroseal.
 2. Roll Width: 60 inches.
 3. Color: White.
 4. Manufacturers:
 - a. Koroseal/RJF International: www.koroseal.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
- C. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.
- D. Termination Trim: Extruded plastic, color as selected.
- E. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.
- F. Substrate Primer and Sealer: Alkyd enamel type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are prime painted and ready to receive work, and comply with requirements of wall covering manufacturer.
- B. Verify flatness tolerance of surfaces does not vary more than 1/8 inch in 10 feet nor vary at a rate greater than 1/16 inch/ft.

3.02 PREPARATION

- A. Fill cracks in substrate and smooth irregularities with filler; sand smooth.
- B. Wash impervious surfaces with tetra-sodium phosphate, rinse and neutralize; wipe dry.
- C. Surface Appurtenances: Remove or mask electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- D. Surfaces: Correct defects and clean surfaces that affect work of this section. Remove existing coatings that exhibit loose surface defects.
- E. Apply one coat of primer sealer to substrate surfaces. Allow to dry. Lightly sand smooth.
- F. Vacuum clean surfaces free of loose particles.

3.03 INSTALLATION

- A. Apply adhesive and wall covering in accordance with manufacturer's instructions.
- B. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface.
- C. Horizontal seams are not acceptable.
- D. Do not seam within 2 inches of internal corners or within 6 inches of external corners.
- E. Install wall covering before installation of bases and items attached to or spaced slightly from wall surface.
- F. Do not install wall covering more than 1/4 inch below top of resilient base.
- G. Cover spaces above and below windows, above doors, in pattern sequence from roll.
- H. Where wall covering tucks into reveals, or metal wallboard or plaster stops, apply with contact adhesive within 6 inches of wall covering termination. Ensure full contact bond.
- I. Install termination trim.
- J. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

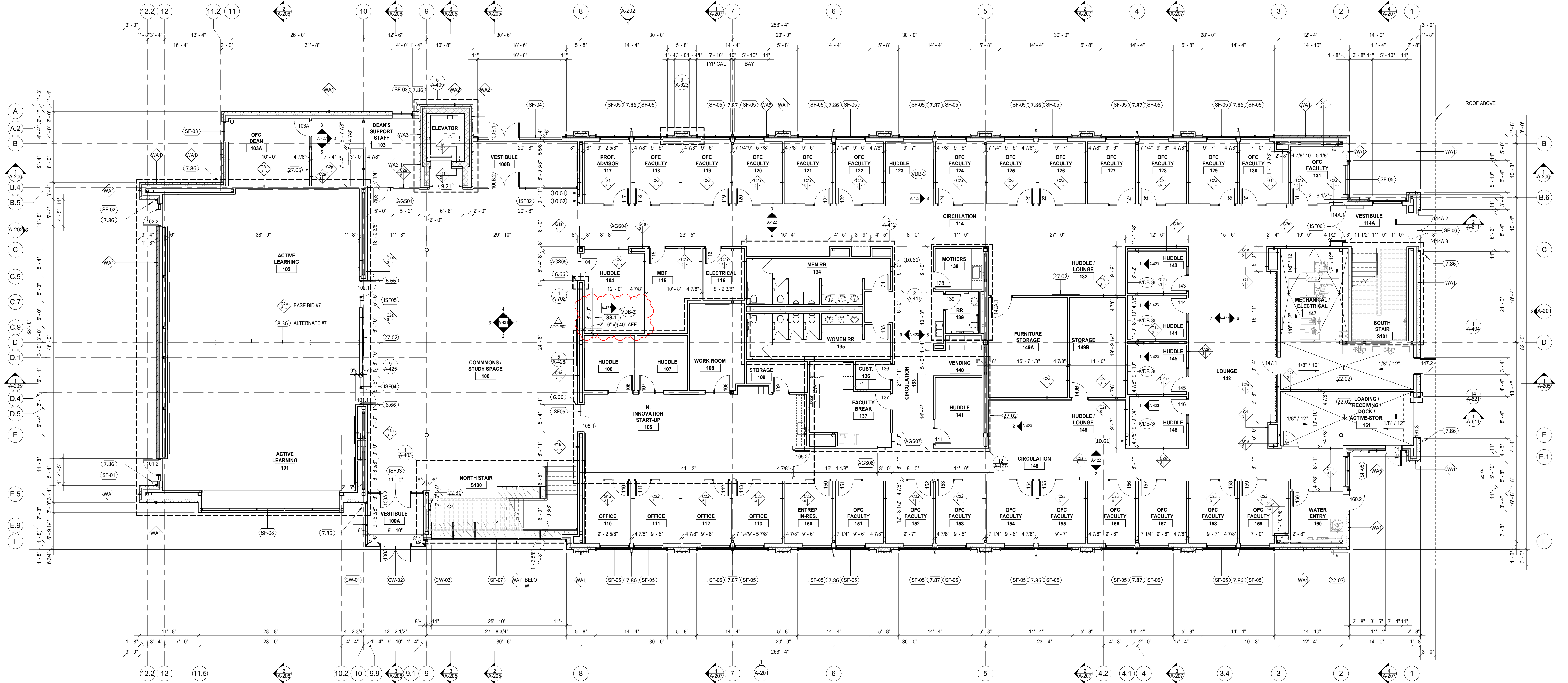
3.04 CLEANING

- A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.
- B. Reinstall wall plates and accessories removed prior to work of this section.

3.05 PROTECTION

- A. Do not permit construction activities at or near finished wall covering areas.

END OF SECTION



LEVEL 1 FLOOR PLAN
1/8" = 1'-0" TRUE NORTH

- | KEYNOTES | GENERAL NOTES |
|---|--|
| 6.66 1" WOOD TRIM (WD-1) EXTEND 4" PAST FACE OF WALL, EXTEND BACK TO WALL OR STOREFRONT WHERE APPLIES, RE: DETAIL 1/A-703 | 1. FURNITURE SHOWN FOR REFERENCE ONLY, OFCI |
| 7.86 PRE-FINISHED DOWNSPOUT, FINISH TO MATCH METAL PANEL, W/ HEAT TRACE & ROUTED DIRECTLY TO BELOW GRADE STORM PIPING, RE: DIV# | 2. PROVIDE FULL HEIGHT STEEL CORNER GUARDS IN PUBLIC AREAS, RE: FINISH PLANS |
| 7.87 PRE-FINISHED FAUX DOWNSPOUT, OPEN-FACED, FINISH TO MATCH METAL PANEL | 3. RE: ROPS FOR PARTITION TYPES ABOVE INTERIOR GLAZING |
| 8.36 VERTICALLY FOLDING OPERABLE PARTITION - BOB SKYFOLD' | 4. DIMENSIONS ARE SHOWN TO FACE OF GYP BD, UNLESS NOTED OTHERWISE |
| 9.21 5/8" GYPSUM BOARD | 5. PARTITIONS THAT APPEAR TO BE CENTERED ON GRID ARE IN FACT CENTER, UNLESS NOTED OTHERWISE |
| 10.61 FIRE EXTINGUISHER AND WALL CABINET | 6. REFER TO SHEET A-601 FOR EXTERIOR WALL, ROOF, AND SOFFIT ASSEMBLIES, AND A-602 FOR INTERIOR PARTITIONS |
| 10.62 RECESSED DEFIBRILLATOR CABINET | 7. PROVIDE PLYWOOD OR BLOCKING AT ALL WALL MOUNTED EQUIPMENT (VISUAL DISPLAY BOARDS, ETC.), ACCESSORIES (GRAB BARS, DOOR STOPS, ETC.), CABINETS, ETC. |
| 22.02 FLOOR DRAIN, RE: MECH | 8. PROVIDE ROOM SIGNAGE AT ALL DOORS, WHERE MOUNTED TO GLAZING, PROVIDE A BLANK PLATE ON OPPOSITE SIDE OF GLAZING. SEE CODE STANDARDS FOR MOUNTING HEIGHTS AND LOCATIONS, RE: A-411. SEE SPECIFICATIONS FOR SPECIAL SIGNAGE REQ. |
| 22.07 WATER METER, RE: MECH | 9. DOOR FRAMES TO BE 4" FROM ADJACENT WALL, UNLESS NOTED OTHERWISE |
| 22.30 ELECTRIC WATER COOLER, RE: MECH | |
| 27.02 VIDEO DISPLAY UNIT, RE: AV | |
| 27.05 ROUGH-IN FOR DISPLAY BUT DONT INCLUDE DISPLAY | |

ADD #02 4/23/2024

CO OP

AndersonMasonDale Architects

Architect of Record
CO-OP Architecture
1108 S Main Street Suite #102
Aberdeen, SD 57401
Telephone: 605-224-4852
E-mail: tom@co-oparch.com

Associate Architect
AndersonMasonDale Architects, P.C.
3198 Speer Boulevard
Denver, CO 80211
Telephone: 303-294-9448
FAX: 303-294-0762
E-mail: bblanchard@amdararchitects.com

Civil Engineer
Helms Engineering
416 Production Street
Aberdeen, SD 57401
Telephone: 605-225-1212
E-mail: lucash@helmsengineering.com

Structural Engineer
Associates, Inc.
6609 S. Lyncrest Place, Suite 110
Sioux Falls, SD 57106
Telephone: 605-443-1310
E-mail: jchristensen@incorpc.com

Mech & Plumbing Engineer
Engineering
801 railroad Ave SE
Aberdeen, South Dakota 57401
Telephone: 605-226-1344
E-mail: travess@sieng.biz

Electrical Engineer
Engineering
3314 Milwaukee Ave. NE
Aberdeen, SD 57401
Telephone: 605-226-1340
E-mail: thomas.j.henz@megecorp.com

ARCHITECTURAL DRAWINGS ARE TO BE VIEWED IN COLOR FOR FULL AND COMPLETE INFORMATION

Seal Issue Date
100% CONSTRUCTION DOCUMENTS APRIL 9, 2024
ADD #02 4/23/2024

REGISTERED ARCHITECT
14657
SPENCER-ALAN
SOMMERS
SOUTH DAKOTA
04/09/24

LINCOLN HALL

12th Ave SE, Aberdeen, SD 57401
21-261 AMD / 2160 CO-OP

Northern State University
1200 S Jay St
Aberdeen, South Dakota 57401
Telephone: 605-626-3011
E-mail:

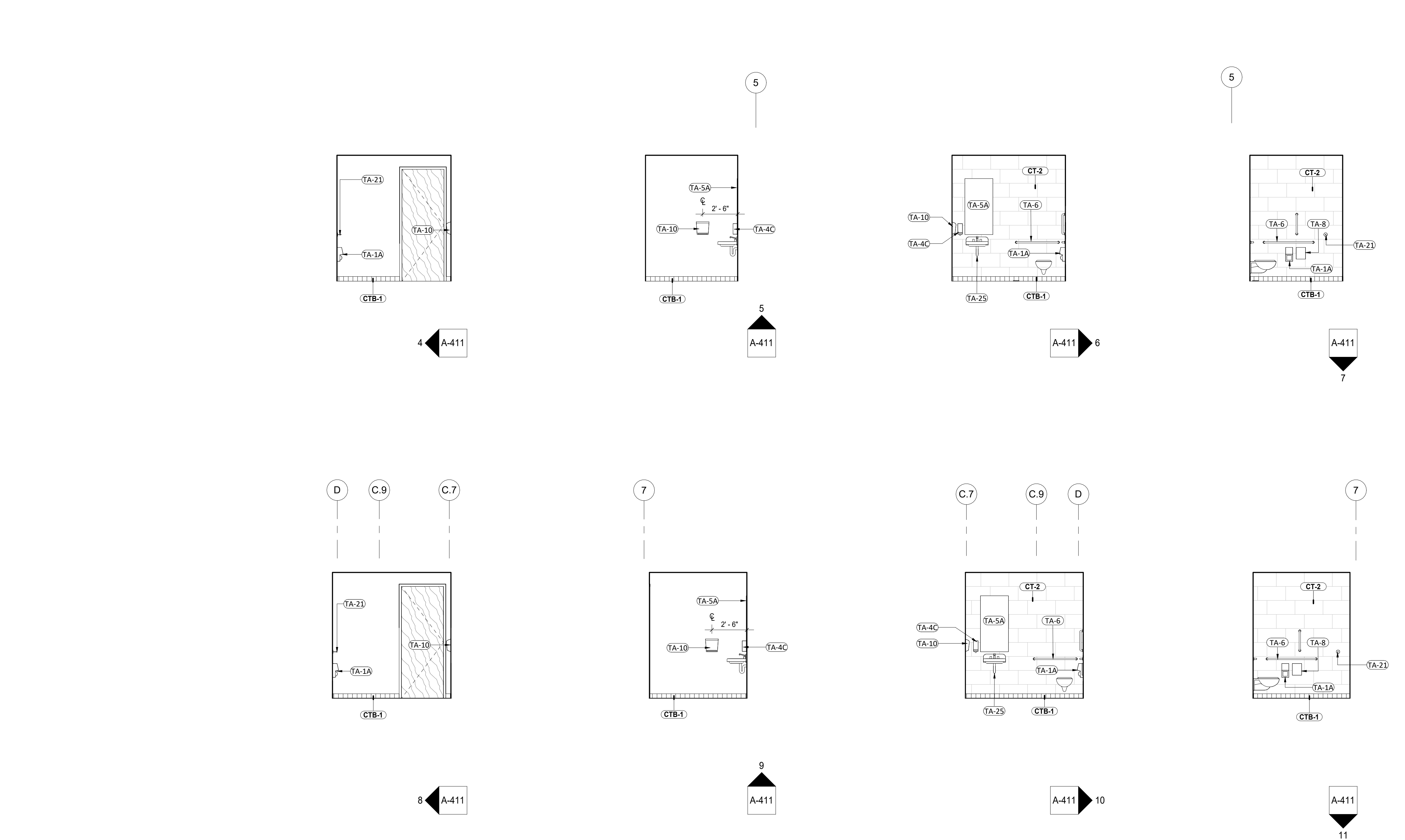
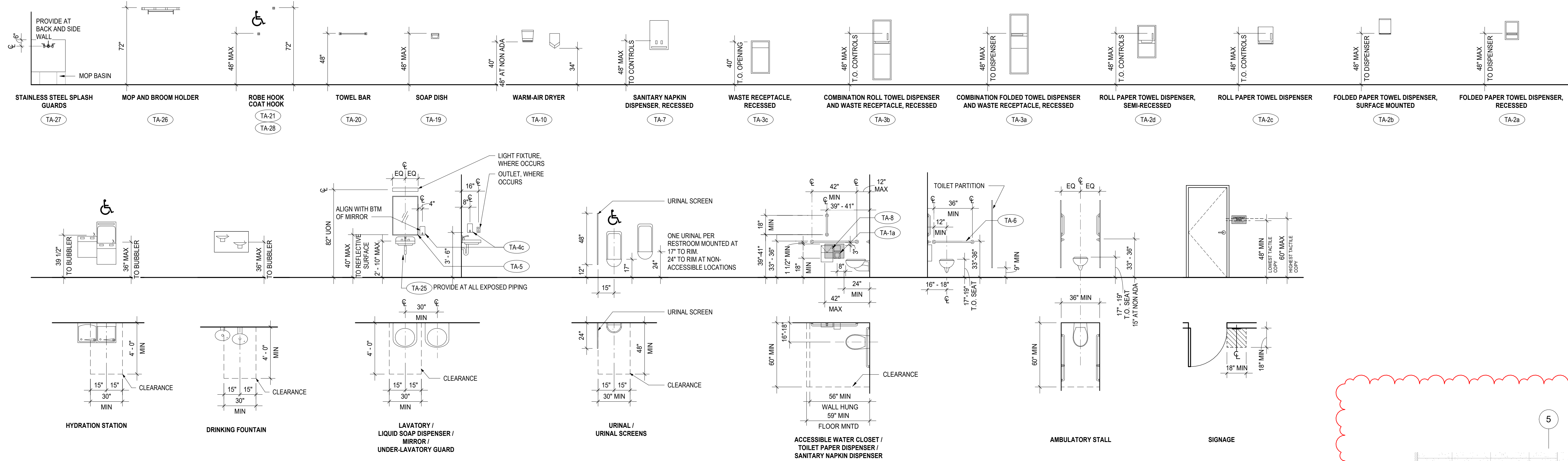
Project Number: 21-261 AMD / 2160 CO-OP
Drawn By: AMD / CO-OP
Reviewed By: SHBB/AD
Approved By: CO-OP

LEVEL 1 FLOOR PLAN

A-101

4/23/2024 2:02:46 PM

PLUMBING AND TOILET ACCESSORIES



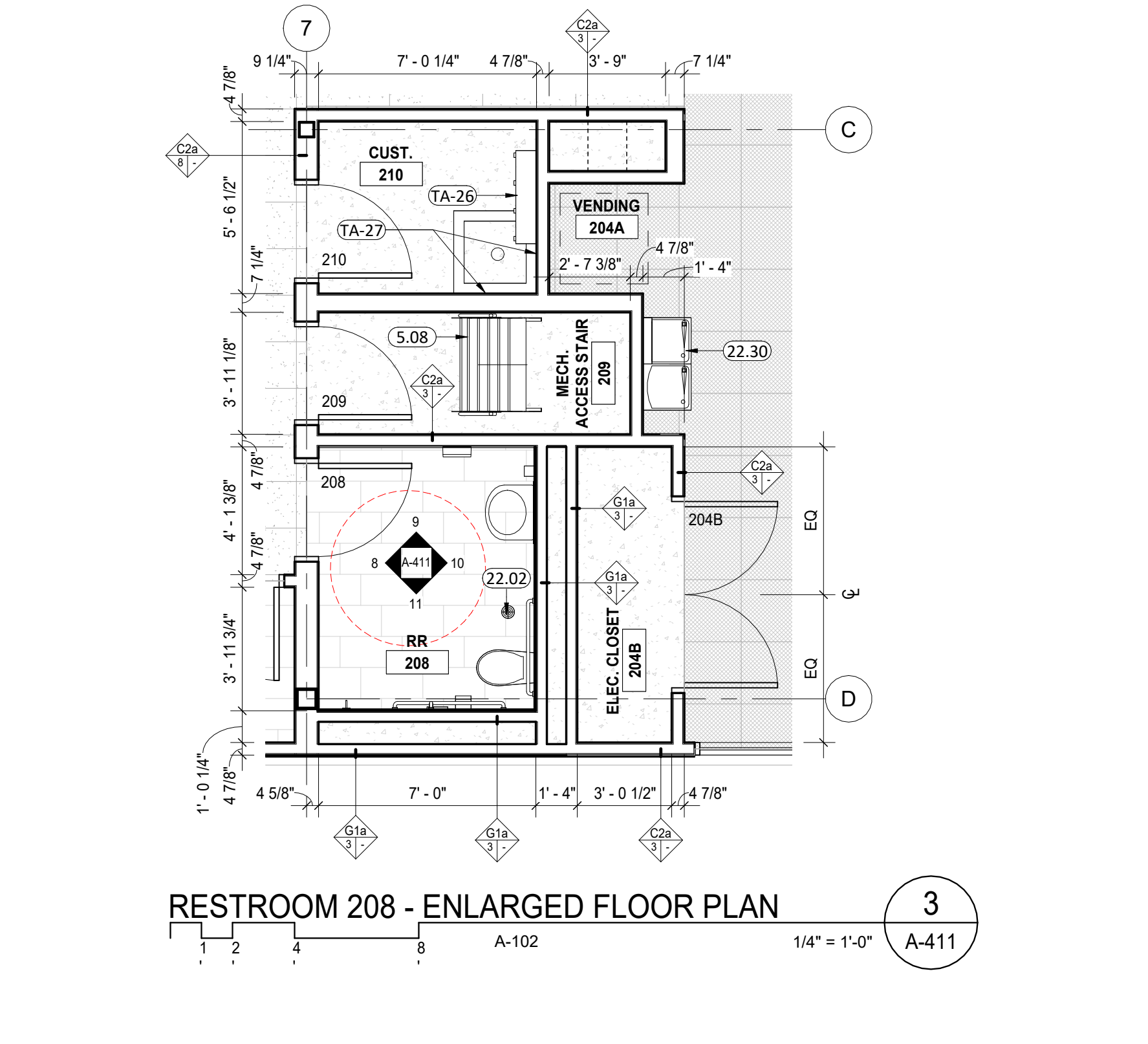
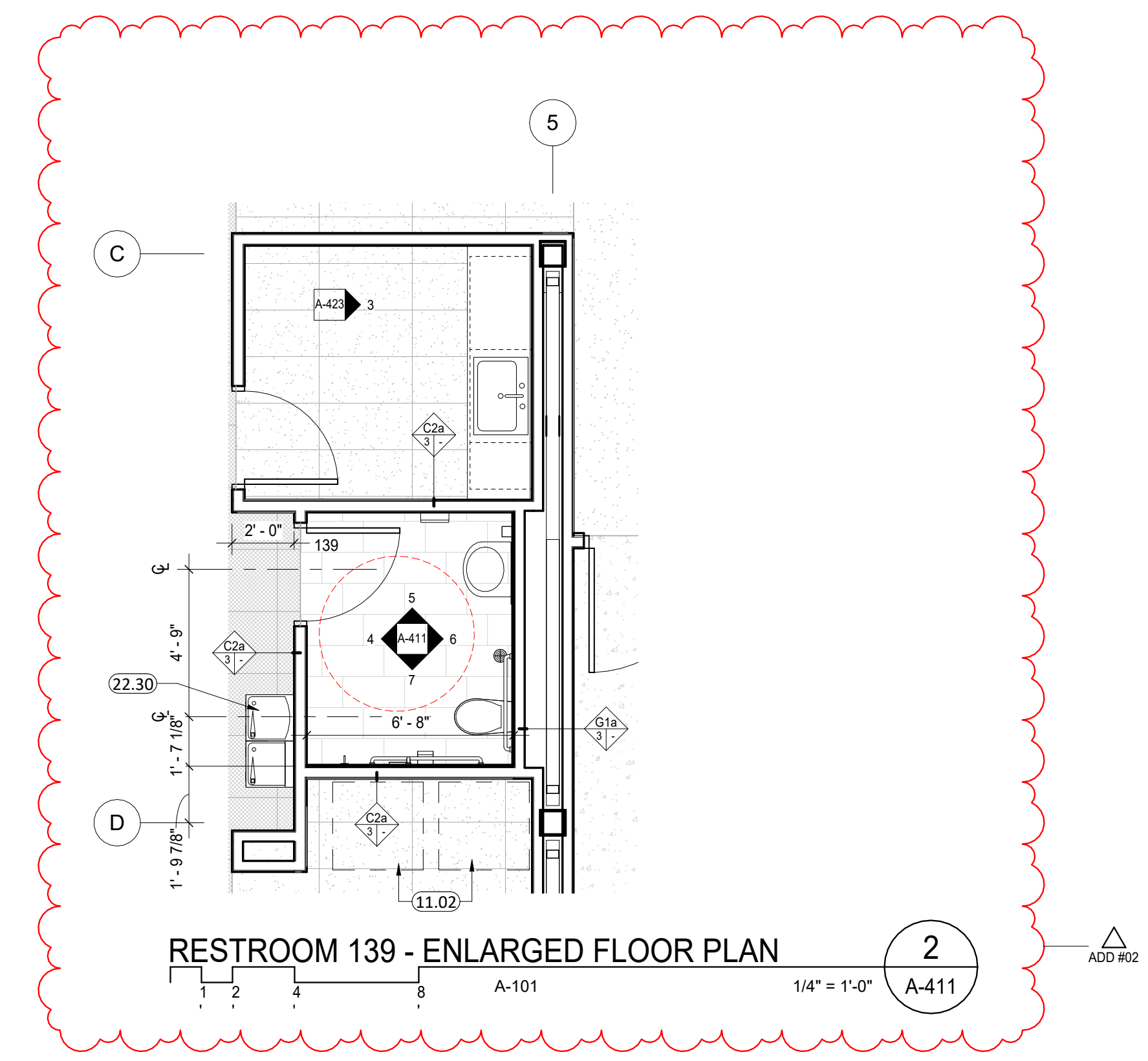
MATERIAL LEGEND		
	WDW-1 WOOD WALL PANEL	WOOD DOORS TO MATCH RE: DOOR SCH. AND FINISH LEGEND A-501
	WF-1 WINDOW FILM	

LEGEND		
	APC-1 FINISH TYPE INDICATOR, RE: FINISH LEGEND ON A-501	
	AC-1 PARTITION TYPE INDICATOR, RE: A-602	
	WINDOW TYPE INDICATOR	
	CABINET TYPE SYMBOL, RE: A-508 UPPER-CABINET STYLE LOWER-CABINET SIZE IN INCHES	
	TA- TOILET ACCESSORY INDICATOR, RE: TOILET ACCESSORY NUMBER- ITEM NUMBER	
	E-0 EQUIPMENT TAG, RE: EQUIPMENT SCHEDULE ON A-501	

- GENERAL NOTES**
- FURNITURE SHOWN FOR REFERENCE ONLY
 - CLEARANCES AND OTHER DIMENSIONS SHOWN IN TOILET FIXTURE AND ACCESSORY MOUNTING HEIGHT SCHEDULE ARE ABSOLUTE. SHOULD PLAN DIMENSIONS OR FIELD CONDITIONS RESULT IN INADEQUATE CLEARANCES NOTIFY ARCHITECT BEFORE PROCEEDING WITH WORK.
 - PARTITIONS WITHIN 2FT OF URINALS, WATER CLOSETS SHALL HAVE CERAMIC TILE CT-2 INCLUDING ALL PARTITIONS PERPENDICULAR TO WATER CLOSETS IN INDIVIDUAL WATER CLOSET ROOMS THROUGHOUT BUILDING.
 - REFER TO A-111 FOR TYPICAL MOUNTING HEIGHTS AND LOCATIONS OF PLUMBING FIXTURES AND TOILET ACCESSORIES
 - DOOR FRAMES TO BE 4" FROM ADJACENT WALL UN

KEYNOTES

5.08	SHIPS LADDER
11.02	VENDING MACHINE, OFOI
22.02	FLOOR DRAIN, RE: MECH
22.30	ELECTRIC WATER COOLER, RE: MECH
TA-1A	DOUBLE-ROLL TOILET TISSUE DISPENSER
TA-4C	LIQUID-SOAP DISPENSER, SURFACE MOUNTED
TA-5A	CUSTOM MIRROR
TA-6	GRAB BARS
TA-8	SANITARY NAPKIN DISPOSAL UNIT
TA-10	WARM-AIR DRYER
TA-21	ROBE HOOK
TA-25	UNDERLAVATORY GUARD
TA-26	MOP AND BROOM HOLDER
TA-27	STAINLESS STEEL SPLASH GUARDS



CO OP

AndersonMasonDale Architects

Architect of Record
CO-OP Architecture
1108 S Main Street Suite #102
Aberdeen, SD 57401
Telephone: 605-225-4852
E-mail: tom@co-oparch.com

Civil Engineer

416 Production Street
Aberdeen, SD 57401
Telephone: 605-225-1212
E-mail: lucash@helmsengineering.com

Structural Engineer

Associates, Inc.
6609 S. Lyncrest Place, Suite 110
Sioux Falls, SD 57103
Telephone: 605-743-3344
E-mail: jchristensen@riseincorp.com

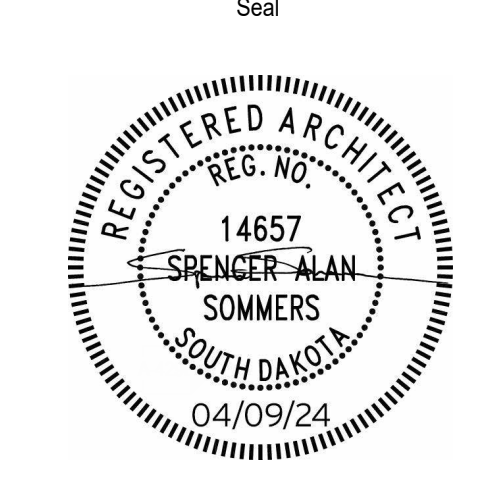
Electrical Engineer

3314 Milwaukee Ave. NE
Aberdeen, SD 57401
Telephone: 605-225-1340
E-mail: thomas.j.heinz@megcorp.com

Mech & Plumbing Engineer

801 railroad Ave SE
Aberdeen, South Dakota 57401
Telephone: 605-225-1344
E-mail: traviss@siocng.biz

ARCHITECTURAL DRAWINGS ARE TO BE VIEWED IN COLOR FOR FULL AND COMPLETE INFORMATION



Seal	Issue	Date
	100% CONSTRUCTION DOCUMENTS ADD #02	APRIL 9, 2024 4/23/2024

LINCOLN HALL

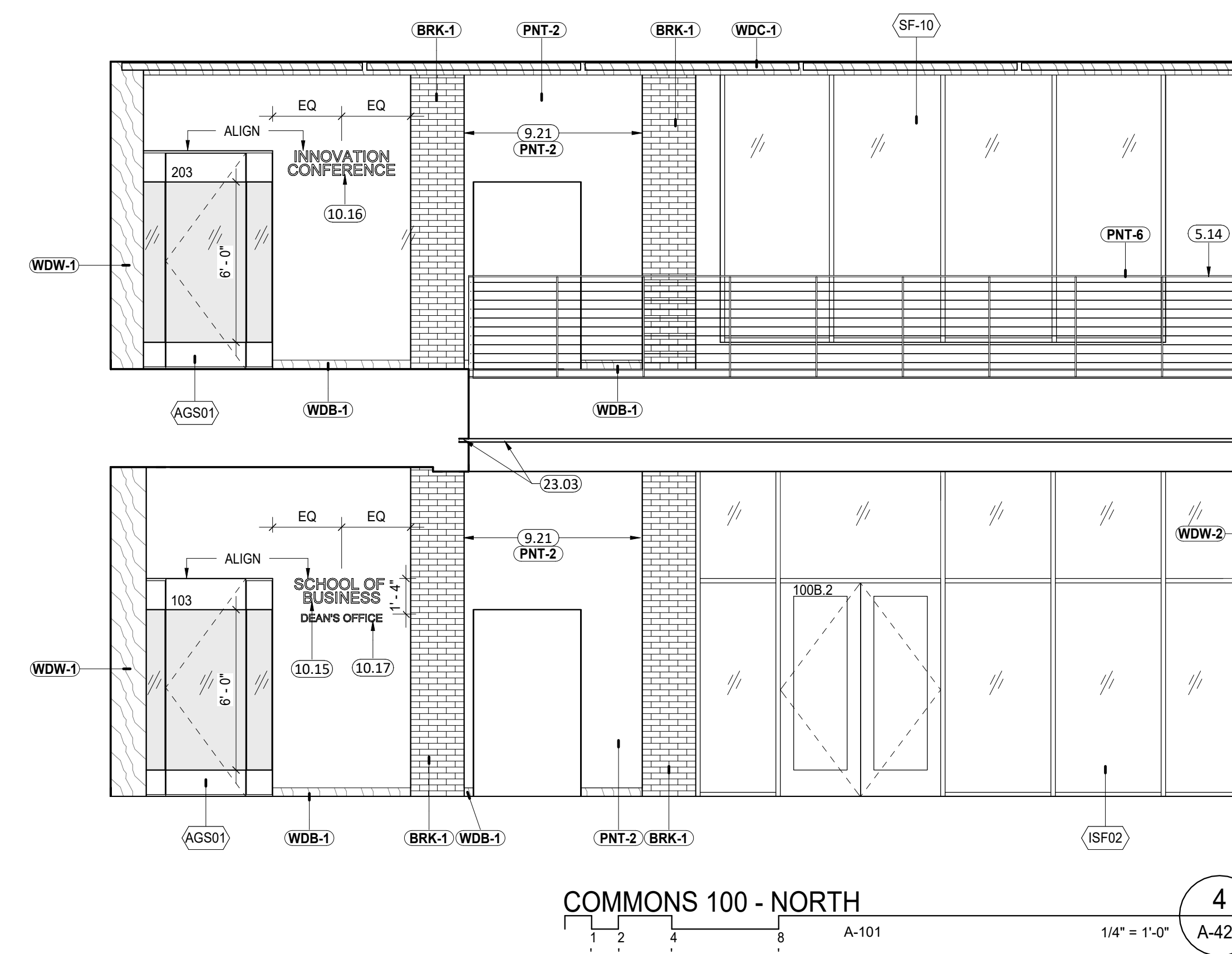
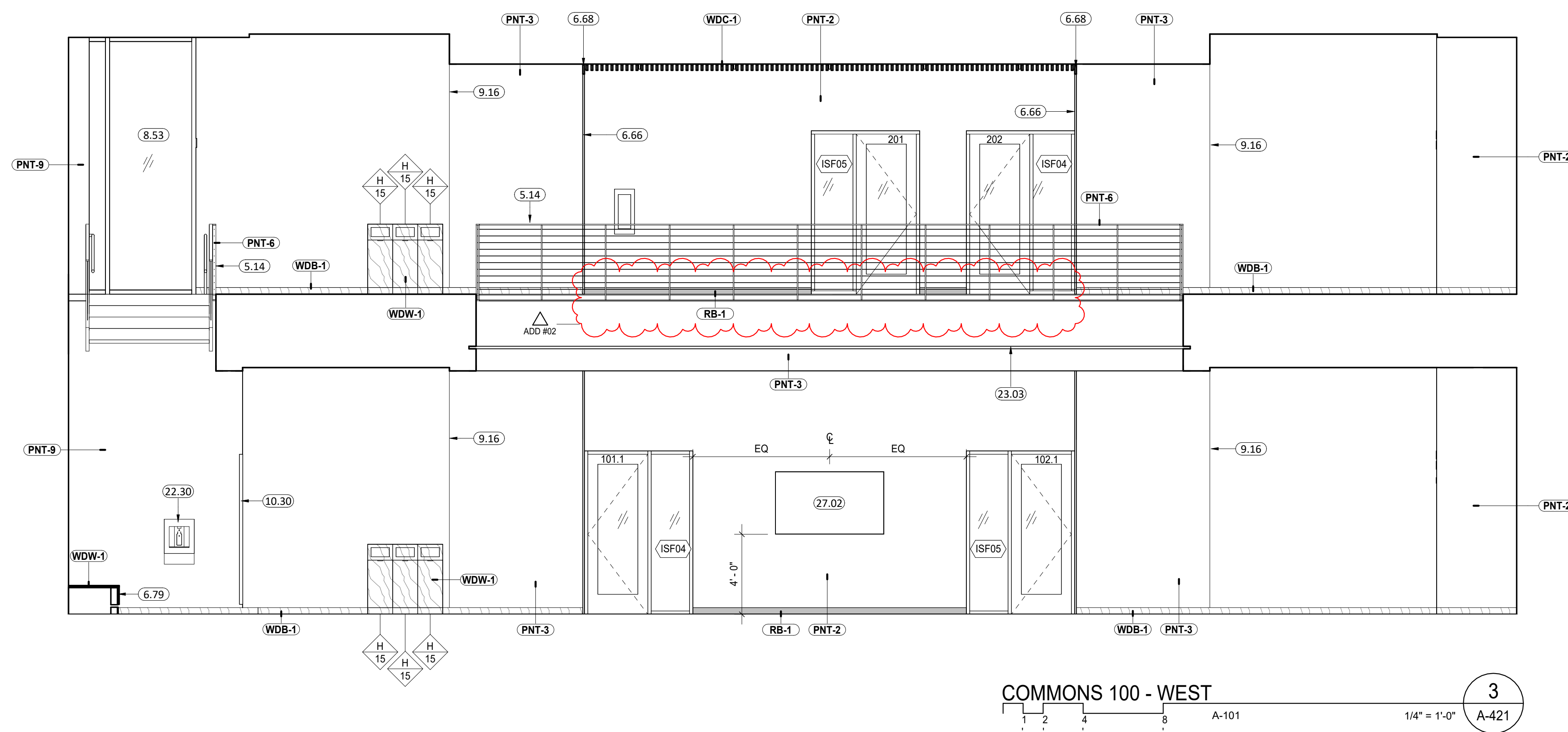
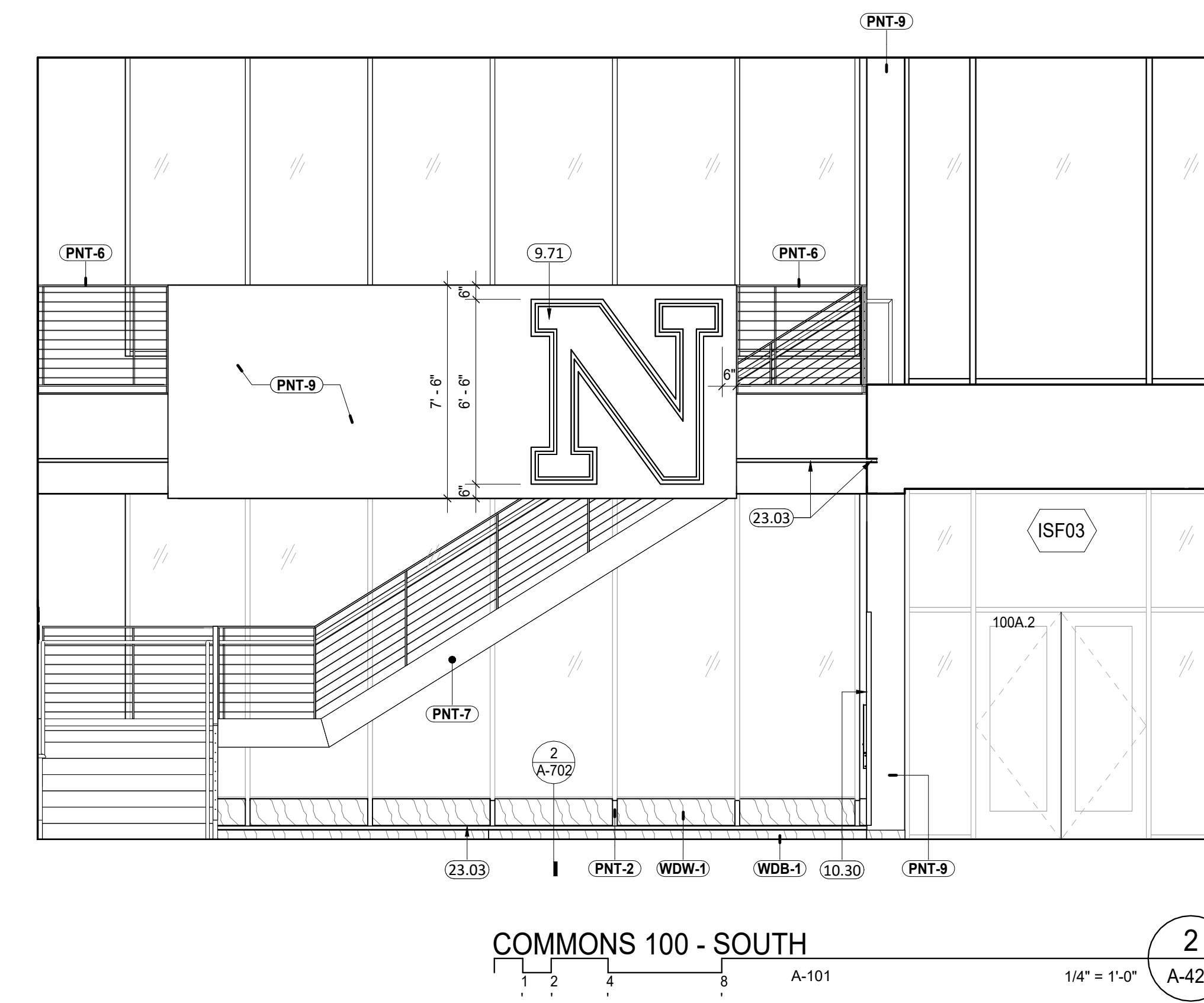
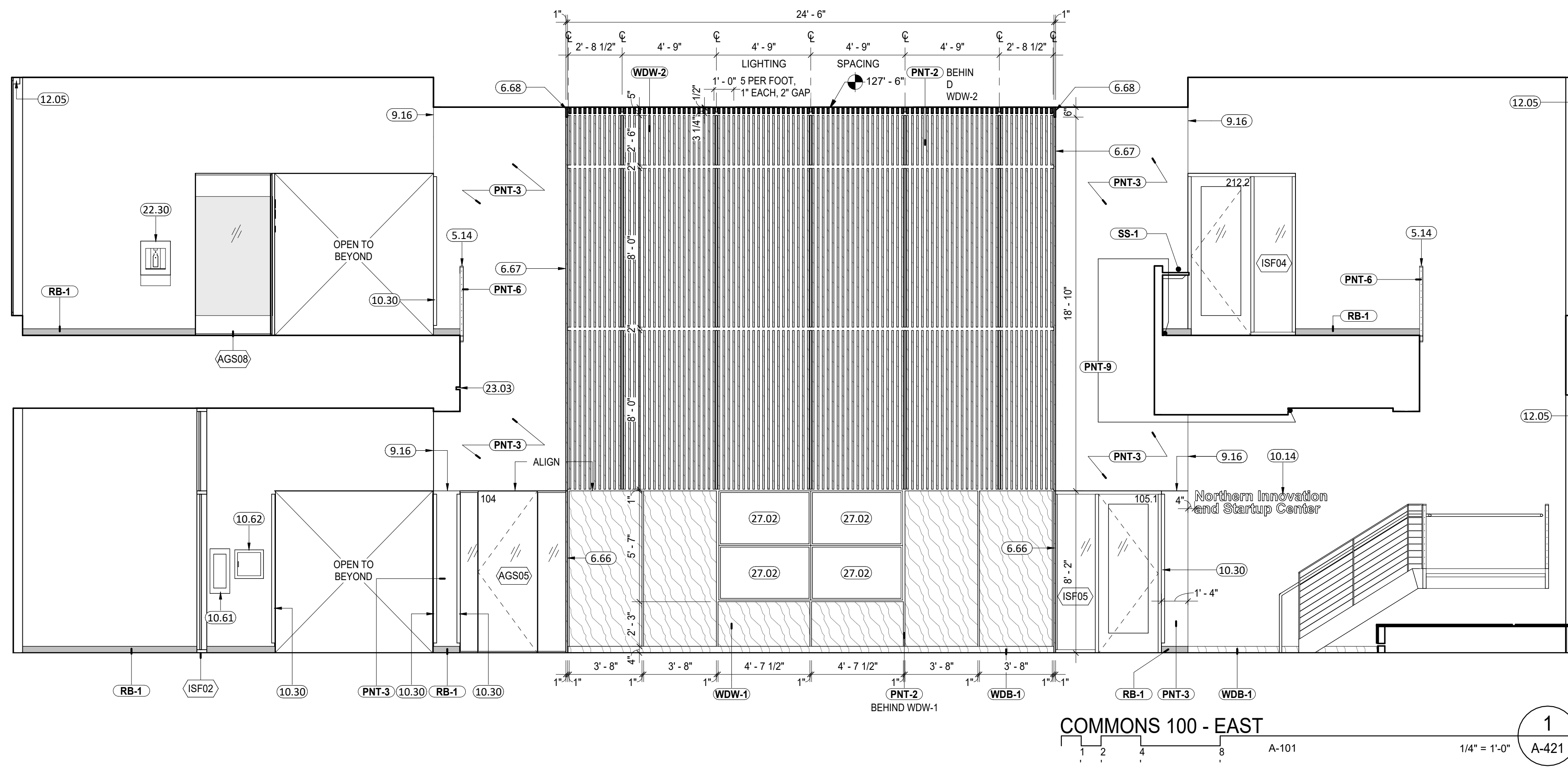
12th Ave SE, Aberdeen, SD 57401
21-261 AMD / 2160 CO-OP

Northern State University
1200 S Jay St
Aberdeen, South Dakota 57401
Telephone: 605-626-3011
E-mail:

Project Number:	21-261 AMD / 2160 CO-OP
Drawn By:	AMD
Reviewed By:	SHBB
Approved By:	CO-OP

ENLARGED RESTROOM PLANS

A-411



MATERIAL LEGEND	
	WDW-1 WOOD WALL PANEL
	WOOD DOORS TO MATCH, RE: DOOR SCH. AND FINISH LEGEND A-501
	WF-1 WINDOW FILM

LEGEND	
	FINISH TYPE INDICATOR, RE: FINISH LEGEND ON A-501
	PARTITION TYPE INDICATOR, RE: A-602
	WINDOW TYPE INDICATOR
	CABINET TYPE SYMBOL, RE: A-506 UPPER-CABINET STYLE LOWER-CABINET SIZE IN INCHES
	TOILET ACCESSORY INDICATOR: TA= TOILET ACCESSORY NUMBER= ITEM NUMBER
	EQUIPMENT TAG, RE: EQUIPMENT SCHEDULE ON A-501

GENERAL NOTES

- FURNITURE SHOWN FOR REFERENCE ONLY
- ALL WALLS TO BE PNT-1 UNO

KEYNOTES	
5.14	HORIZONTAL ROD METAL GUARDRAIL
6.66	1\" WOOD TRIM (WD-1), EXTEND 4\" PAST FACE OF WALL, EXTEND BACK TO WALL OR STOREFRONT WHERE APPLIES, RE: DETAIL 11A-703
6.67	1\" WOOD TRIM (WD-1), 4\" EDGE TRIM
6.68	1\" WOOD TRIM (WD-1), 6\" EDGE TRIM
6.79	CUSTOM BUILT-IN BENCH
8.53	SEE EXTERIOR WINDOW SCHEDULE
9.16	CONTROL JOINT
9.21	3/8\" GYPSUM BOARD
9.71	HIGH GLOSS VINYL DECAL (TONE-ON-TONE), SLIGHT VARIANT FROM PNT-9
10.14	ALUMINUM DIMENSIONAL LETTER SIGNAGE, 6\" ARIAL FONT STYLE, COLOR TO MATCH PNT-9, TEXT: 'Northern Innovation and Startup Center'
10.15	ALUMINUM DIMENSIONAL LETTER SIGNAGE, 5\" ARIAL FONT STYLE, COLOR TO MATCH PNT-9, TEXT: 'SCHOOL OF BUSINESS'
10.16	ALUMINUM DIMENSIONAL LETTER SIGNAGE, 5\" ARIAL FONT STYLE, COLOR TO MATCH PNT-9, TEXT: 'INNOVATION CONFERENCE'
10.17	ALUMINUM DIMENSIONAL LETTER SIGNAGE, 3\" ARIAL FONT STYLE, COLOR TO MATCH PNT-9, TEXT: 'DEANS OFFICE'
10.30	CORNER GUARDS (HEIGHT = 7'-6\" @ 6\" AFF), UNO
10.61	FIRE EXTINGUISHER AND WALL CABINET
10.62	RECESSED DEBRILLATOR CABINET
12.05	MOTORIZED ROLLER SHADE
22.30	ELECTRIC WATER COOLER, RE: MECH
23.03	MUD-IN LINEAR SLOT DIFFUSER, RE: MECH
27.02	VIDEO DISPLAY UNIT, RE: AV

ADD #02 4/23/2024

CO OP

AndersonMasonDale Architects

Architect of Record
CO-OP Architecture
1108 S Main Street Suite #102
Aberdeen, SD 57401
Telephone: 605-225-4852
E-mail: tom@co-oparch.com

Associate Architect
AndersonMasonDale Architects, P.C.
3198 Speer Boulevard
Denver, CO 80211
Telephone: 303-294-9448
FAX: 303-294-0762
E-mail: bblanchard@amdarchitects.com

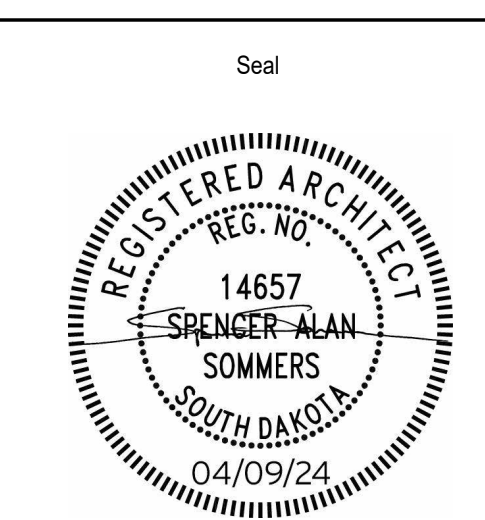
Civil Engineer
Helms Engineering
416 Production Street
Aberdeen, SD 57401
Telephone: 605-225-1212
E-mail: lucash@helmsengineering.com

Structural Engineer
Associates, Inc.
6609 S. Lyncrest Place, Suite 110
Sioux Falls, SD 57105
Telephone: 605-743-2310
E-mail: jchristensen@resincorp.com

Mech & Plumbing Engineer
Engineering
801 railroad Ave SE
Aberdeen, South Dakota 57401
Telephone: 605-225-1344
E-mail: traviss@sieng.biz

Electrical Engineer
Engineering
3314 Milwaukee Ave. NE
Aberdeen, SD 57401
Telephone: 605-225-1349
E-mail: thomas.j.heinz@megcorp.com

ARCHITECTURAL DRAWINGS ARE TO BE VIEWED IN COLOR FOR FULL AND COMPLETE INFORMATION



Seal Issue Date
100% CONSTRUCTION DOCUMENTS APRIL 9, 2024
ADD #02 4/23/2024

LINCOLN HALL

12th Ave SE, Aberdeen, SD 57401
21-261 AMD / 2160 CO-OP

Northern State University
1200 S. Jay St.
Aberdeen, South Dakota 57401
Telephone: 605-626-3011
E-mail:



Project Number: 21-261 AMD / 2160 CO-OP
Drawn By: AMD / CO-OP
Reviewed By: SHBB/AD
Approved By: CO-OP

INTERIOR ELEVATIONS - LOBBY / COMMONS

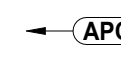
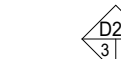

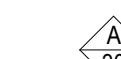


A-421

4/23/2024 2:08:47 PM

MATERIAL LEGEND

-  WDW-1 WOOD WALL PANEL MATCH, RE: DOOR SCH. AND FINISH LEGEND A-501
-  WF-1 WINDOW FILM

LEGEND

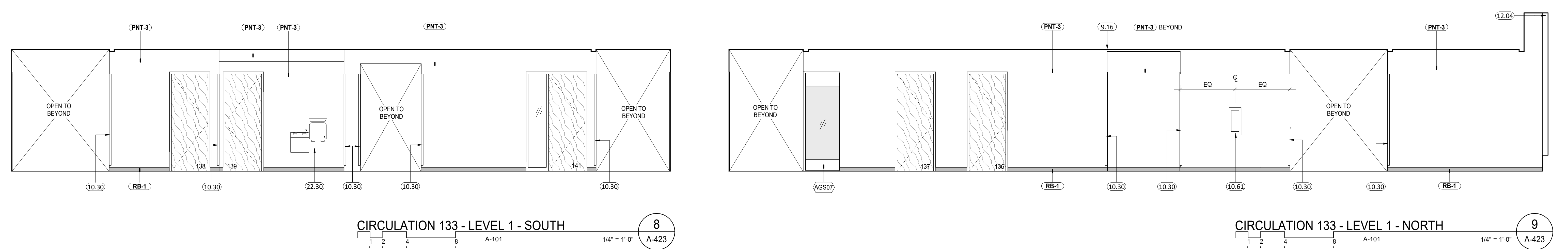
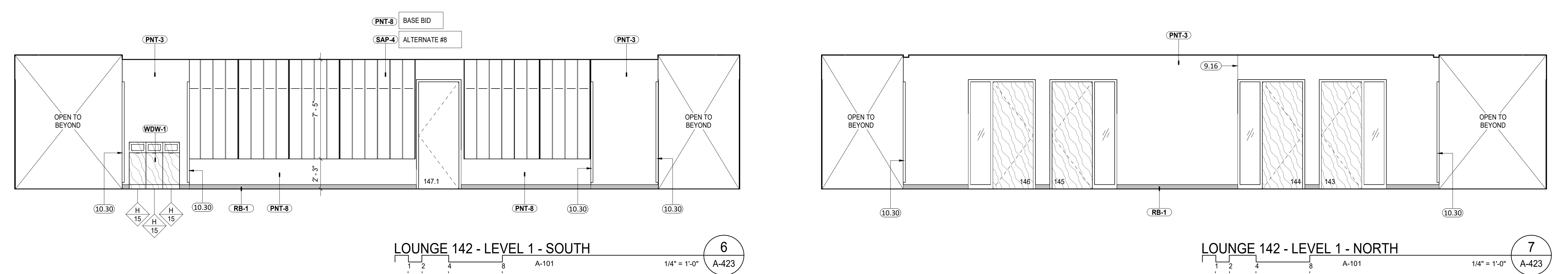
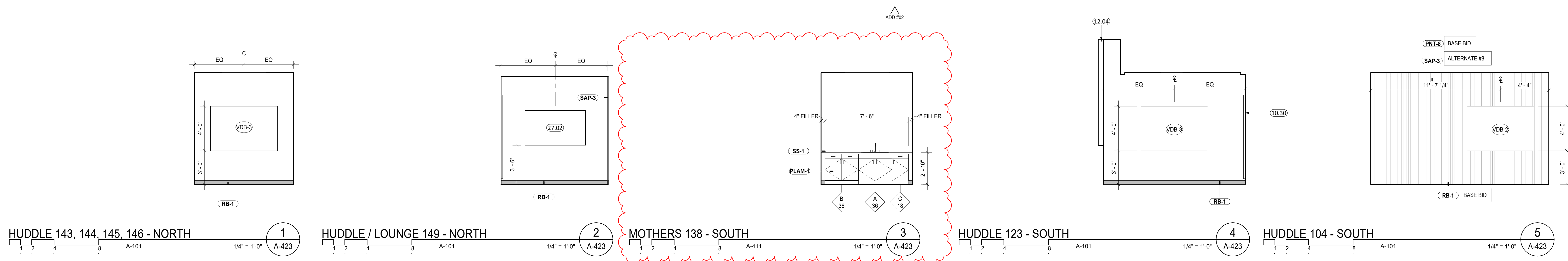
-  (APC-1) FINISH TYPE INDICATOR, RE: FINISH LEGEND ON A-501
-  (PT-1) PARTITION TYPE INDICATOR, RE: A-602
-  (AC-1) WINDOW TYPE INDICATOR
-  (CB-1) CABINET TYPE SYMBOL, RE: A-506 UPPER-CABINET STYLE LOWER-CABINET SIZE IN INCHES
-  (TA-1) TOILET ACCESSORY INDICATOR: TA= TOILET ACCESSORY NUMBER- ITEM NUMBER
-  (EQ-1) EQUIPMENT TAG, RE: EQUIPMENT SCHEDULE ON A-501

GENERAL NOTES

1. FURNITURE SHOWN FOR REFERENCE ONLY
2. ALL WALLS TO BE PNT-1 UNO

KEYNOTES

- 9.16 CONTROL JOINT
- 10.30 CORNER GUARDS (HEIGHT = 7'-6" @ 6" AFF), UNO
- 10.61 FIRE EXTINGUISHER AND WALL CABINET
- 12.04 ROLLER WINDOW SHADES
- 22.30 ELECTRIC WATER COOLER, RE: MECH
- 27.02 VIDEO DISPLAY UNIT, RE: AV



ADD #02 4/23/2024



Architect of Record
 CO-OP Architecture
 1108 S Main Street Suite #102
 Aberdeen, SD 57401
 Telephone: 605-225-4852
 E-mail: tom@co-oparch.com

Civil Engineer
 Associates, Inc.
 416 Production Street
 Aberdeen, SD 57401
 Telephone: 605-225-1212
 E-mail: lucash@helmsengineering.com

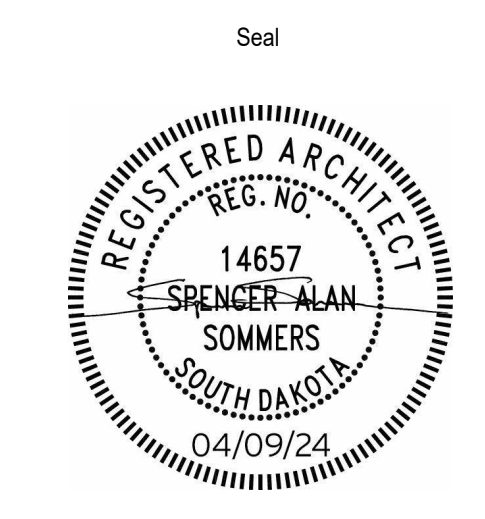
Structural Engineer
 Associates, Inc.
 6909 S. Lyncrest Place, Suite 110
 Sioux Falls, SD 57106
 Telephone: 605-743-8110
 E-mail: jchristensen@riseincorp.com

Electrical Engineer
 on
 3314 Milwaukee Ave. NE
 Aberdeen, SD 57401
 Telephone: 605-225-1340
 E-mail: thomas.j.heinz@megcorp.com

Associate Architect
 AndersonMasonDale Architects, P.C.
 3198 Speer Boulevard
 Denver, CO 80211
 Telephone: 303-294-9448
 FAX: 303-294-0762
 E-mail: bblanchard@amdarchitects.com

Mech & Plumbing Engineer
 Engineering
 801 railroad Ave SE
 Aberdeen, South Dakota 57401
 Telephone: 605-228-1344
 E-mail: traviss@sieng.biz

ARCHITECTURAL DRAWINGS ARE TO BE VIEWED IN COLOR FOR FULL AND COMPLETE INFORMATION



Issue
 100% CONSTRUCTION DOCUMENTS
 ADD #02

Date
 APRIL 9, 2024
 4/23/2024

LINCOLN HALL
 12th Ave SE, Aberdeen, SD 57401
 21-261 AMD / 2160 CO-OP
 Northern State University
 1200 S. Jay St.
 Aberdeen, South Dakota 57401
 Telephone: 605-626-3011
 E-mail:

Project Number: 21-261 AMD / 2160 CO-OP
 Drawn By: SHBB
 Reviewed By: SHBB
 Approved By: CO-OP

INTERIOR ELEVATIONS - LEVEL 1

A-423

4/23/2024 2:16:50 PM

MATERIAL LEGEND

	WDW-1 WOOD WALL PANEL	WOOD DOORS TO MATCH, RE: DOOR SCH. AND FINISH LEGEND A-501
	WF-1 WINDOW FILM	

LEGEND

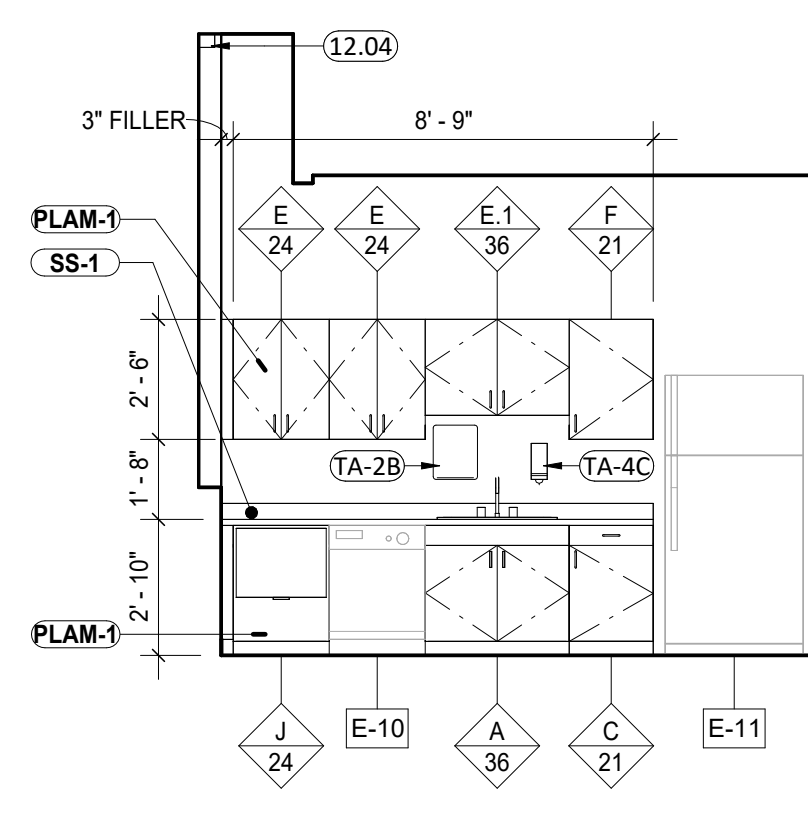
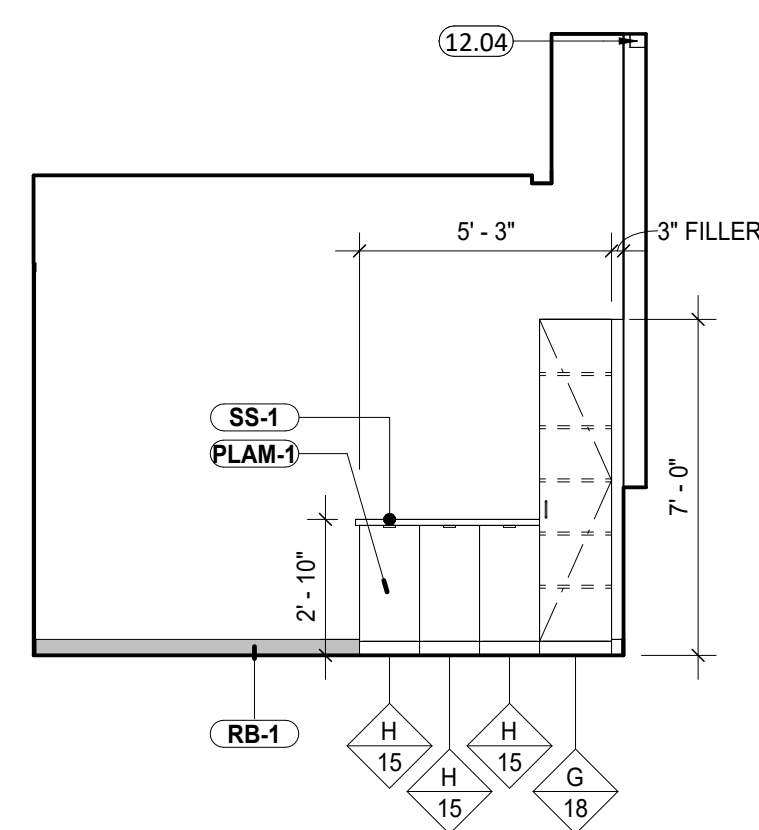
	FINISH TYPE INDICATOR, RE: FINISH LEGEND ON A-501
	PARTITION TYPE INDICATOR, RE: A-602
	WINDOW TYPE INDICATOR
	CABINET TYPE SYMBOL, RE: A-506 UPPER-CABINET STYLE LOWER-CABINET SIZE IN INCHES
	TOILET ACCESSORY INDICATOR: TA= TOILET ACCESSORY NUMBER+ ITEM NUMBER
	EQUIPMENT TAG, RE: EQUIPMENT SCHEDULE ON A-501

GENERAL NOTES

- FURNITURE SHOWN FOR REFERENCE ONLY
- ALL WALLS TO BE PNT-1 UNO

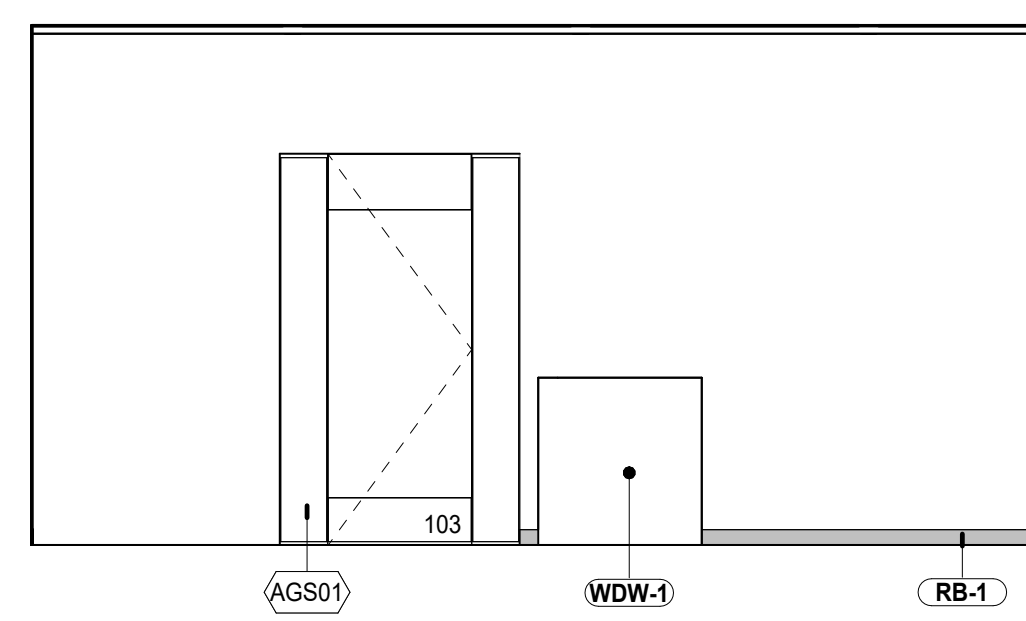
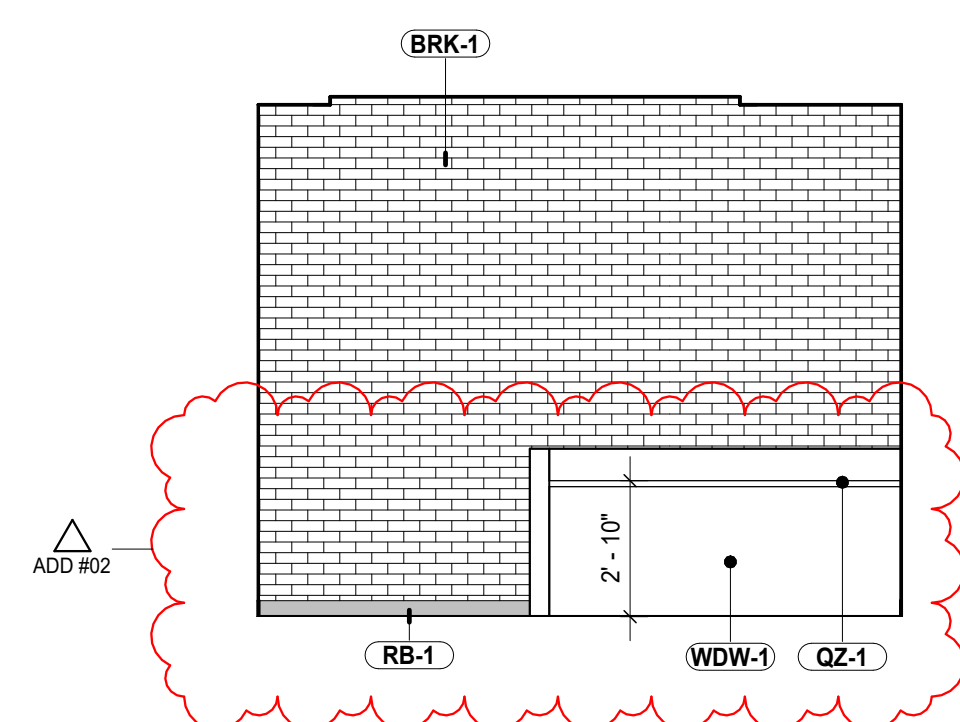
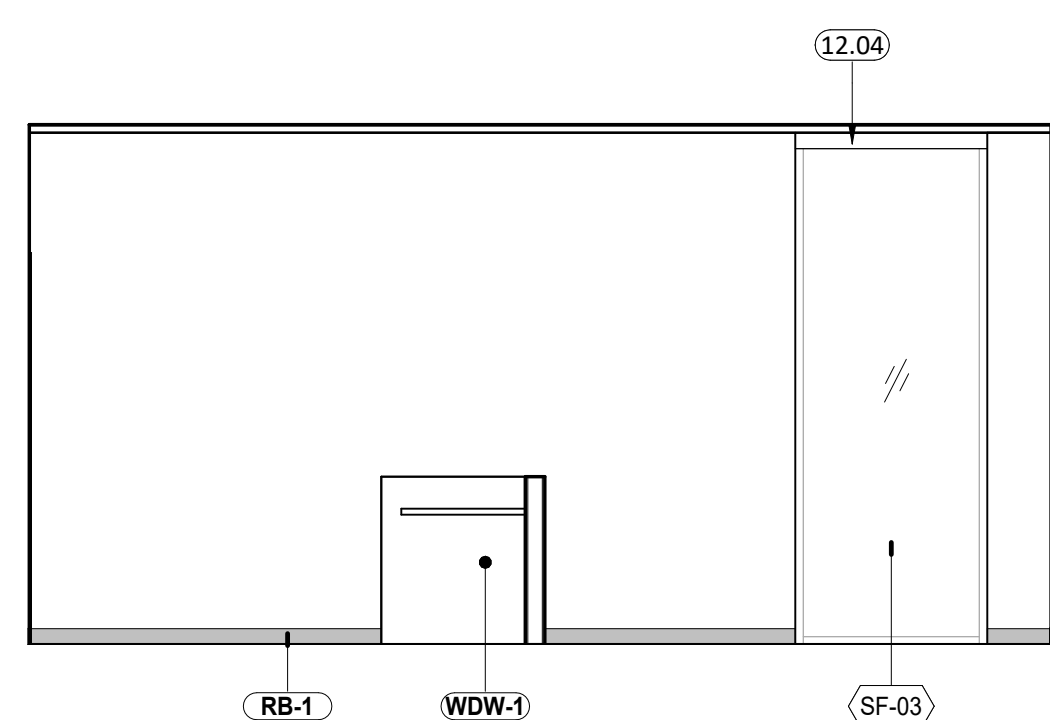
KEYNOTES

- 10.02 MARKERBOARD
- 12.04 ROLLER WINDOW SHADES
- TA-2B FOLDED PAPER TOWEL DISPENSER, SURFACE MOUNTED
- TA-2C ROLL PAPER TOWEL DISPENSER
- TA-4C LIQUID SOAP DISPENSER, SURFACE MOUNTED
- TA-27 STAINLESS STEEL SPLASH GUARDS



BREAK 211 - NORTH

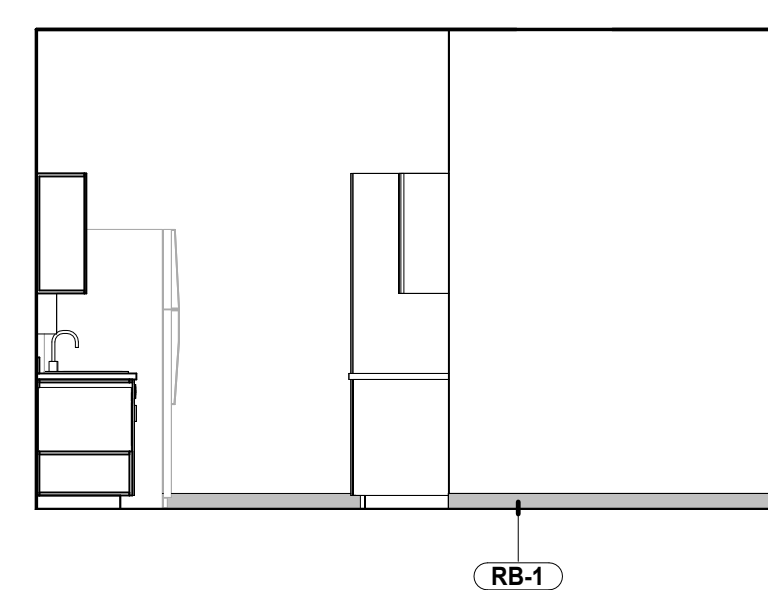
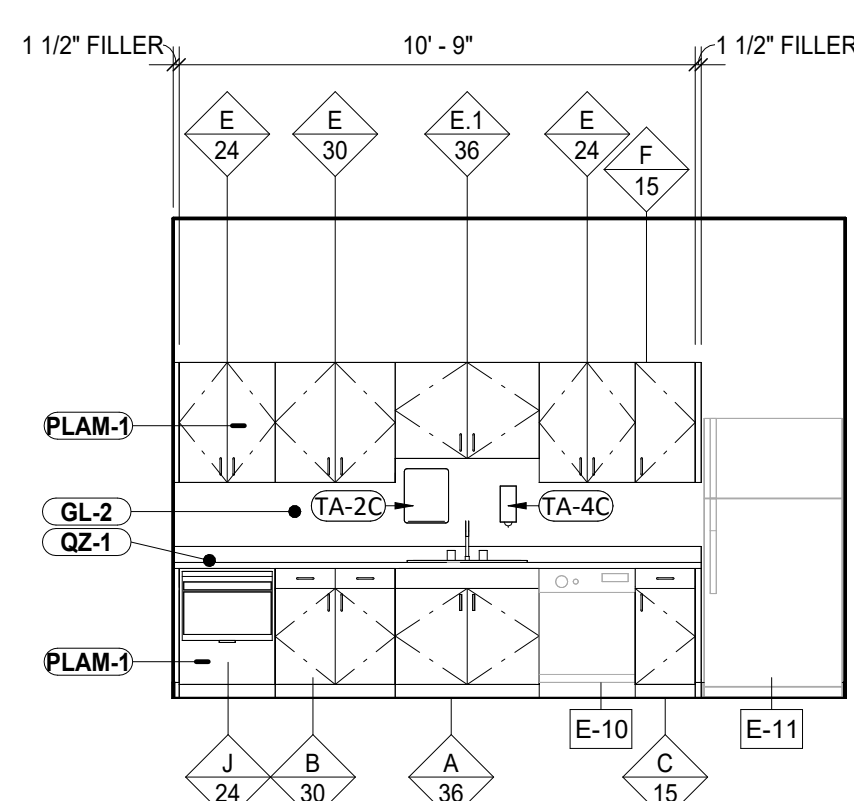
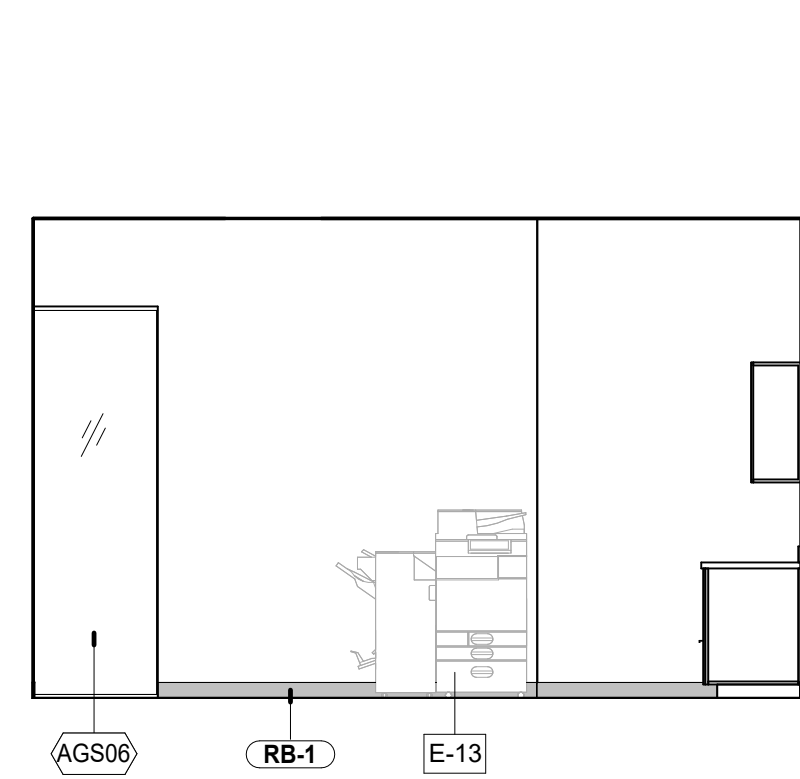
BREAK 211 - SOUTH



DEAN'S SUPPORT 103 - LEVEL 1 - EAST

DEAN'S SUPPORT 103 - LEVEL 1 - SOUTH

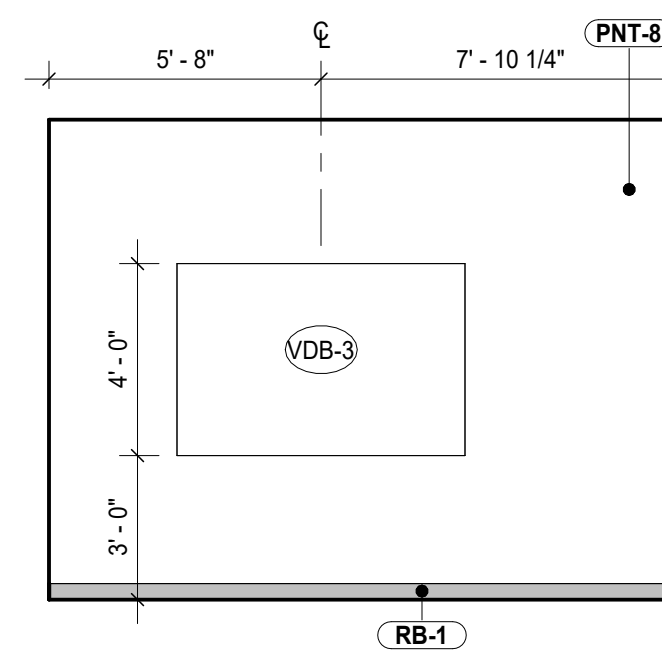
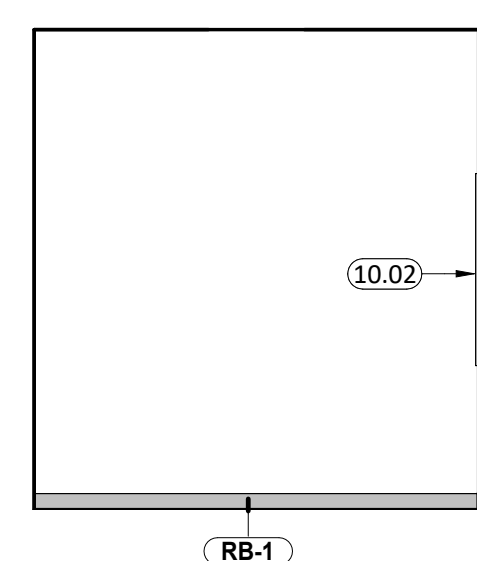
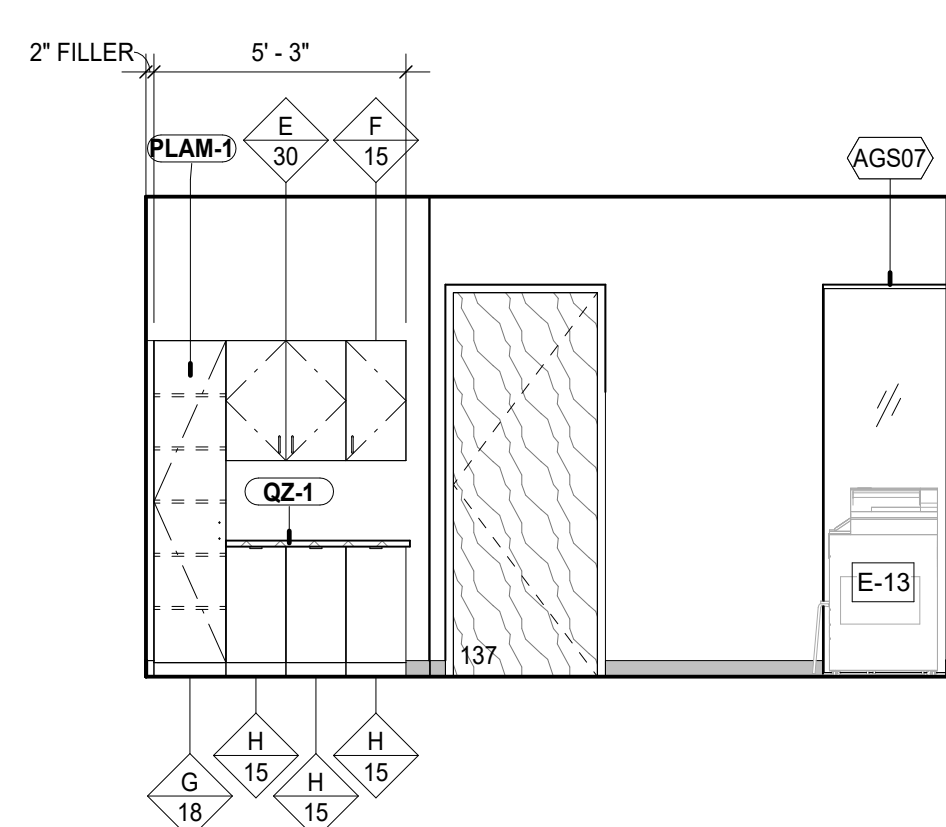
DEAN'S SUPPORT 103 - LEVEL 1



BREAK ROOM 137 - LEVEL 1

BREAK ROOM 137 - LEVEL 1 - NORTH

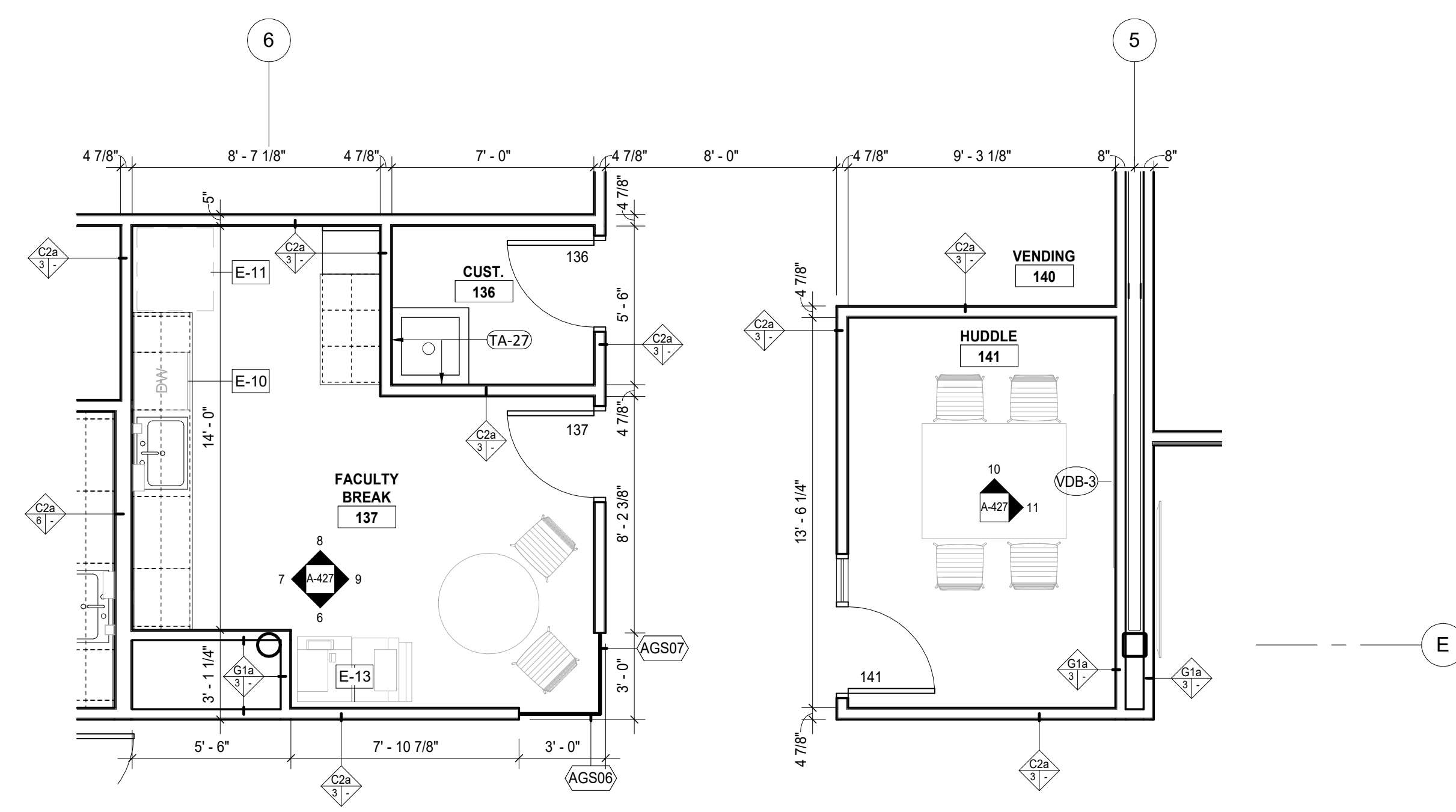
BREAK ROOM 137 - LEVEL 1 - EAST



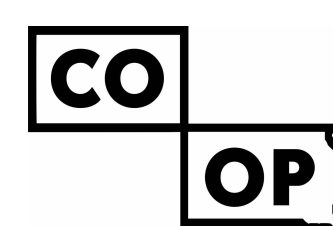
BREAK ROOM 137 - LEVEL 1 - SOUTH

HUDDLE 141 - LEVEL 1 - EAST

HUDDLE 141 - LEVEL 1 - SOUTH



ENLARGED PLAN - BREAK ROOM 137



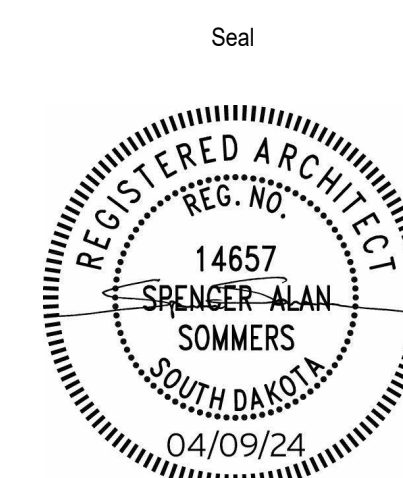
Architect of Record
CO-OP Architecture
1108 S Main Street Suite #102
Aberdeen, SD 57401
Telephone: 605-225-4852
E-mail: tom@co-oparch.com

Civil Engineer
Helms Engineering
416 Production Street
Aberdeen, SD 57401
Telephone: 605-225-1212
E-mail: lucash@helmsengineering.com

Structural Engineer
Associates, Inc.
6609 S. Lyncrest Place, Suite 110
Sioux Falls, SD 57106
Telephone: 605-225-1340
E-mail: jchristensen@riseincorp.com

Electrical Engineer
MEG Corp
3314 Milwaukee Ave. NE
Aberdeen, SD 57401
Telephone: 605-225-1349
E-mail: thomas.j.heinz@megcorp.com

ARCHITECTURAL DRAWINGS ARE TO BE VIEWED IN COLOR FOR FULL AND COMPLETE INFORMATION



Issue
100% CONSTRUCTION DOCUMENTS
ADD R02

Date
APRIL 9, 2024
4/23/2024

LINCOLN HALL
21-261 AMD / 2160 CO-OP
12th Ave SE, Aberdeen, SD 57401
21-261 AMD / 2160 CO-OP
Notern State University
1200 S Jay St
Aberdeen, South Dakota 57401
Telephone: 605-626-3011
E-mail:

Project Number: 21-261 AMD / 2160 CO-OP
Drawn By: AMD / CO-OP
Reviewed By: SHBB
Approved By: CO-OP

ENLARGED PLAN & ELEVATIONS - LEVEL 1 & 2 ADMIN & FACULTY ROOMS

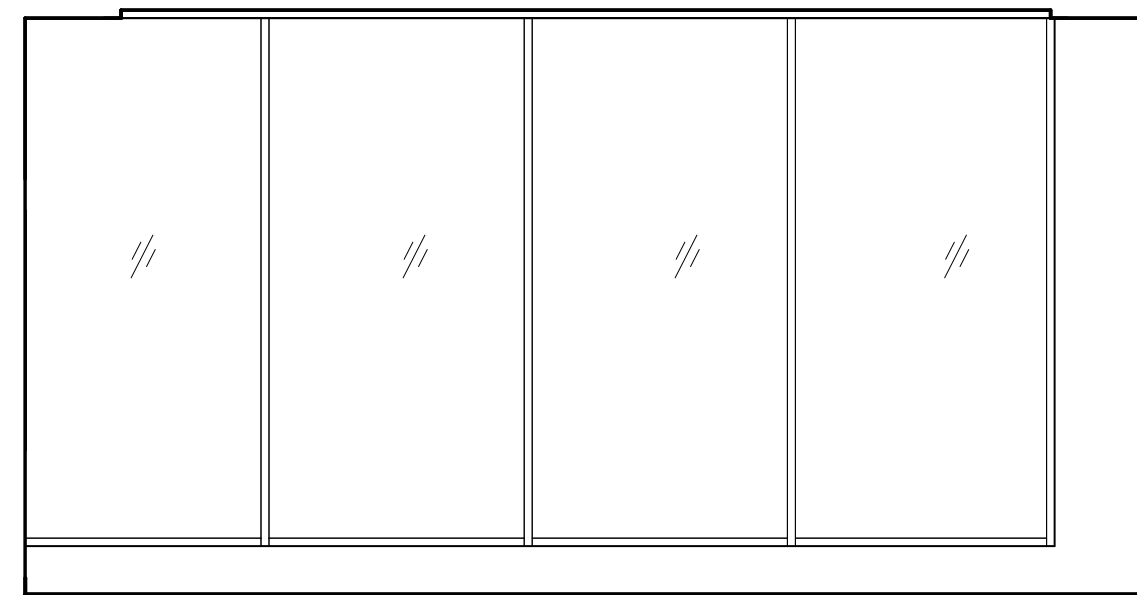
A-427

AndersonMasonDale Architects

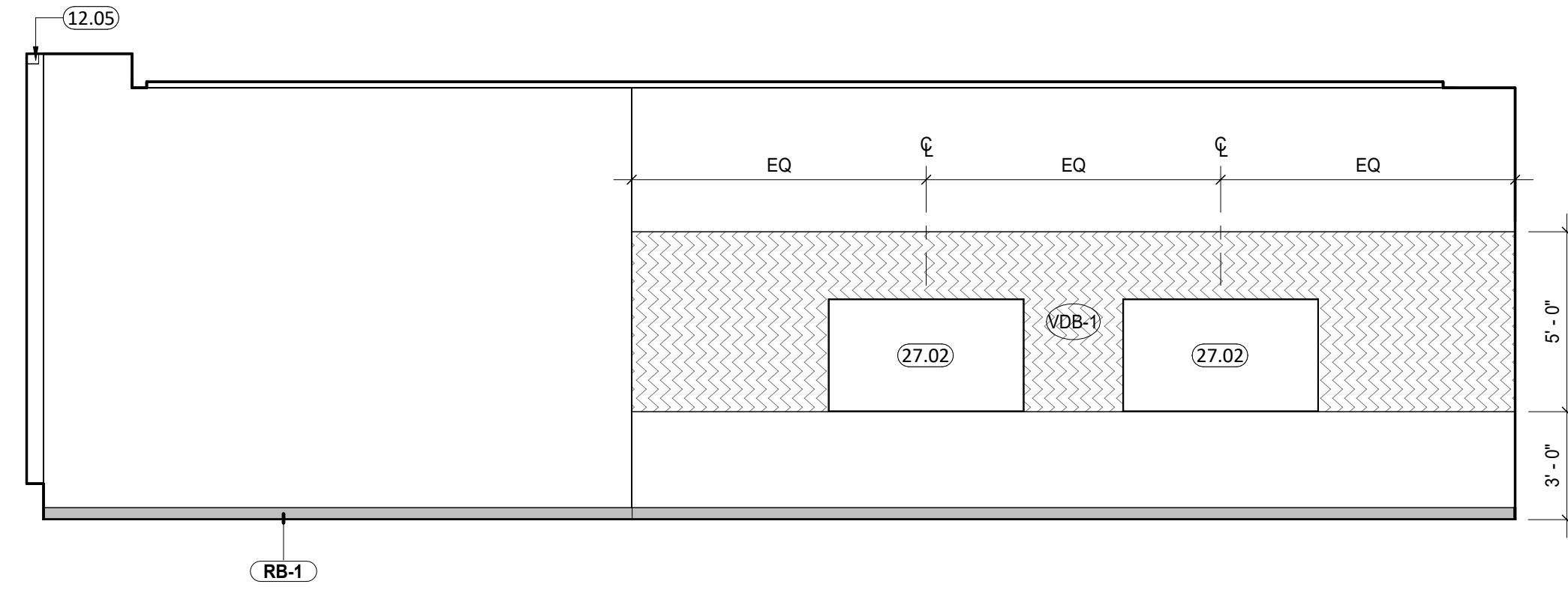
Associate Architect
AndersonMasonDale Architects, P.C.
3198 Speer Boulevard
Denver, CO 80211
Telephone: 303-294-9448
FAX: 303-294-0762
E-mail: bblanchard@amdarchitects.com

Landscape Architect
thinkinKonfurence
524 N Main Ave, Suite 201
Sioux Falls, SD 57105
Telephone: 605-228-1305
E-mail: tpudwill@thinkinKonfurence.com

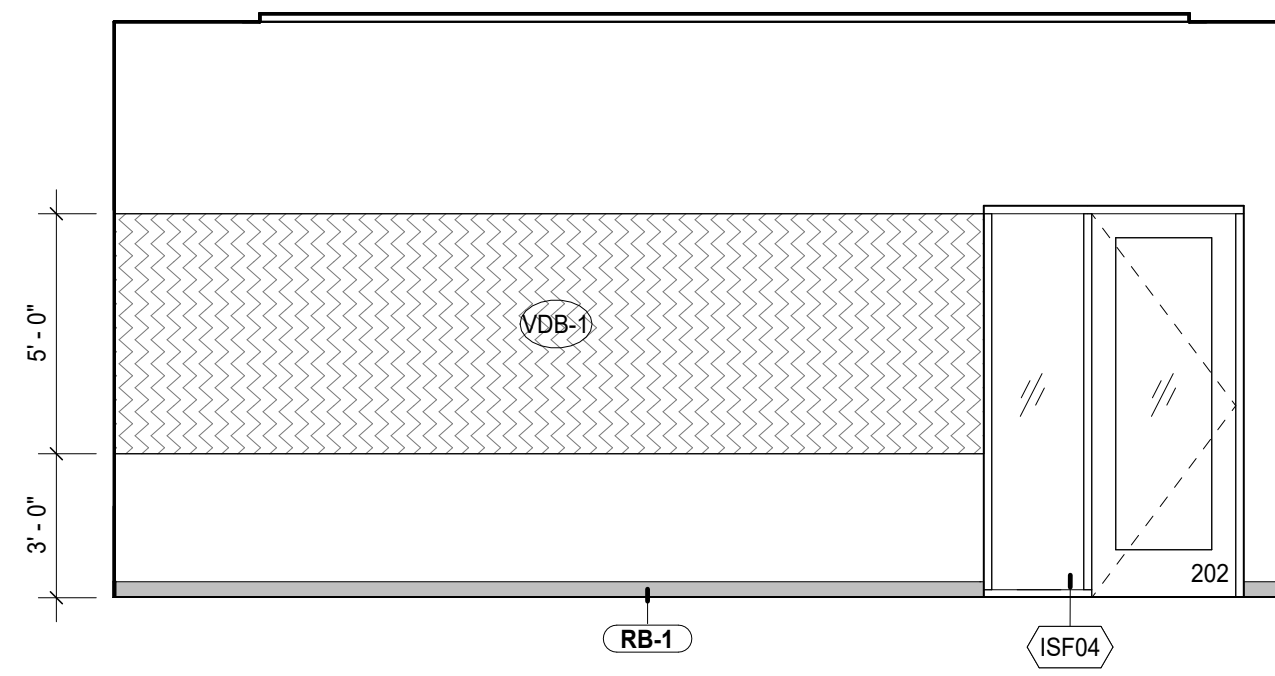
Mech & Plumbing Engineer
Sieng Engineering
801 railroad Ave SE
Aberdeen, South Dakota 57401
Telephone: 605-225-1344
E-mail: traviss@sieng.biz



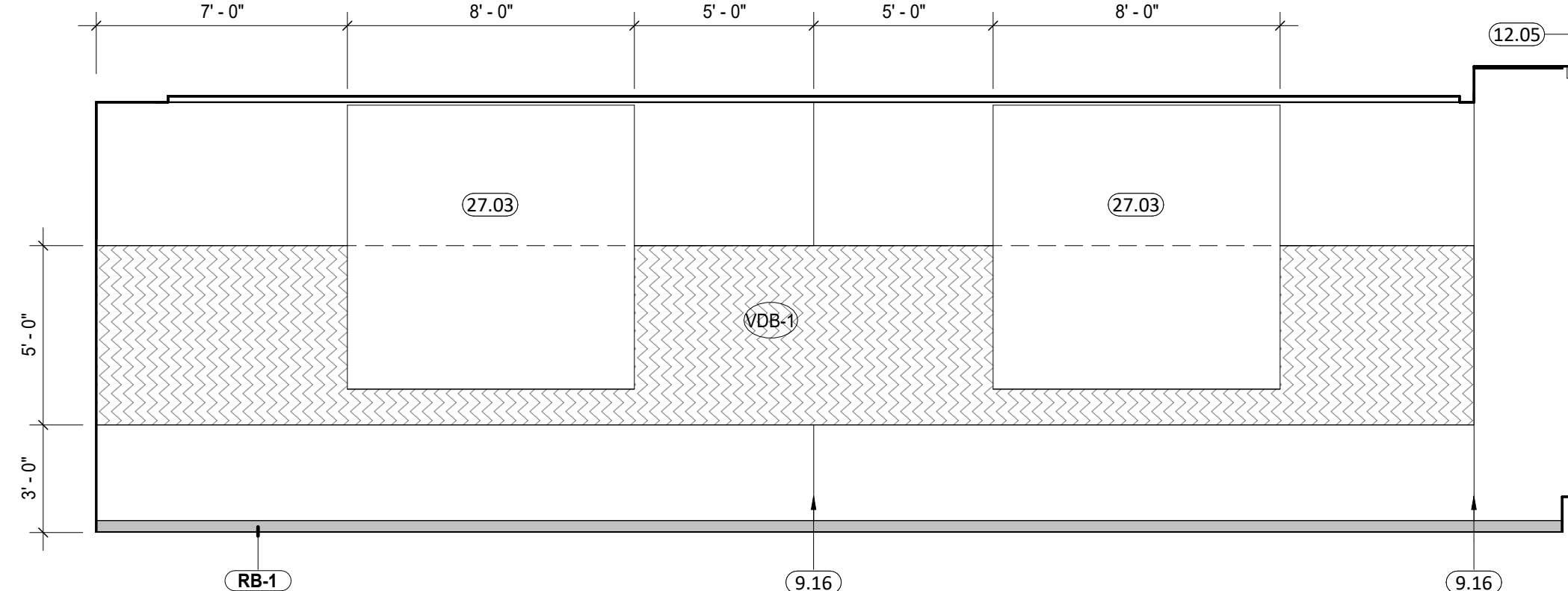
CLASSROOM 202 - LEVEL 2 - NORTH
1/4" = 1'-0" A-428



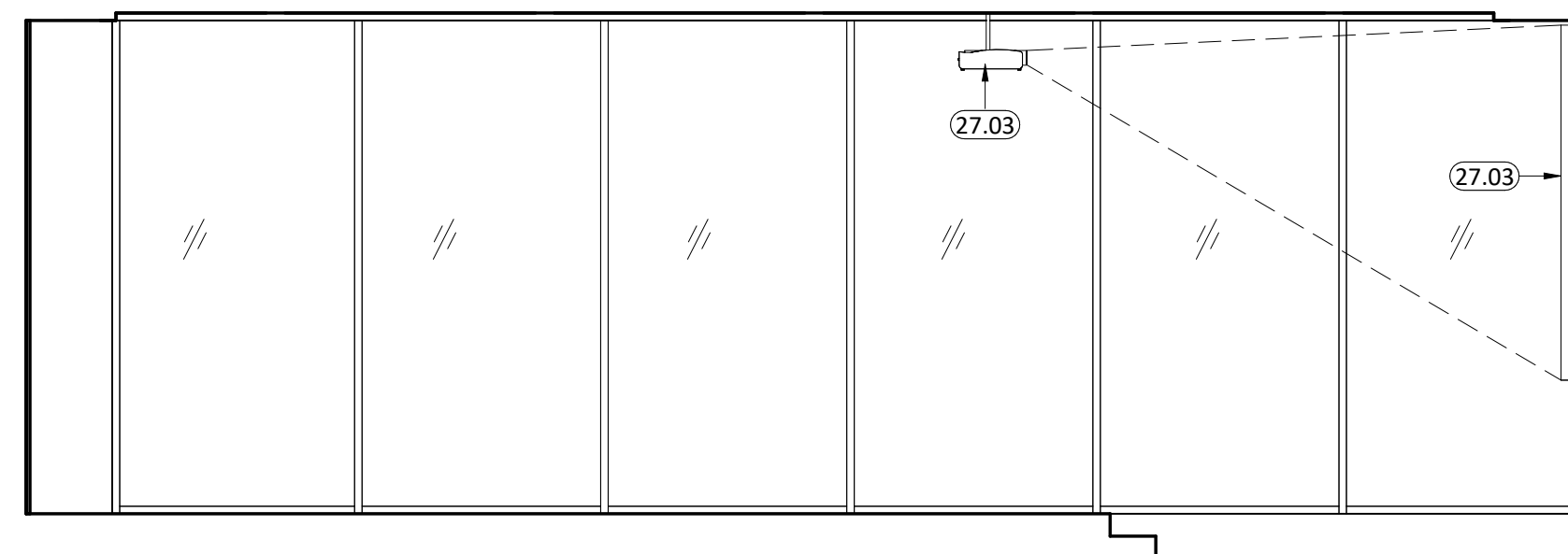
CLASSROOM 202 - LEVEL 2 - EAST
1/4" = 1'-0" A-428



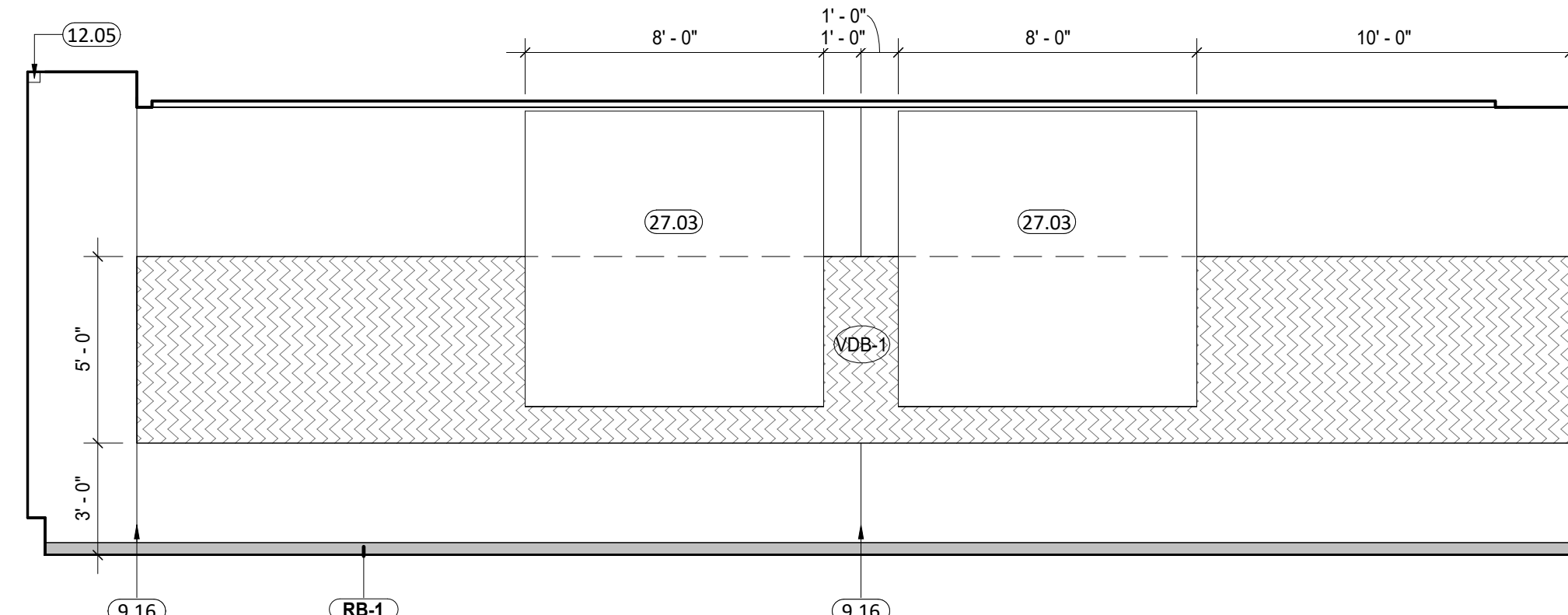
CLASSROOM 202 - LEVEL 2 - SOUTH
1/4" = 1'-0" A-428



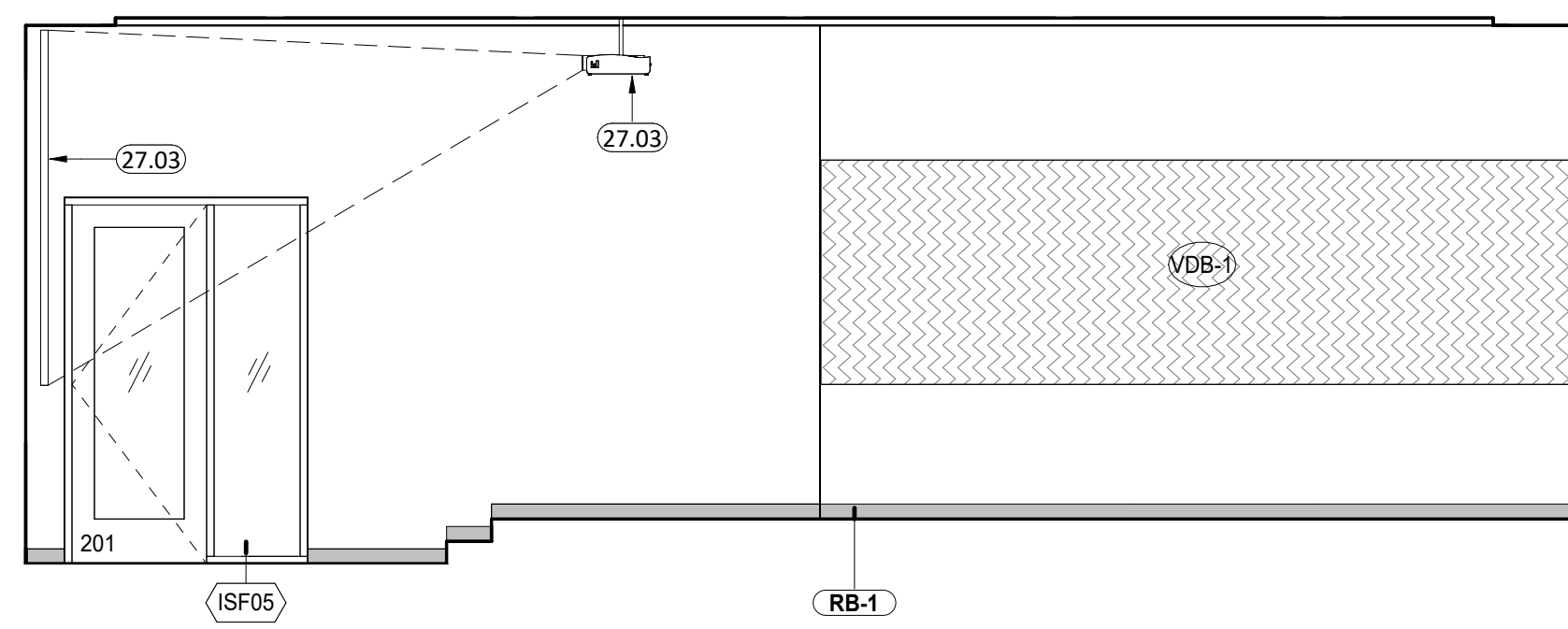
CLASSROOM 202 - LEVEL 2 - WEST
1/4" = 1'-0" A-428



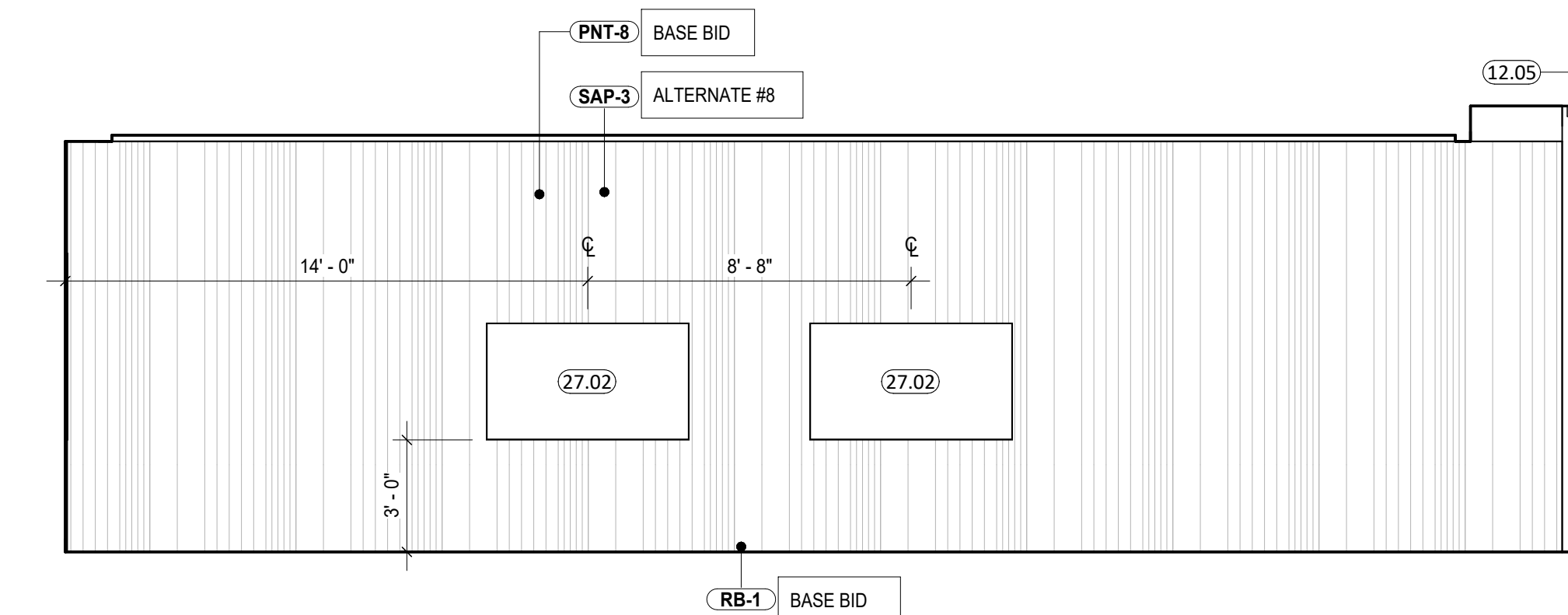
TIERED CLASSROOM 201 - LEVEL 2 - NORTH
1/4" = 1'-0" A-428



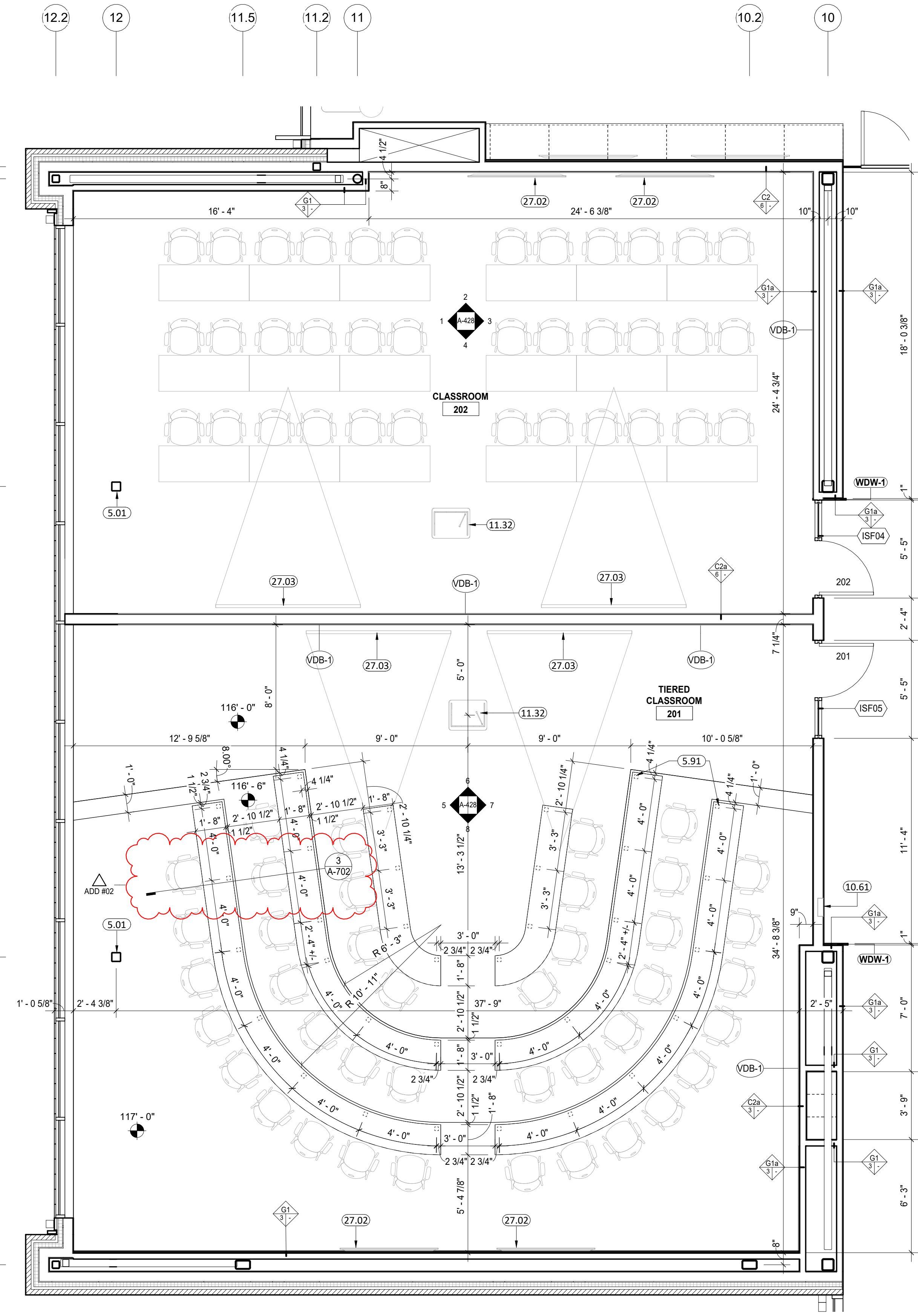
TIERED CLASSROOM 201 - LEVEL 2 - EAST
1/4" = 1'-0" A-428



TIERED CLASSROOM 201 - LEVEL 2 - SOUTH
1/4" = 1'-0" A-428



TIERED CLASSROOM 201 - LEVEL 2 - WEST
1/4" = 1'-0" A-428



ENLARGED PLAN - CLASSROOMS 201 & 202
1/4" = 1'-0" A-428

MATERIAL LEGEND	
	WDW-1 WOOD WALL PANEL MATCH, RE. DOOR SCH. AND FINISH LEGEND A-501
	WF-1 WINDOW FILM

LEGEND	
	APC-1 FINISH TYPE INDICATOR, RE: FINISH LEGEND ON A-501
	PARTITION TYPE INDICATOR, RE: A-602
	AC-1 WINDOW TYPE INDICATOR
	CABINET TYPE SYMBOL, RE: A-506 UPPER-CABINET STYLE LOWER-CABINET SIZE IN INCHES
	TA- TOILET ACCESSORY NUMBER- ITEM NUMBER
	E-0 EQUIPMENT TAG, RE: EQUIPMENT SCHEDULE ON A-501

- GENERAL NOTES**
- FURNITURE SHOWN FOR REFERENCE ONLY
 - ALL WALLS TO BE PNT-1 UNO

- KEYNOTES**
- 5.01 STRUCTURAL STEEL COLUMN, RE: STRUCTURAL
 - 5.91 STEEL VERTICAL POSTS (HSS2-1/2X2-1/2X14), PAINT PNT-3, TYP
 - 9.16 CONTROL JOINT
 - 10.61 FIRE EXTINGUISHER AND WALL CABINET
 - 11.32 MOBILE PODIUM (POD)
 - 12.05 MOTORIZED ROLLER SHADE
 - 27.02 VIDEO DISPLAY UNIT, RE: AV
 - 27.03 PROJECTOR / SCREEN, RE: AV

ADD #02 4/23/2024

4/23/2024 2:12:40 PM



Architect of Record
CO-OP Architecture
1108 S Main Street Suite #102
Aberdeen, SD 57401
Telephone: 605-225-4852
E-mail: tom@co-oparch.com

Associate Architect
AndersonMasonDale Architects, P.C.
3198 Speer Boulevard
Denver, CO 80211
Telephone: 303-294-9448
FAX: 303-294-0762
E-mail: bblanchar@amdarchitects.com

Civil Engineer
Helms Engineering
416 Production Street
Aberdeen, SD 57401
Telephone: 605-225-1212
E-mail: lucash@helmsengineering.com

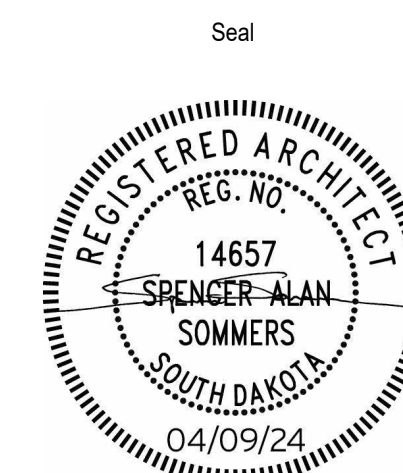
Landscape Architect
Tudwil
524 N Main Ave, Suite 201
Sioux Falls, SD 57104
Telephone: 605-228-1305
E-mail: tudwil@thinkonfluence.com

Structural Engineer
Associates, Inc.
6909 S. Lyncrest Place, Suite 110
Sioux Falls, SD 57101
Telephone: 605-743-2310
E-mail: jchristensen@riseincorp.com

Mech & Plumbing Engineer
Sieng
801 railroad Ave SE
Aberdeen, South Dakota 57401
Telephone: 605-225-1344
E-mail: travis@sieng.biz

Electrical Engineer
Sieng
3314 Milwaukee Ave. NE
Aberdeen, SD 57401
Telephone: 605-225-1349
E-mail: thomas.j.heinz@megecorp.com

ARCHITECTURAL DRAWINGS ARE TO BE VIEWED IN COLOR FOR FULL AND COMPLETE INFORMATION



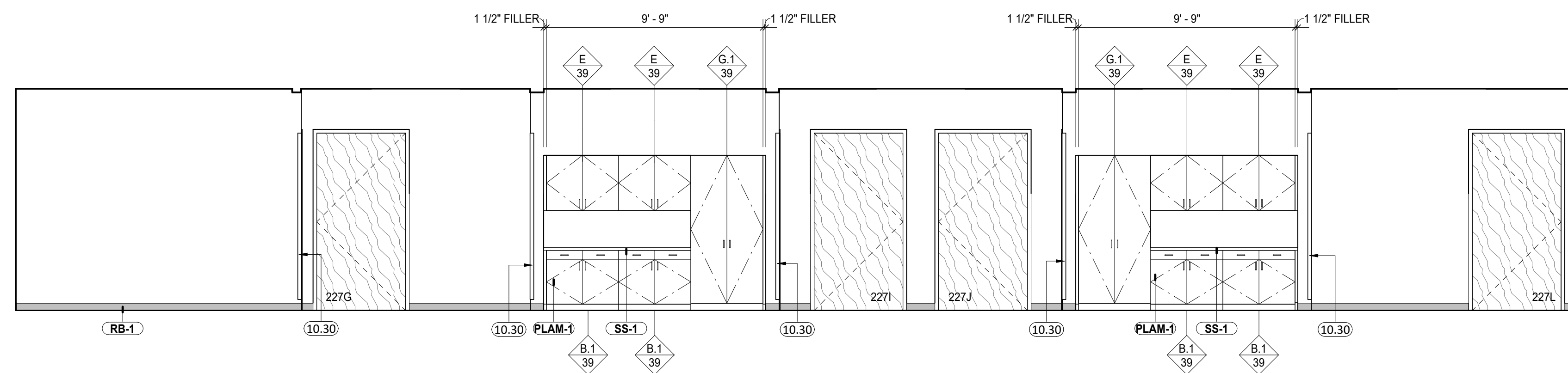
Seal Issue Date
100% CONSTRUCTION DOCUMENTS APRIL 9, 2024
ADD #02 4/23/2024

LINCOLN HALL
12th Ave SE, Aberdeen, SD 57401
21-261 AMD / 2160 CO-OP
Northern State University
1200 S Jay St
Aberdeen, South Dakota 57401
Telephone: 605-626-3011
E-mail:

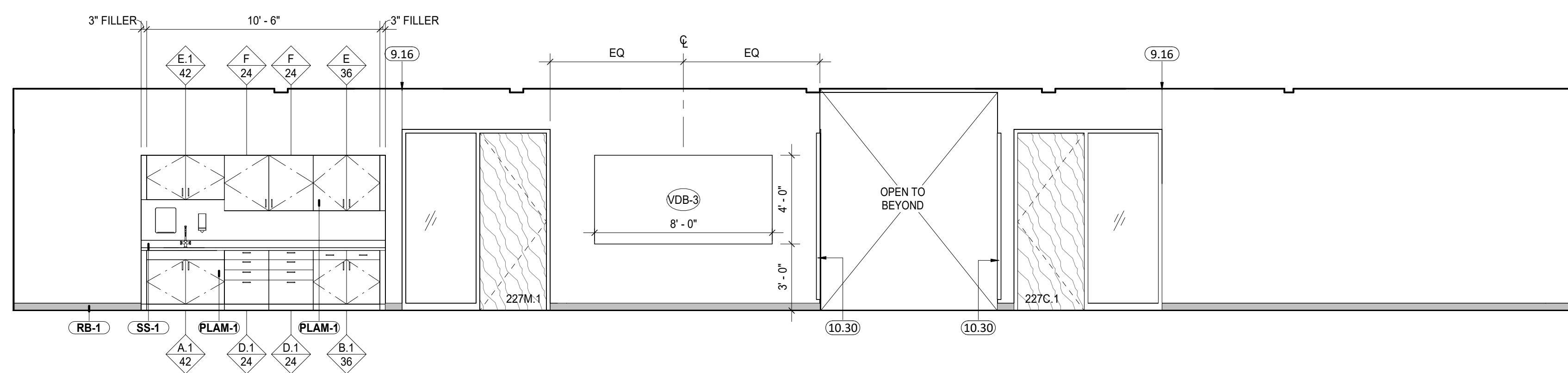
Project Number: 21-261 AMD / 2160 CO-OP
Drawn By: AMD
Reviewed By: SHBB
Approved By: CO-OP

ENLARGED PLAN & ELEVATIONS - CLASSROOMS 201 & 202

A-428

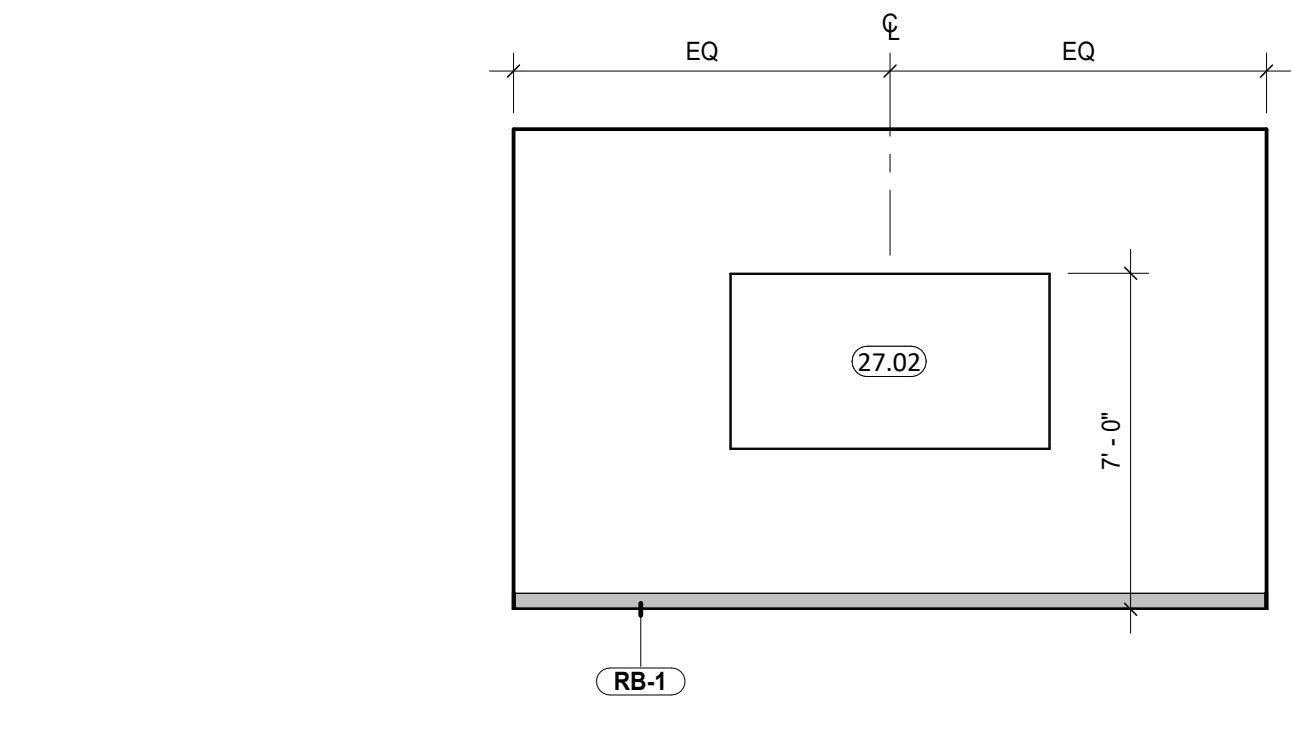


CLINICAL PREP 227 - WEST
1
1/4" = 1'-0" A-431

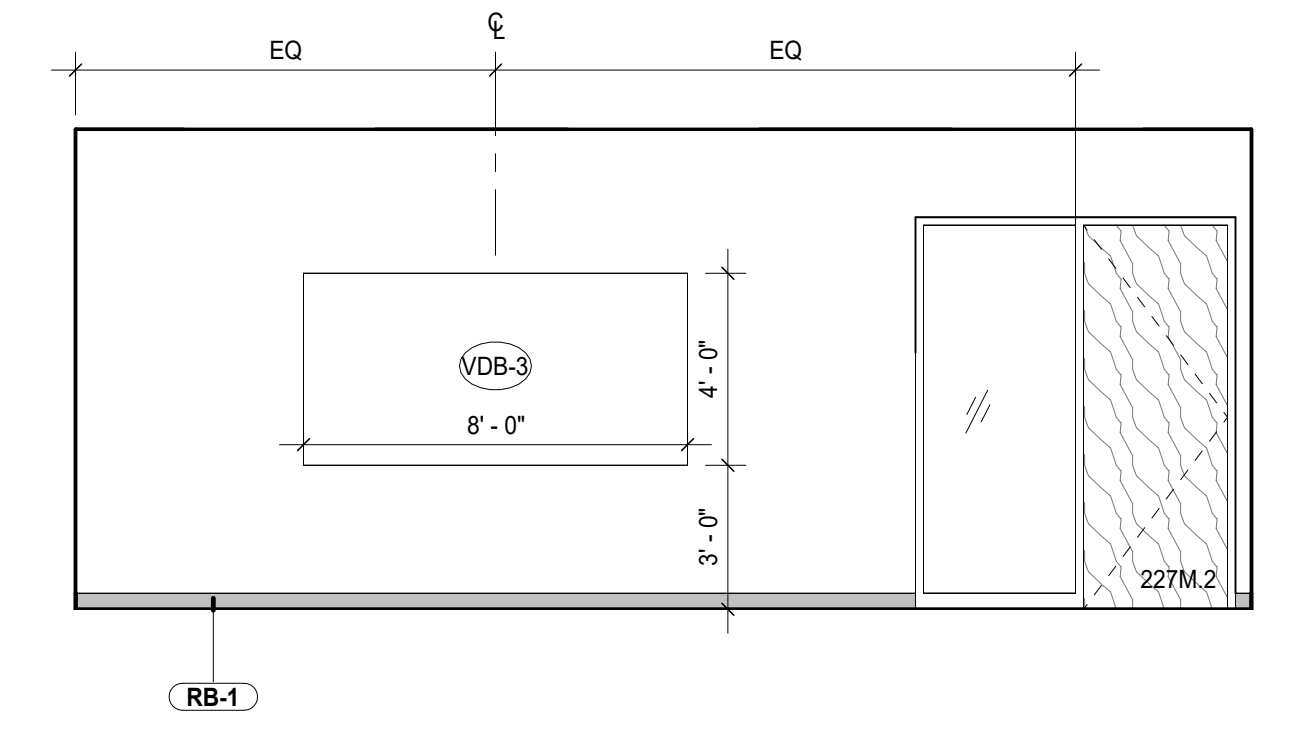


CLINICAL PREP 227
2
1/4" = 1'-0" A-431

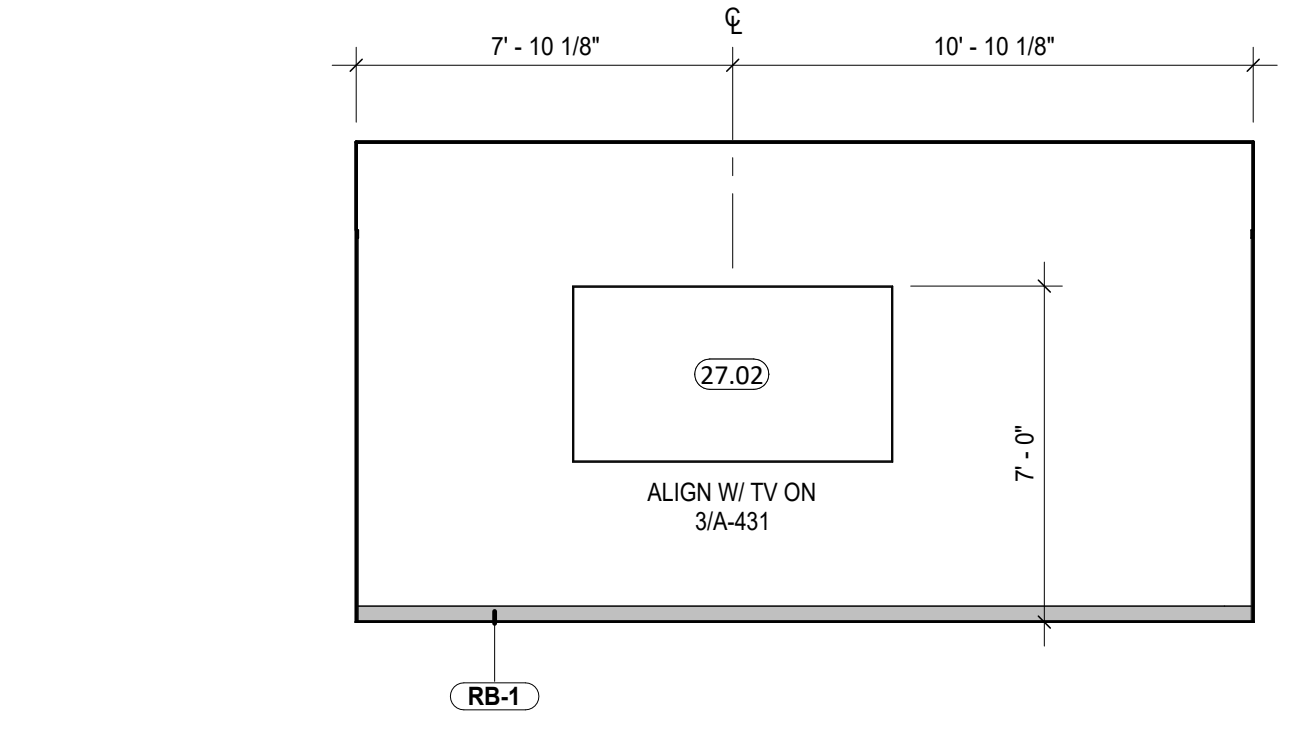
- MATERIAL LEGEND**
- WIDW-1 WOOD WALL PANEL MATCH, RE: DOOR SCH. AND FINISH LEGEND A-501
 - WF-1 WINDOW FILM
- LEGEND**
- APC-1 FINISH TYPE INDICATOR, RE: FINISH LEGEND ON A-501
 - PRT-1 PARTITION TYPE INDICATOR, RE: A-602
 - AC-1 WINDOW TYPE INDICATOR
 - CAB-1 CABINET TYPE SYMBOL, RE: A-506 UPPER-CABINET STYLE LOWER-CABINET SIZE IN INCHES
 - TA- TOILET ACCESSORY INDICATOR, RE: TA- TOILET ACCESSORY NUMBER- ITEM NUMBER
 - E-0 EQUIPMENT TAG, RE: EQUIPMENT SCHEDULE ON A-501
- GENERAL NOTES**
- FURNITURE SHOWN FOR REFERENCE ONLY
 - ALL WALLS TO BE PNT-1 UNO
- KEYNOTES**
- 5.92 SPEEDBRACES
 - 9.16 CONTROL JOINT
 - 10.30 CORNER GUARDS (HEIGHT = 7'-6" @ 6" AFF), UNO
 - 10.91 FIRE EXTINGUISHER AND WALL CABINET
 - 27.02 CPU BRACKET, CFO
 - 27.02 VIDEO DISPLAY UNIT, RE: AV



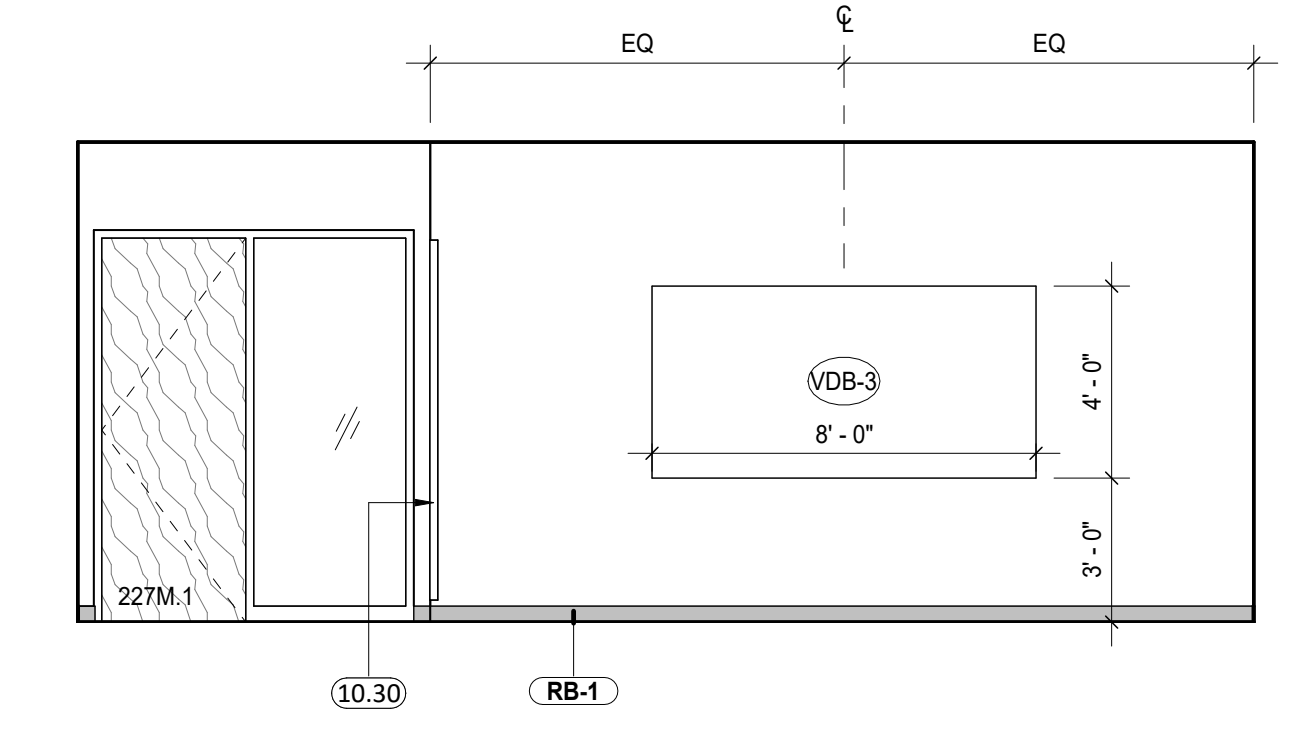
DEBRIEF 227M - NORTH
3
1/4" = 1'-0" A-431



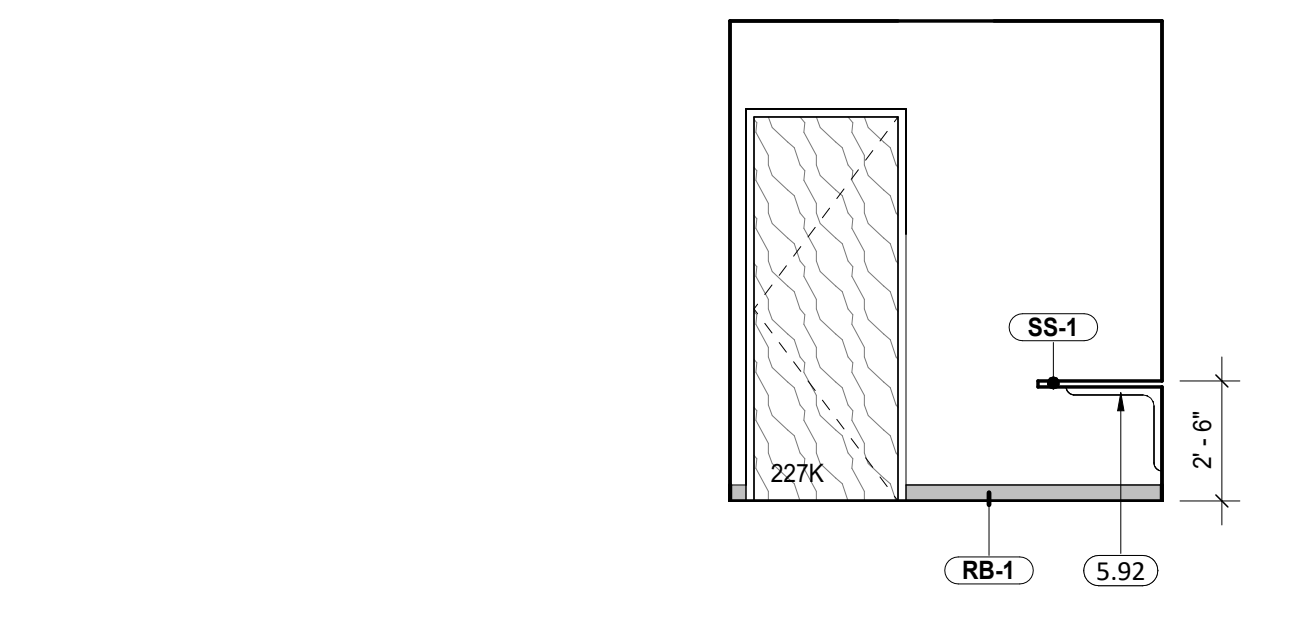
DEBRIEF 227M
4
1/4" = 1'-0" A-431



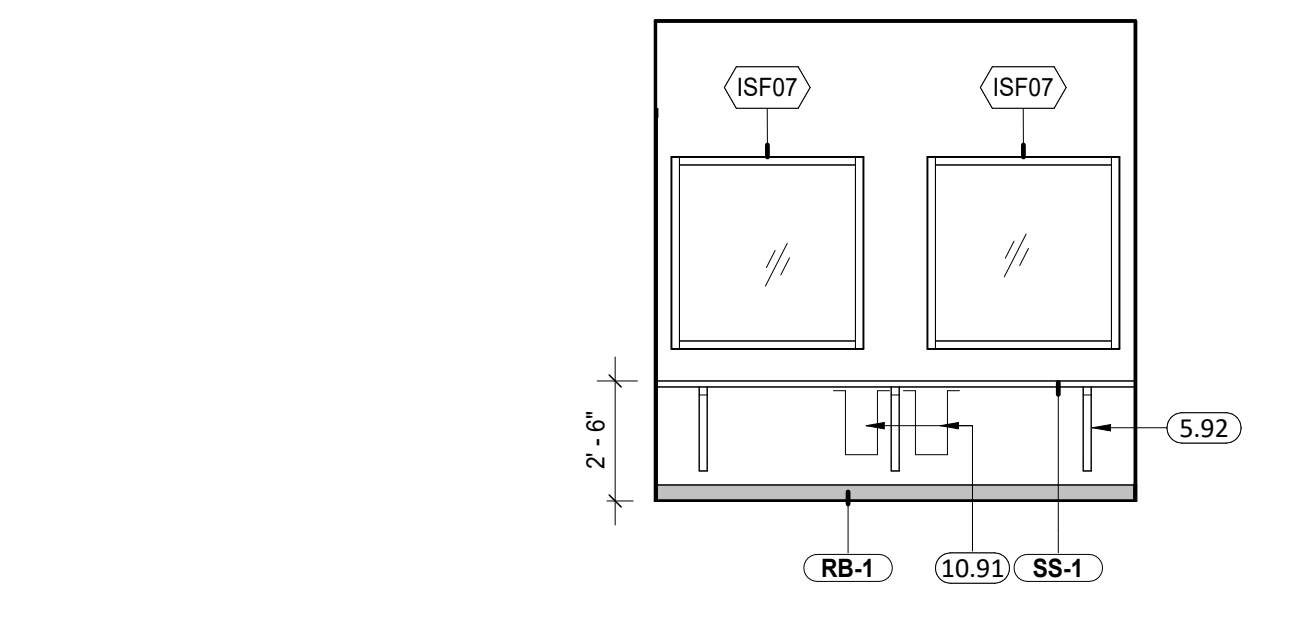
DEBRIEF 227M - SOUTH
5
1/4" = 1'-0" A-431



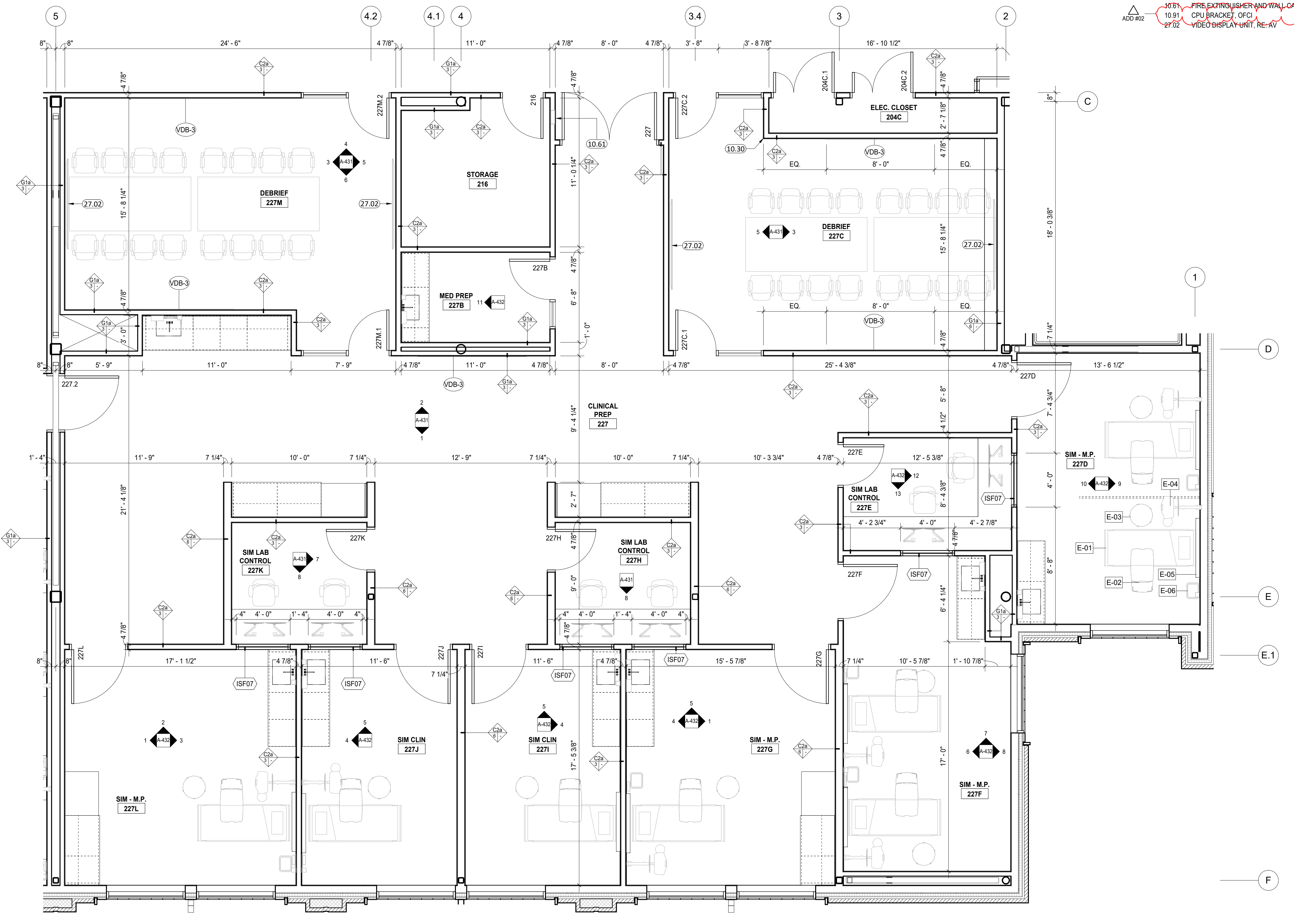
DEBRIEF 227M
6
1/4" = 1'-0" A-431



SIM LAB CONTROL 227K - SOUTH
7
1/4" = 1'-0" A-431

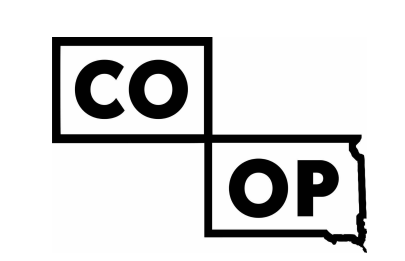


SIM LAB CONTROL 227K
8
1/4" = 1'-0" A-431



ENLARGED PLAN - SIMULATION SUITE
9
1/4" = 1'-0" A-431

ADD #02 4/23/2024



AndersonMasonDale Architects

Architect of Record
CO-OP Architecture
1108 S Main Street Suite #102
Aberdeen, SD 57401
Telephone: 605-225-4852
E-mail: tom@co-oparch.com

Associate Architect
AndersonMasonDale Architects, P.C.
3198 Speer Boulevard
Denver, CO 80211
Telephone: 303-294-9448
FAX: 303-294-0762
E-mail: bblanchard@amdarchitects.com

Civil Engineer
Helms Engineering
416 Production Street
Aberdeen, SD 57401
Telephone: 605-225-1212
E-mail: lucash@helmsengineering.com

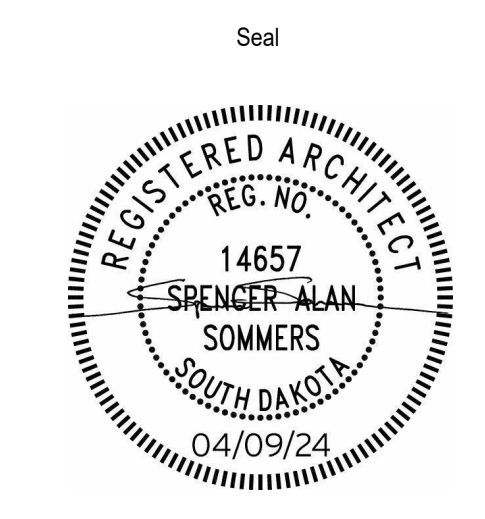
Landscape Architect
Landscape Architecture
624 N Main Ave, Suite 201
Sioux Falls, SD 57104
Telephone: 605-224-1505
E-mail: tpudwill@thinkinfuence.com

Structural Engineer
Associates, Inc.
6609 S. Lyncrest Place, Suite 110
Sioux Falls, SD 57103
Telephone: 605-743-8310
E-mail: jchristensen@riseincorp.com

Mech & Plumbing Engineer
Engineering
801 railroad Ave SE
Aberdeen, South Dakota 57401
Telephone: 605-226-1344
E-mail: traviss@sieng.biz

Electrical Engineer
Engineering
3314 Milwaukee Ave. NE
Aberdeen, SD 57401
Telephone: 605-226-1340
E-mail: thomas.j.heinz@megcorp.com

ARCHITECTURAL DRAWINGS ARE TO BE VIEWED IN COLOR FOR FULL AND COMPLETE INFORMATION



Seal Issue Date
100% CONSTRUCTION DOCUMENTS APRIL 9, 2024
ADD #02 4/23/2024

LINCOLN HALL
12th Ave SE, Aberdeen, SD 57401
21-261 AMD / 2160 CO-OP
Northern State University
1200 S Jay St
Aberdeen, South Dakota 57401
Telephone: 605-626-3011
E-mail:

Project Number: 21-261 AMD / 2160 CO-OP
Drawn By: AMD
Reviewed By: SHBB
Approved By: CO-OP

ENLARGED PLAN & ELEVATIONS - SIMULATION SUITE

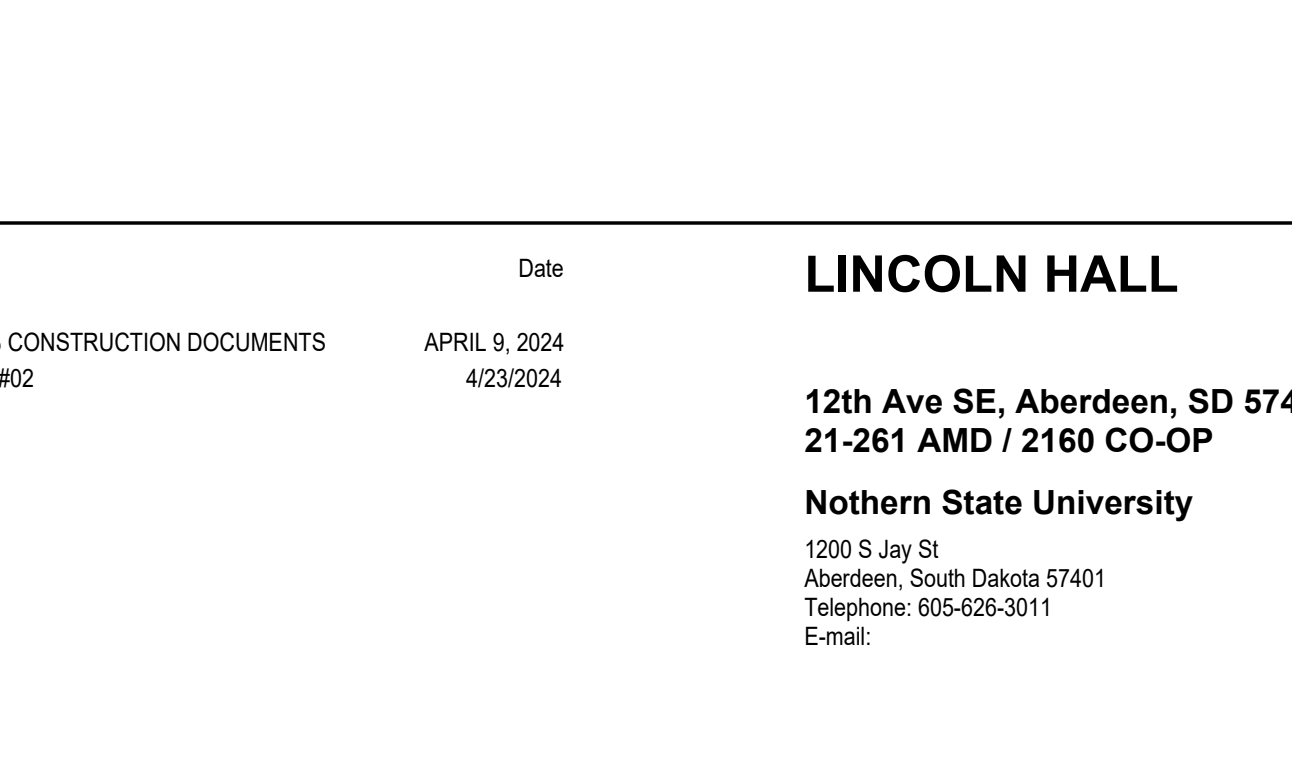
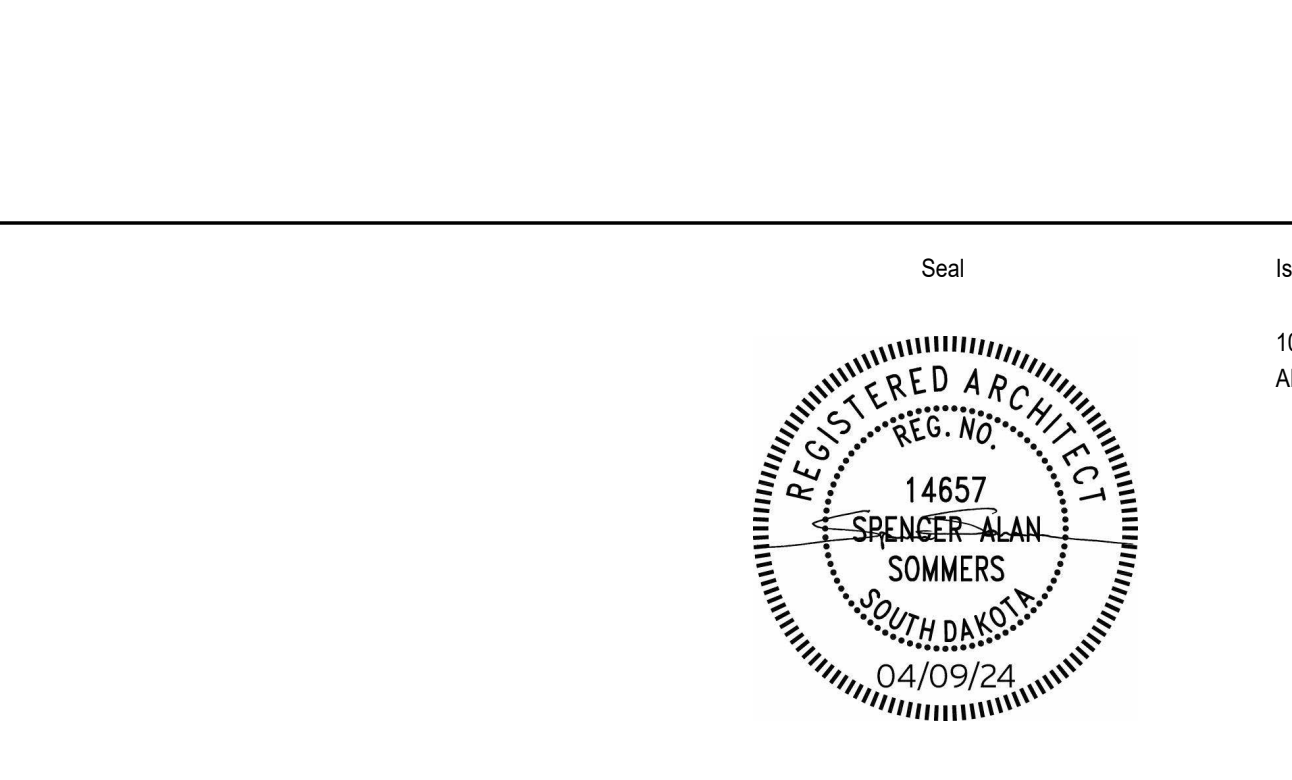
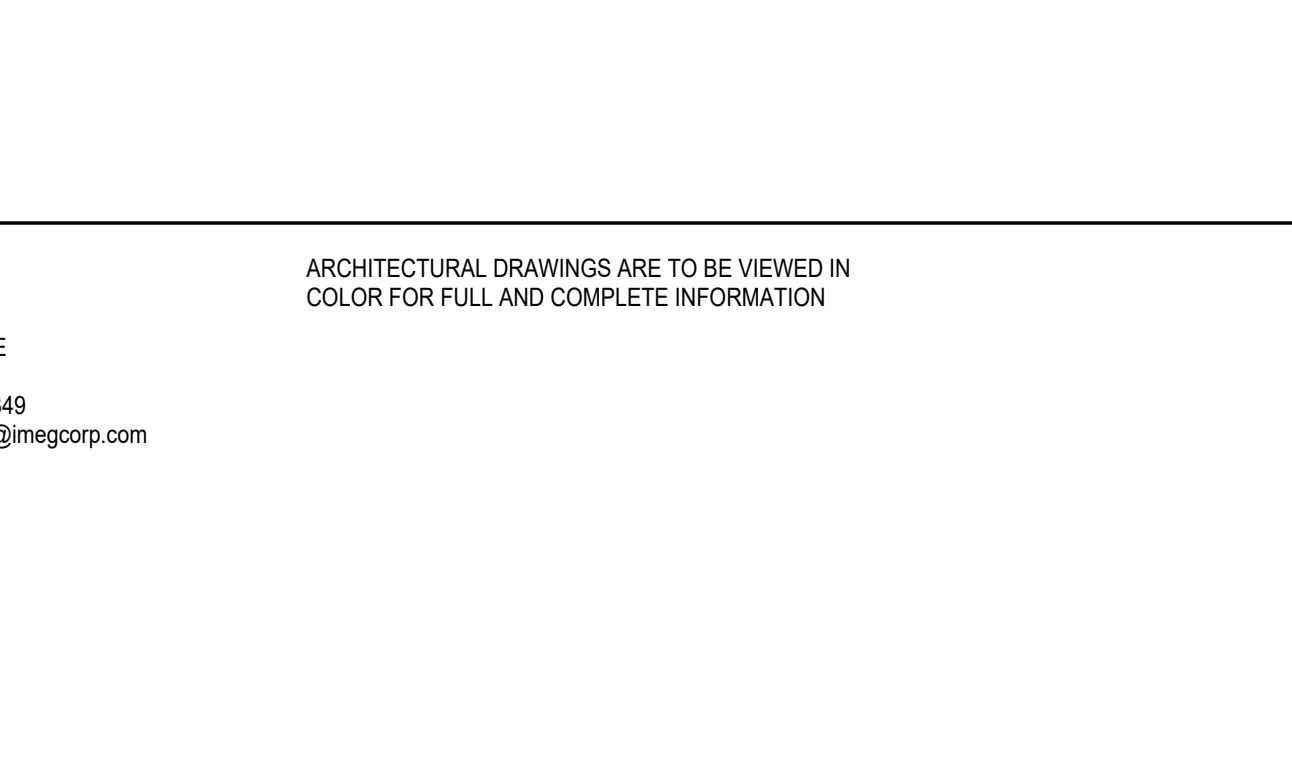
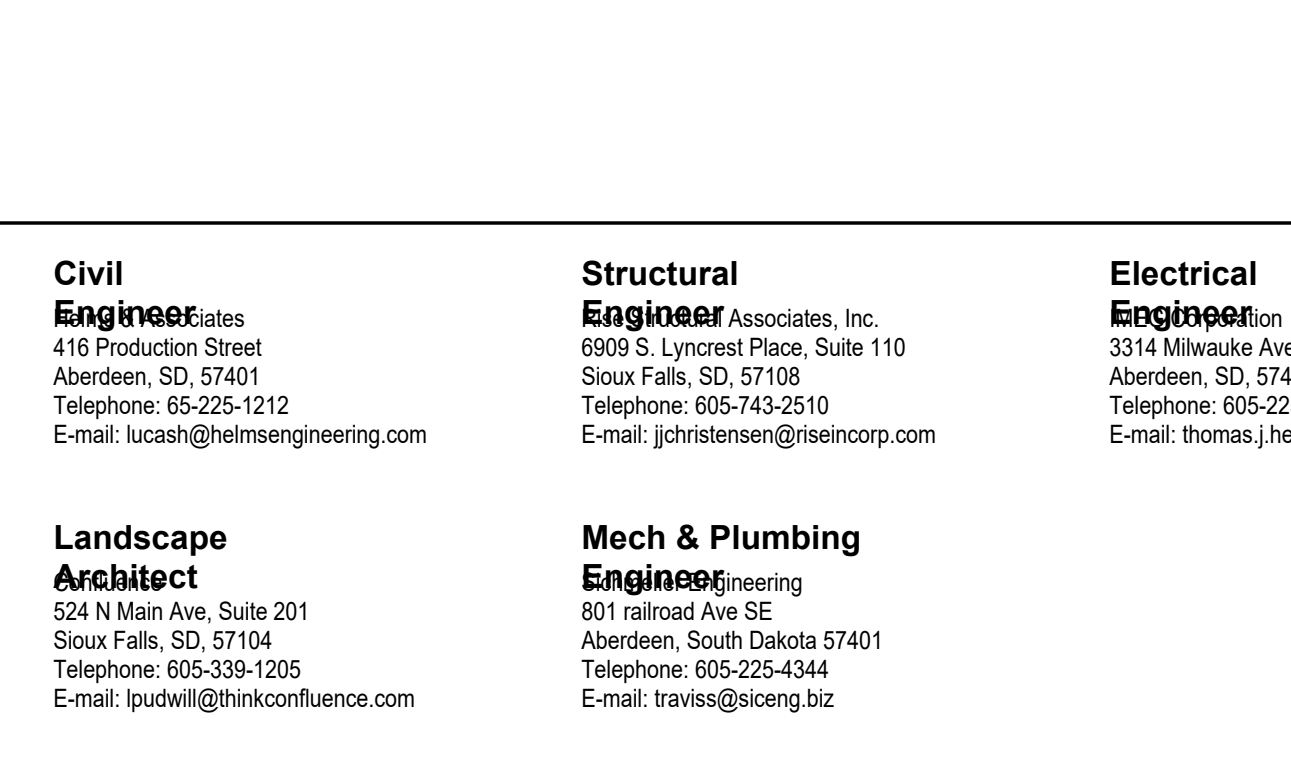
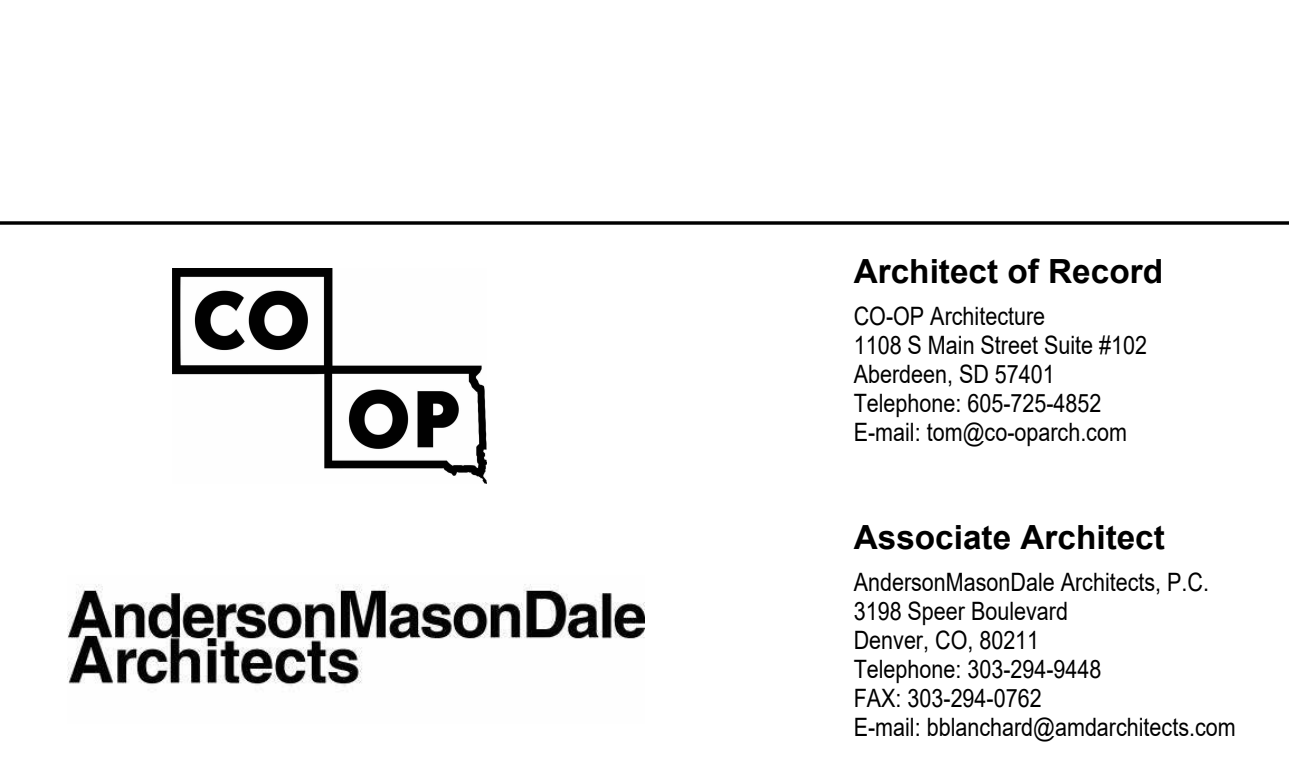
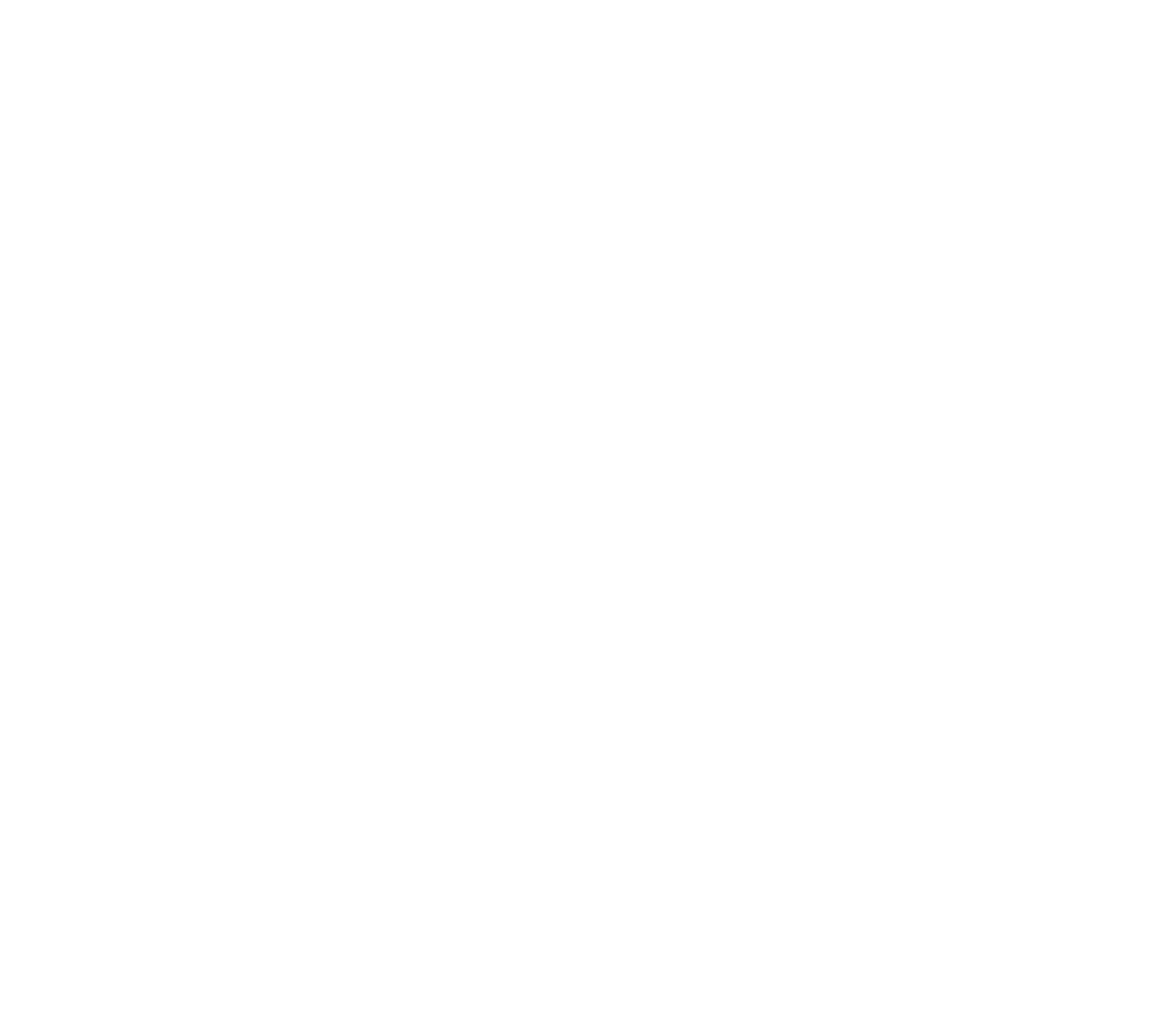
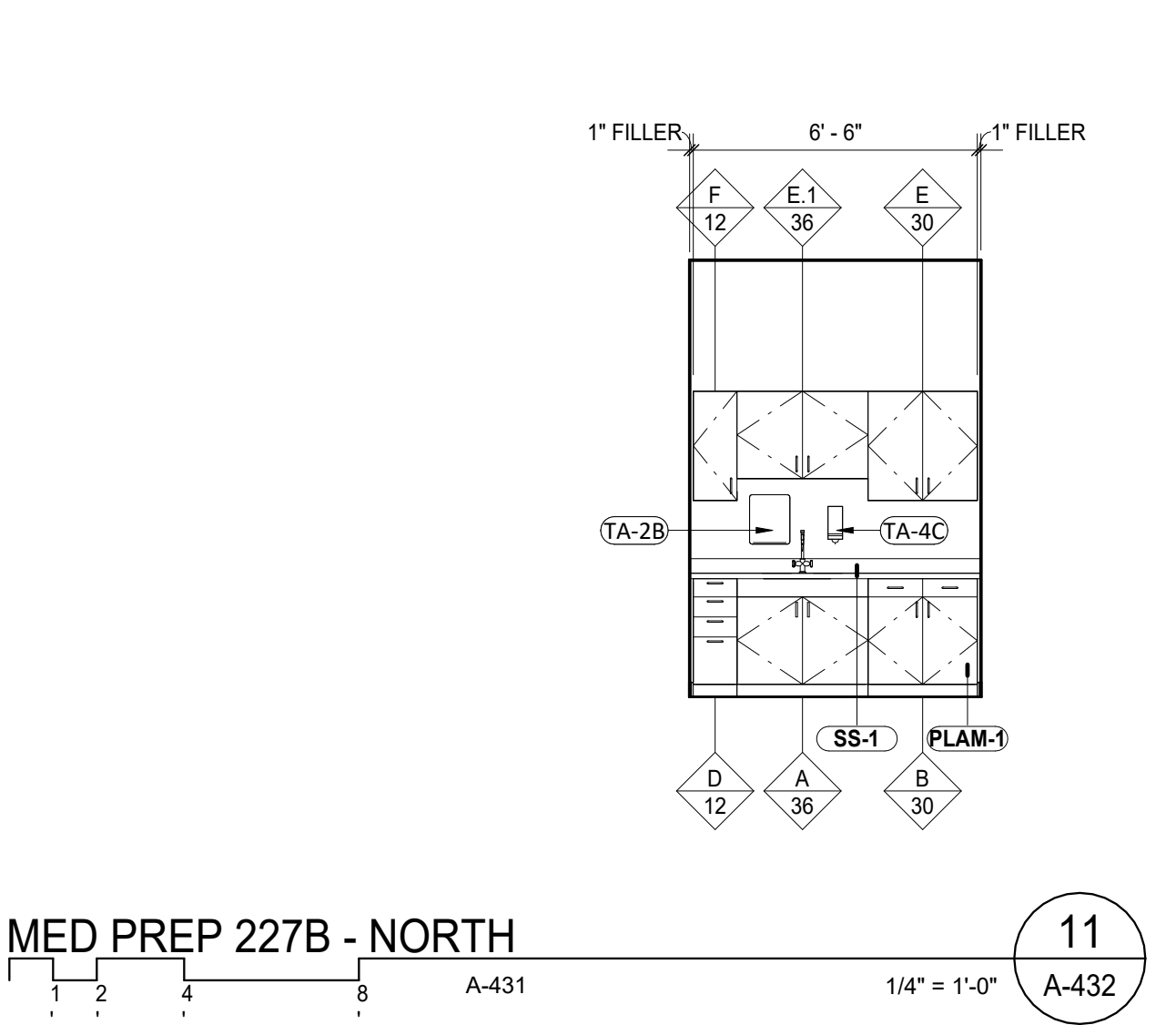
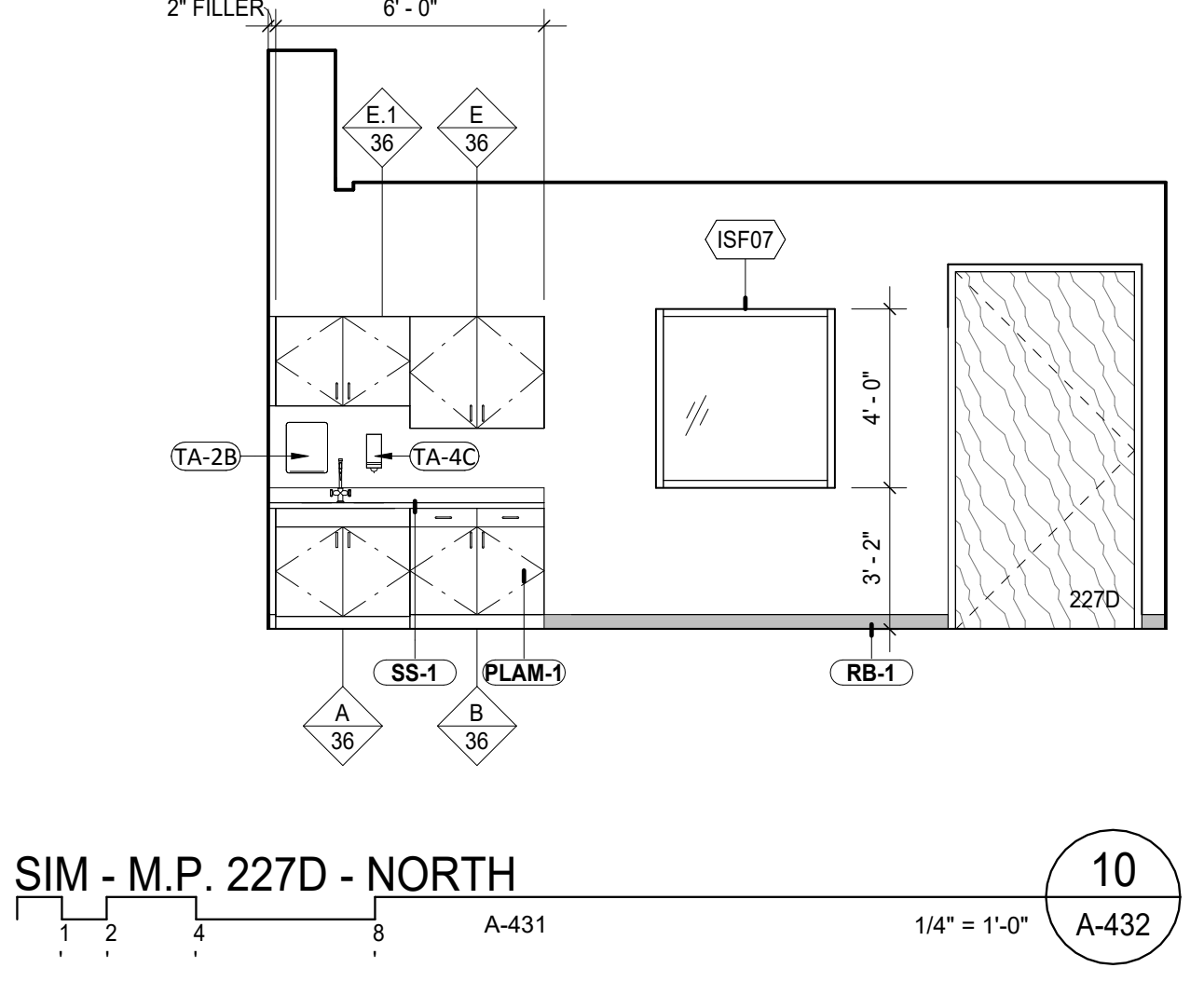
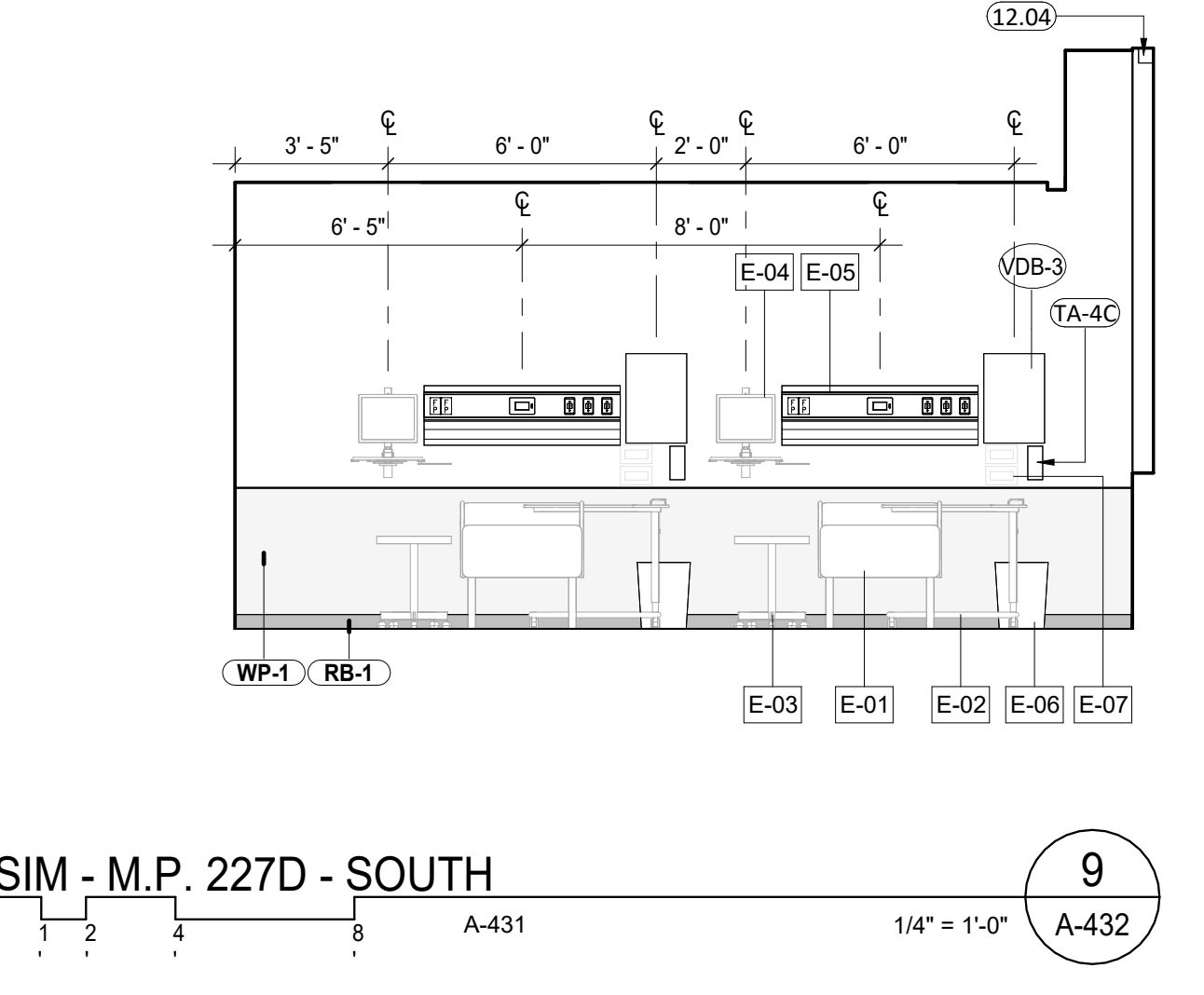
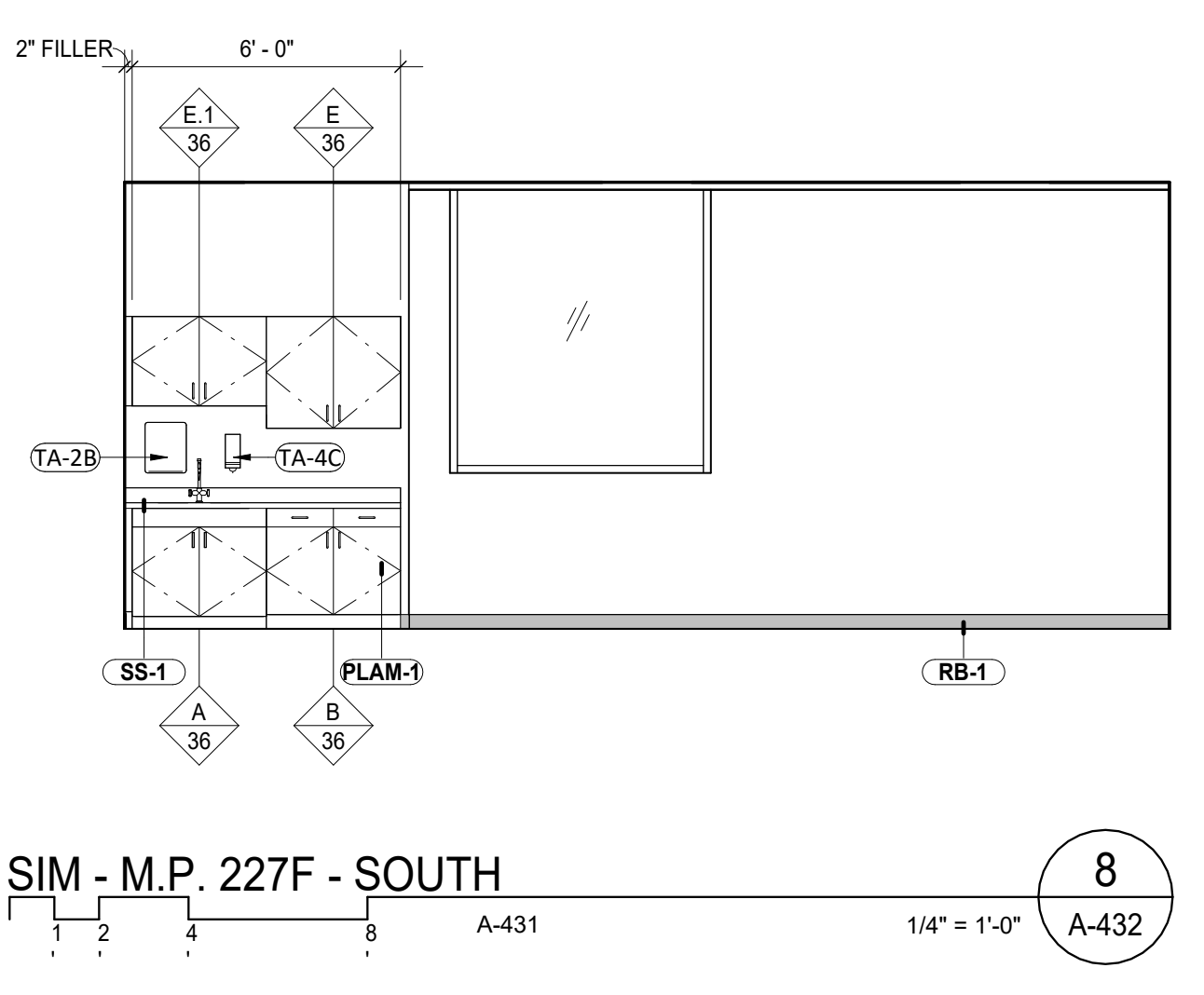
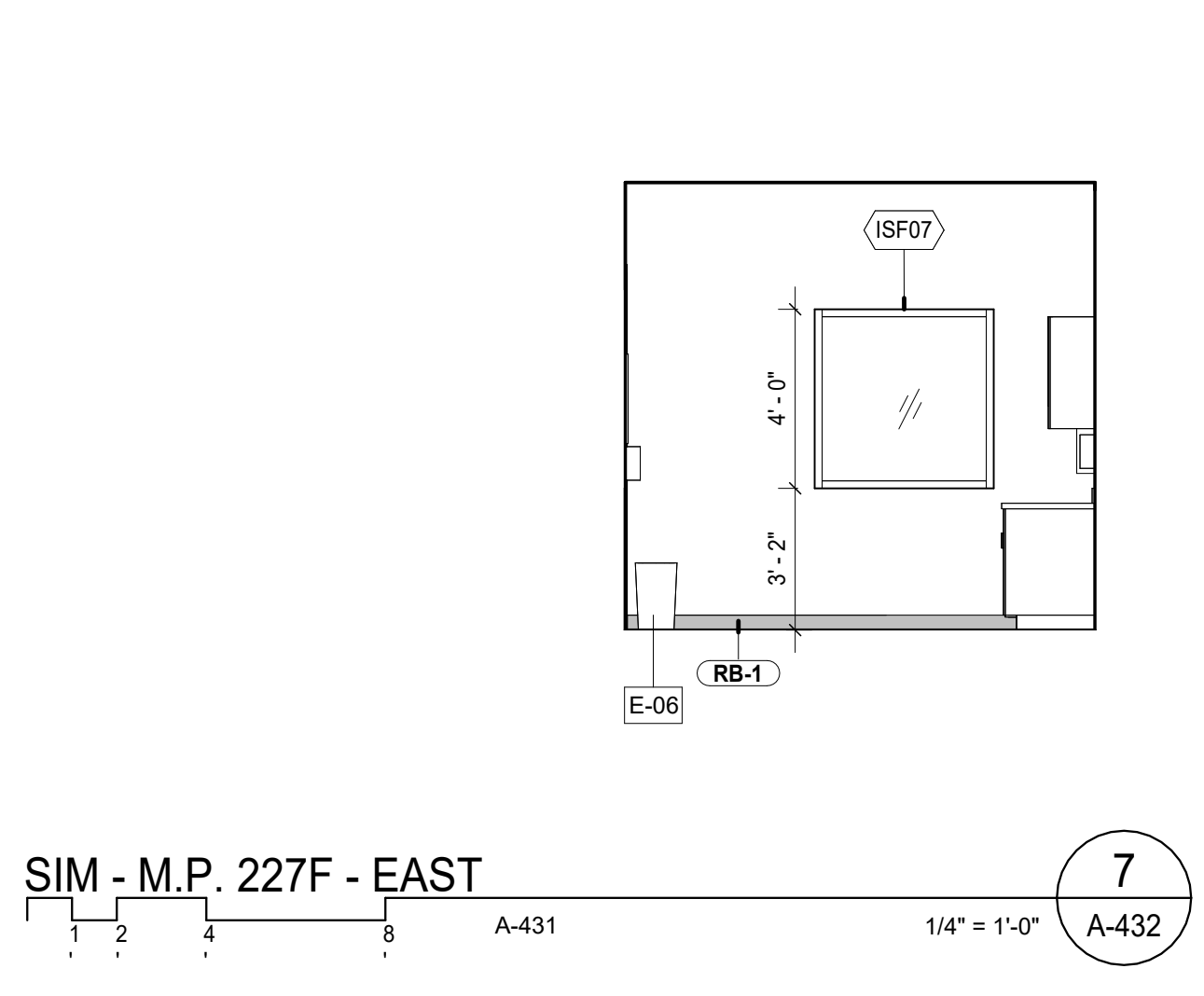
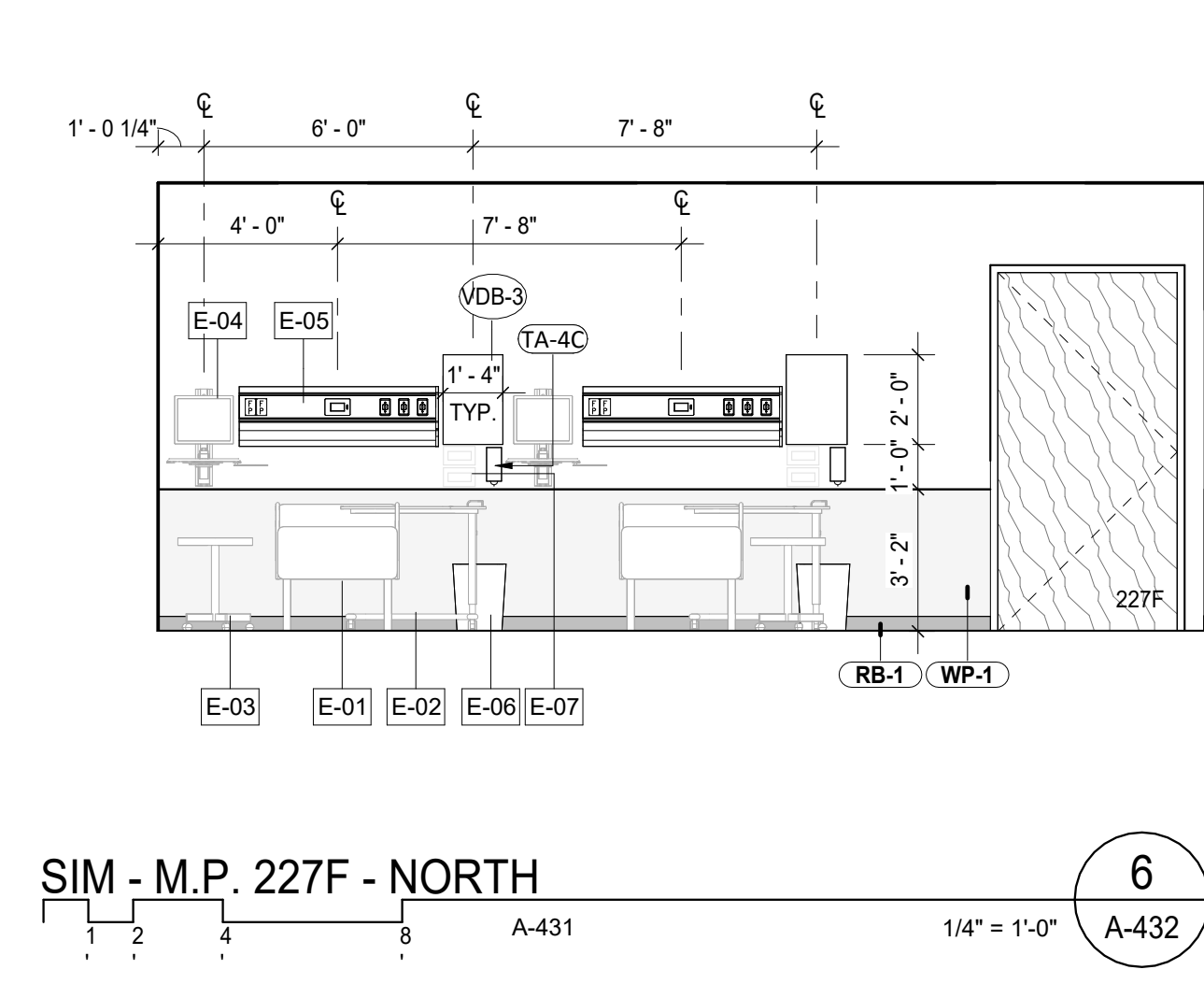
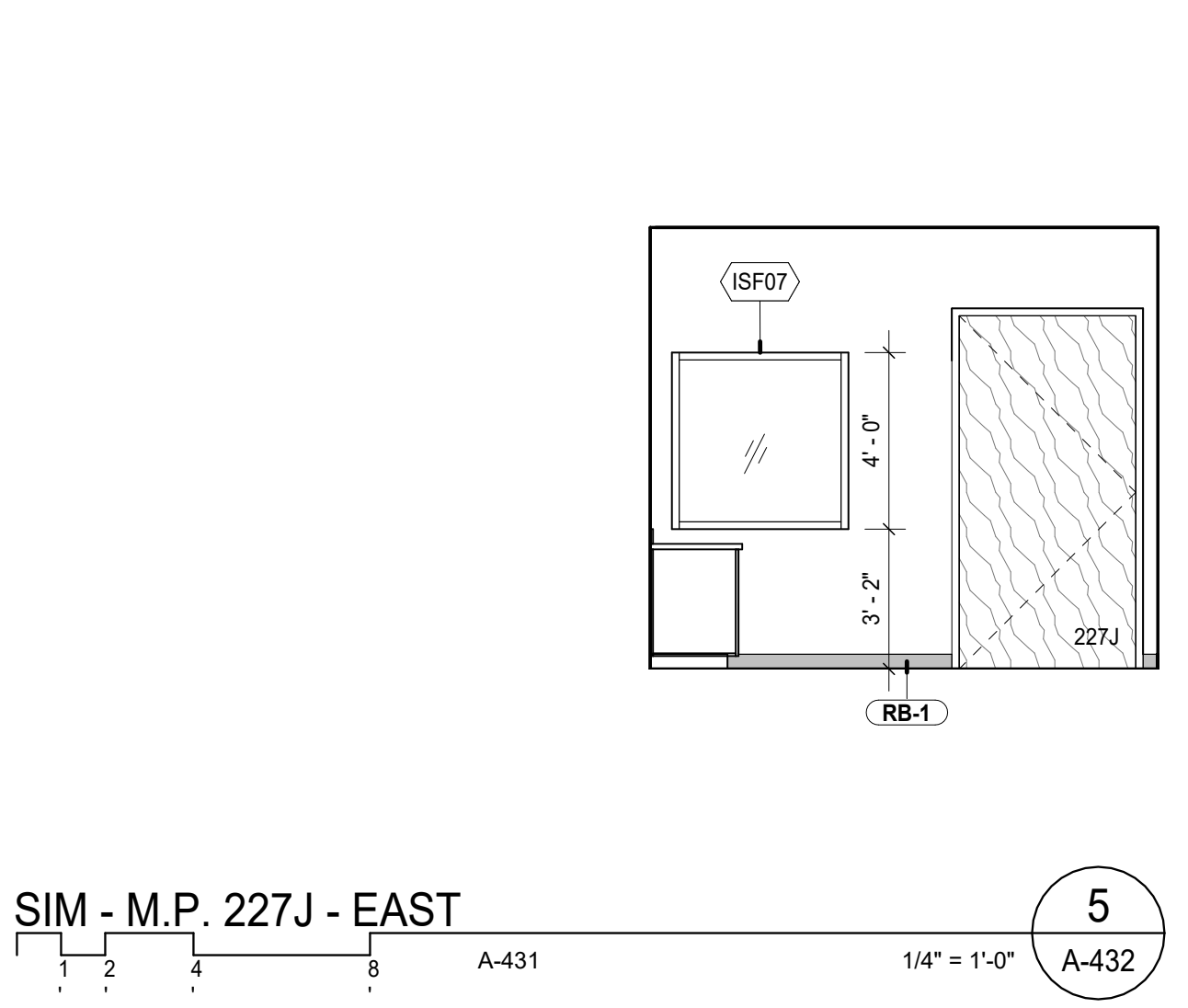
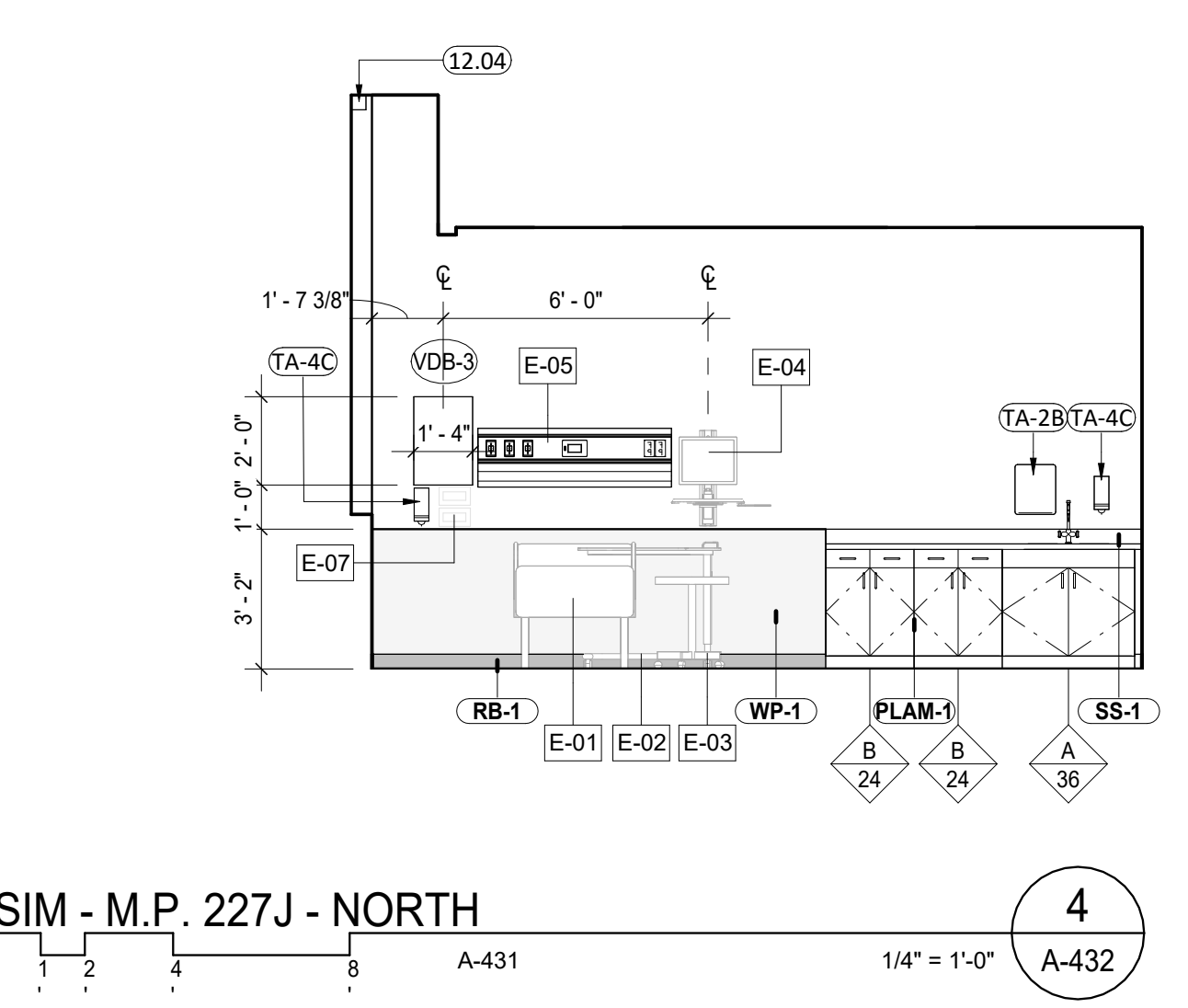
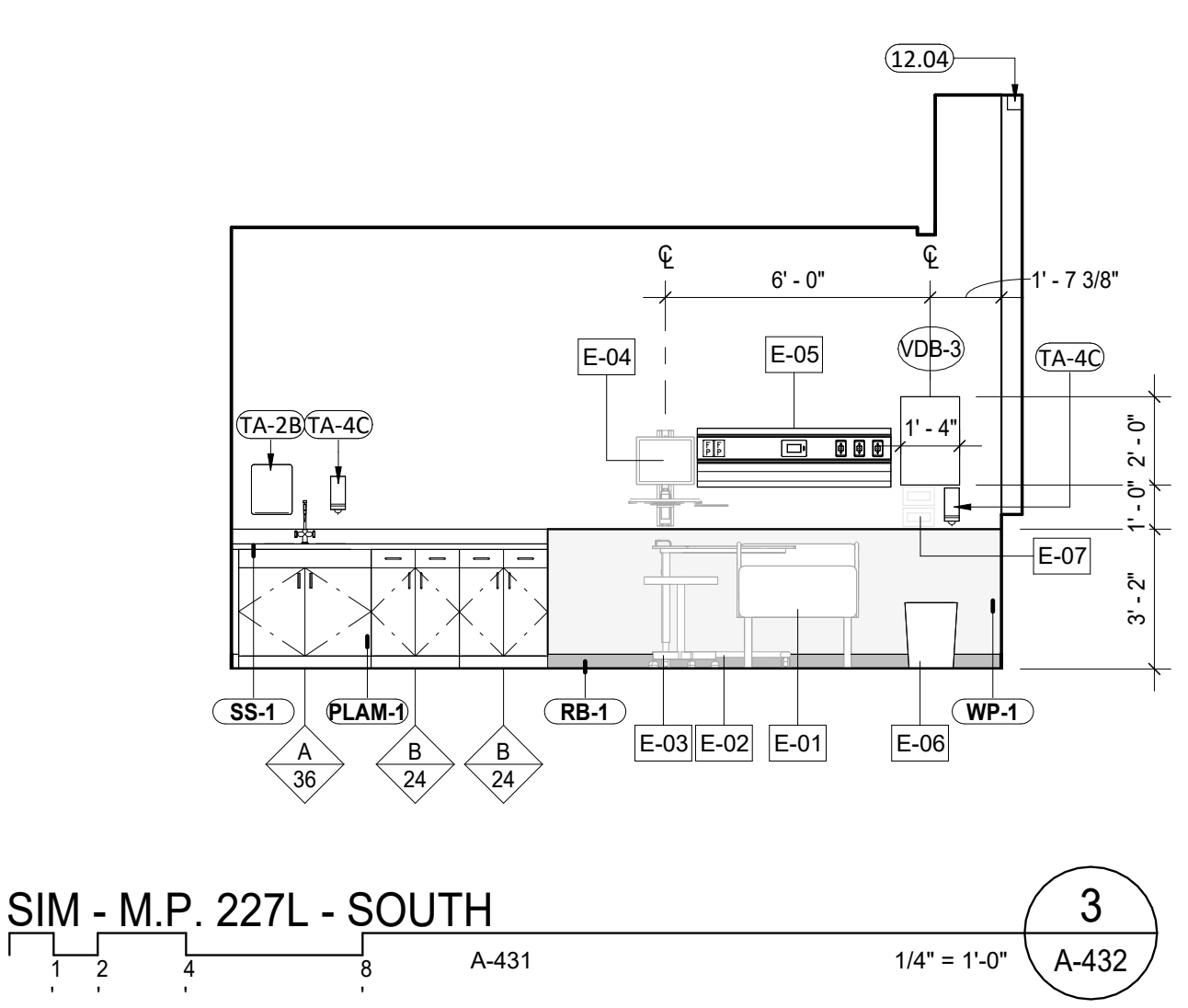
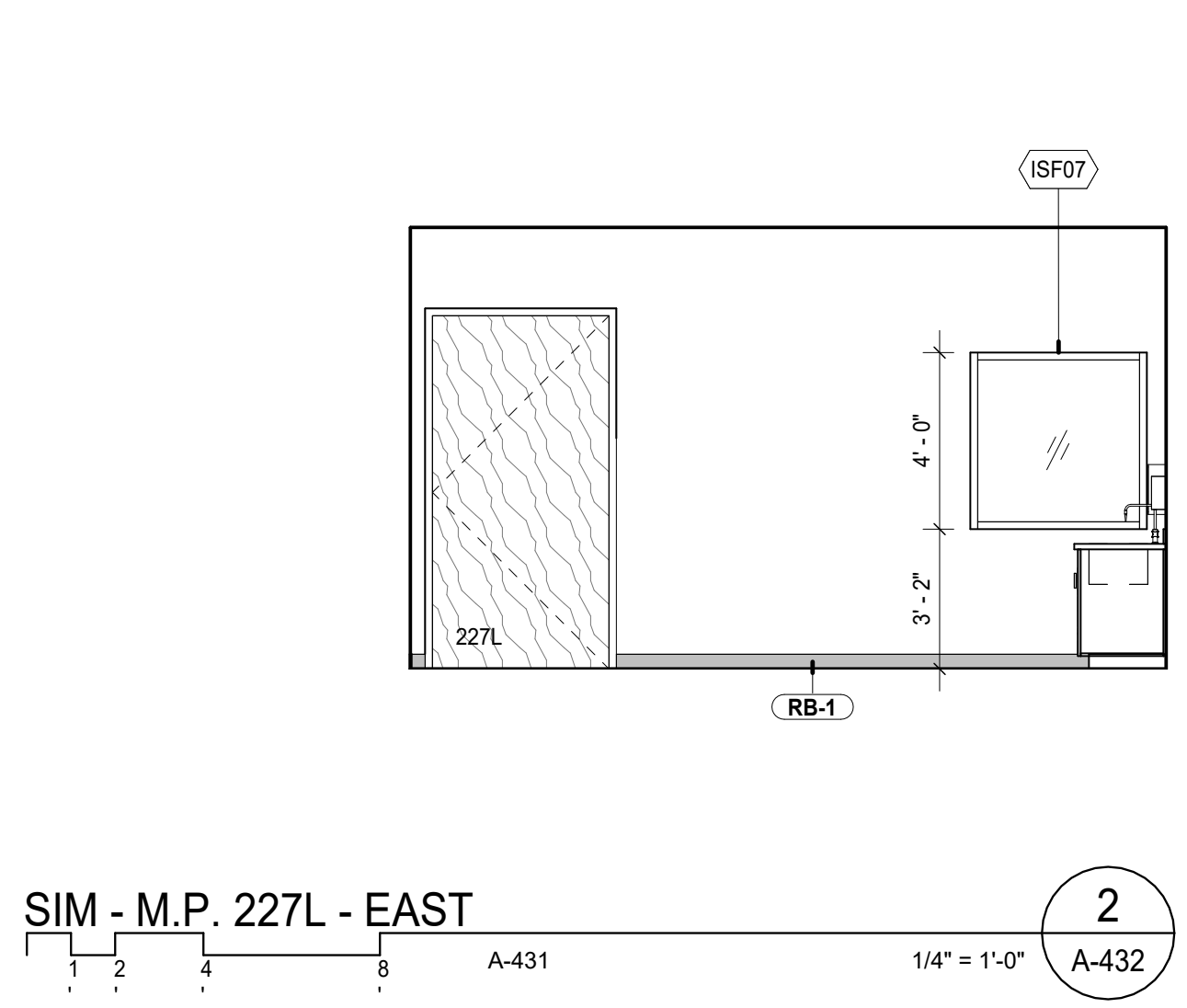
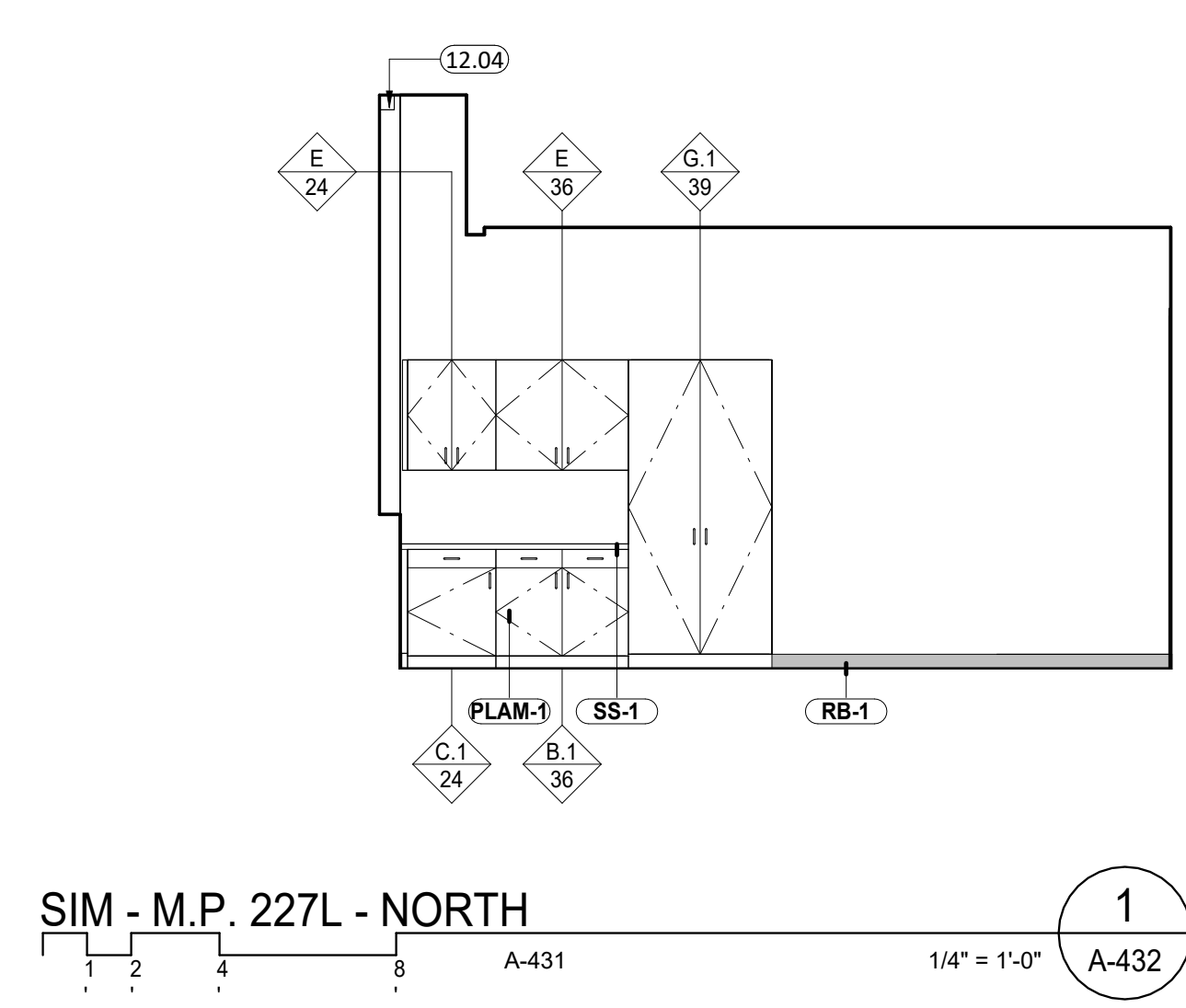
A-431

4/23/2024 2:08:13 PM

MATERIAL LEGEND	
	WDW-1 WOOD WALL PANEL
	WF-1 WINDOW FILM
	WOOD DOORS TO MATCH, RE. DOOR SCH. AND FINISH LEGEND A-501
LEGEND	
	APC-1 FINISH TYPE INDICATOR, RE: FINISH LEGEND ON A-501
	AC-1 PARTITION TYPE INDICATOR, RE: A-602
	AC-1 WINDOW TYPE INDICATOR
	A-506 CABINET TYPE SYMBOL, RE: A-506 UPPER-CABINET STYLE LOWER-CABINET SIZE IN INCHES
	TA-1 TOILET ACCESSORY INDICATOR: TA= TOILET ACCESSORY NUMBER- ITEM NUMBER
	E-1 EQUIPMENT TAG, RE: EQUIPMENT SCHEDULE ON A-501

- GENERAL NOTES**
- FURNITURE SHOWN FOR REFERENCE ONLY
 - ALL WALLS TO BE PNT-1 UNO

- KEYNOTES**
- 3.92 SPEEDGRACES
 - 10.91 CPU BRACKET, (FC)
 - 12.04 ROLLER HANGING BRACKET
 - TA-2B FOLDED PAPER TOWEL DISPENSER, SURFACE MOUNTED
 - TA-4C LIQUID SOAP DISPENSER, SURFACE MOUNTED



Architect of Record
 CO-OP Architecture
 1108 S Main Street Suite #102
 Aberdeen, SD 57401
 Telephone: 605-225-4852
 E-mail: tom@co-oparch.com

Associate Architect
 AndersonMasonDale Architects, P.C.
 3198 Speer Boulevard
 Denver, CO 80211
 Telephone: 303-294-9448
 FAX: 303-294-0762
 E-mail: bblanchard@amdararchitects.com

Civil Engineer
 Helms Engineering
 416 Production Street
 Aberdeen, SD 57401
 Telephone: 605-225-1212
 E-mail: lucash@helmsengineering.com

Structural Engineer
 Associates, Inc.
 6609 S. Lyncrest Place, Suite 110
 Sioux Falls, SD 57106
 Telephone: 605-743-8110
 E-mail: jchristensen@riseincorp.com

Electrical Engineer
 on
 3314 Milwaukee Ave. NE
 Aberdeen, SD 57401
 Telephone: 605-225-1349
 E-mail: thomas.j.heinz@megcorp.com

Mech & Plumbing Engineer
 Engineering
 801 railroad Ave SE
 Aberdeen, South Dakota 57401
 Telephone: 605-254-1344
 E-mail: traviss@sieng.biz

Landscap Architect
 thinkconfluence.com
 524 N Main Ave, Suite 201
 Sioux Falls, SD 57104
 Telephone: 605-254-1505
 FAX: 605-254-1505
 E-mail: tpudwill@thinkconfluence.com

ARCHITECTURAL DRAWINGS ARE TO BE VIEWED IN COLOR FOR FULL AND COMPLETE INFORMATION

Seal
 Issue
 Date
 100% CONSTRUCTION DOCUMENTS
 APRIL 9, 2024
 ADD #02
 4/23/2024

REGISTERED ARCHITECT
 REG. NO.
 14657
 SPENCER-ALAN
 SOMMERS
 SOUTH DAKOTA
 04/09/24

LINCOLN HALL
 12th Ave SE, Aberdeen, SD 57401
 21-261 AMD / 2160 CO-OP
 Northern State University
 1200 S Jay St
 Aberdeen, South Dakota 57401
 Telephone: 605-626-3011
 E-mail:

Project Number: 21-261 AMD / 2160 CO-OP
 Drawn By: AMD
 Reviewed By: SHBB
 Approved By: CO-OP

ENLARGED ELEVATIONS - SIMULATION SUITE

A-432

EQUIPMENT SCHEDULE

Table with columns: MARK, QTY, DESCRIPTION, FURNISHED, INSTALLED. Includes sections for Break Room 137, Break Room 211, Laundry 214, Mechanical Penthouse, SIM - M.P. 227D, SIM - M.P. 227F, SIM - M.P. 227G, SIM - M.P. 227L, SIM CLIN 227I, SIM CLIN 227J, SIM CLIN 227K, SKILLS LAB 213, and MISC.

FINISH LEGEND

NOTE: PRODUCTS INDICATED ARE BASIS OF DESIGN, FOR REFERENCE ONLY. REFER TO SPECIFICATIONS FOR LIST OF COMPARABLE PRODUCTS.

Table with columns: TAG, CSI SECTION #, CSI SECTION NAME, TYPE, DESCRIPTION, MFR, PRODUCT / PATTERN, COLOR, SIZE (INCHES), INSTALLATION DIRECTION, COMMENTS. Includes sections for Exterior, Floor, Wall, Ceiling, and Misc.

GENERAL NOTES

- 1. REFER TO THE DOOR SCHEDULE FOR DOOR AND DOOR FRAME FINISHES
2. REFER TO INTERIOR ELEVATIONS FOR VDU MOUNTING HEIGHTS AND SIZES.

AndersonMasonDale Architects logo and contact information for Architect of Record and Associate Architect.

Civil Engineer contact information.

Structural Engineer contact information.

Electrical Engineer contact information.

Mech & Plumbing Engineer contact information.

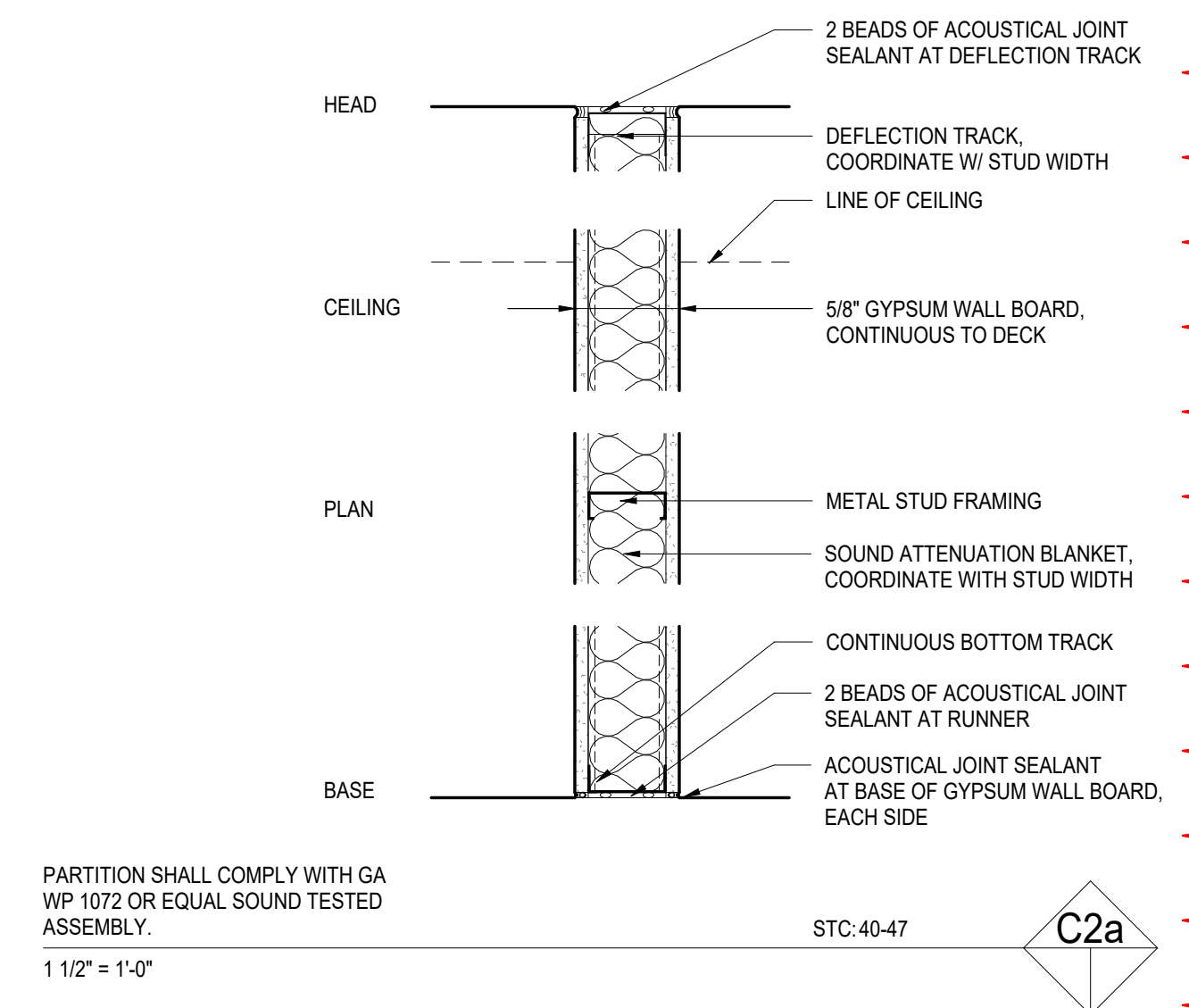
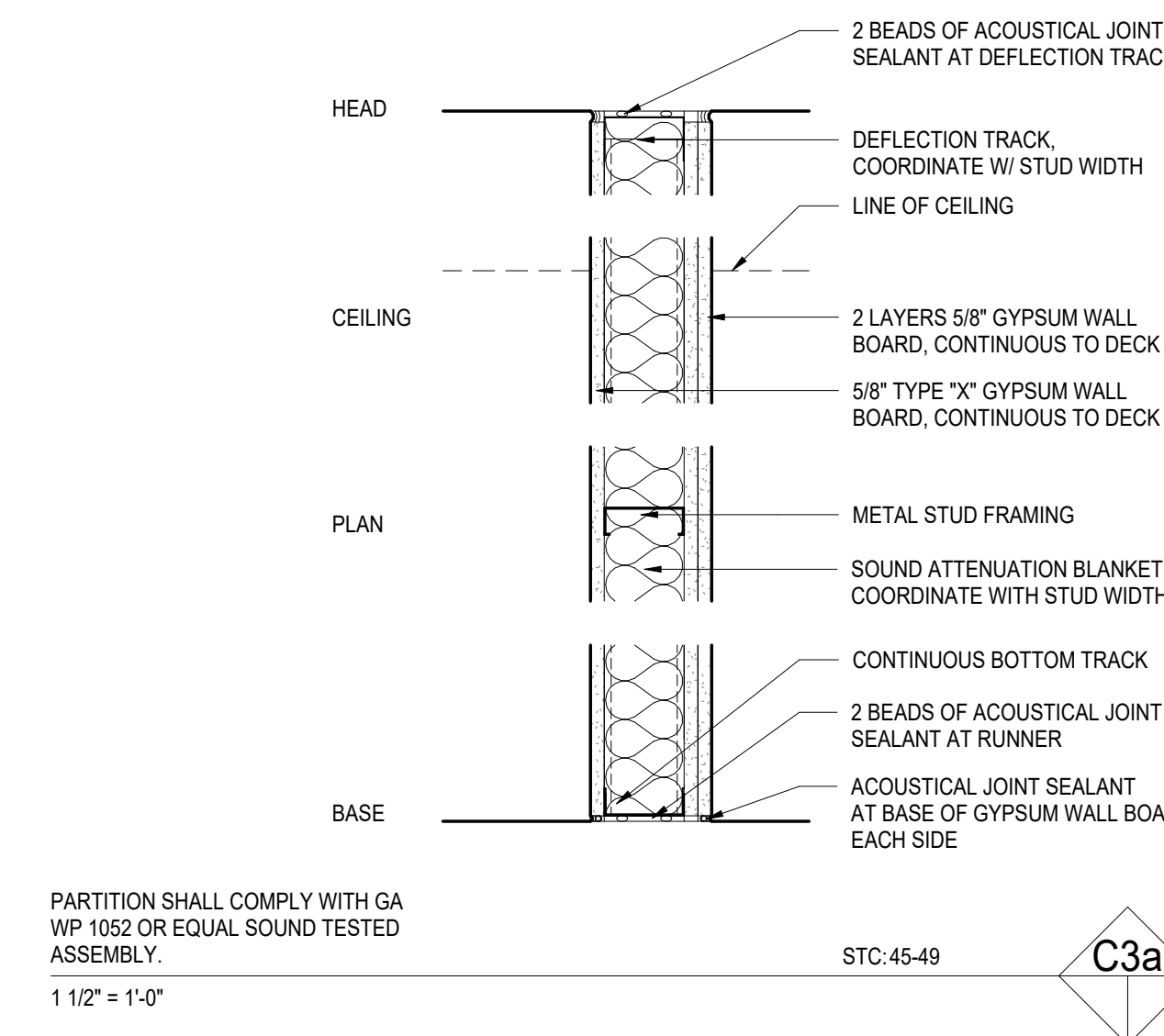
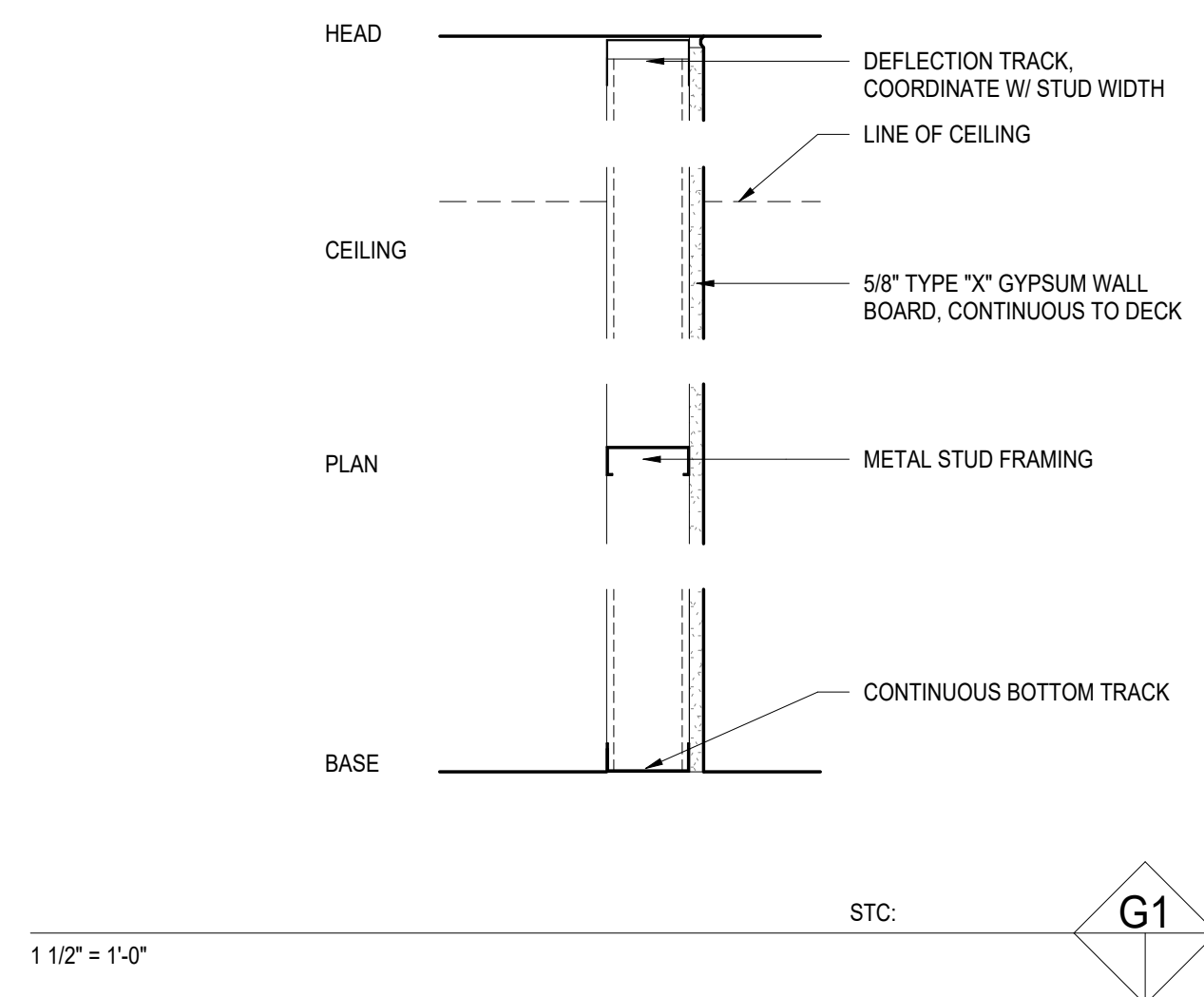
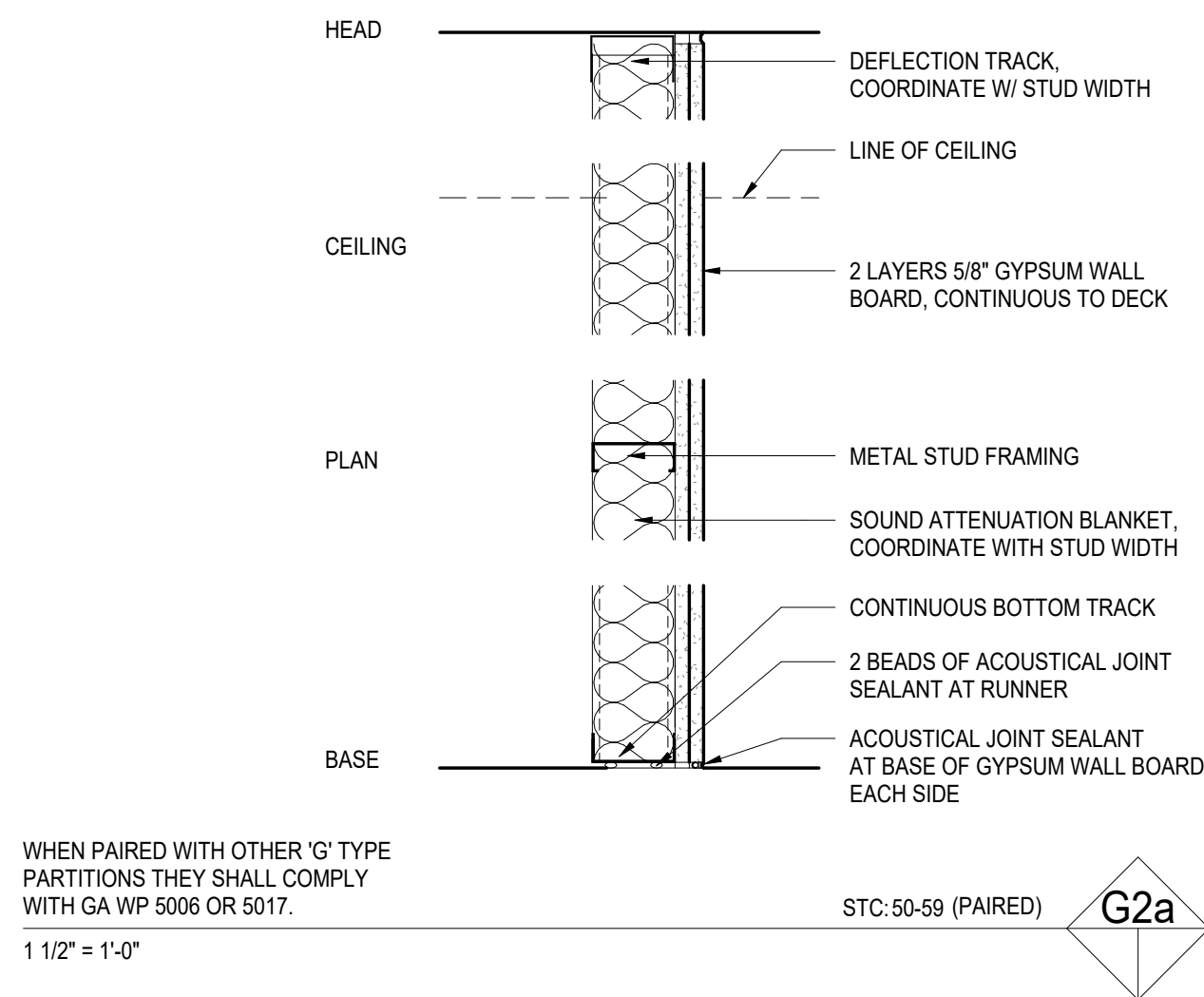
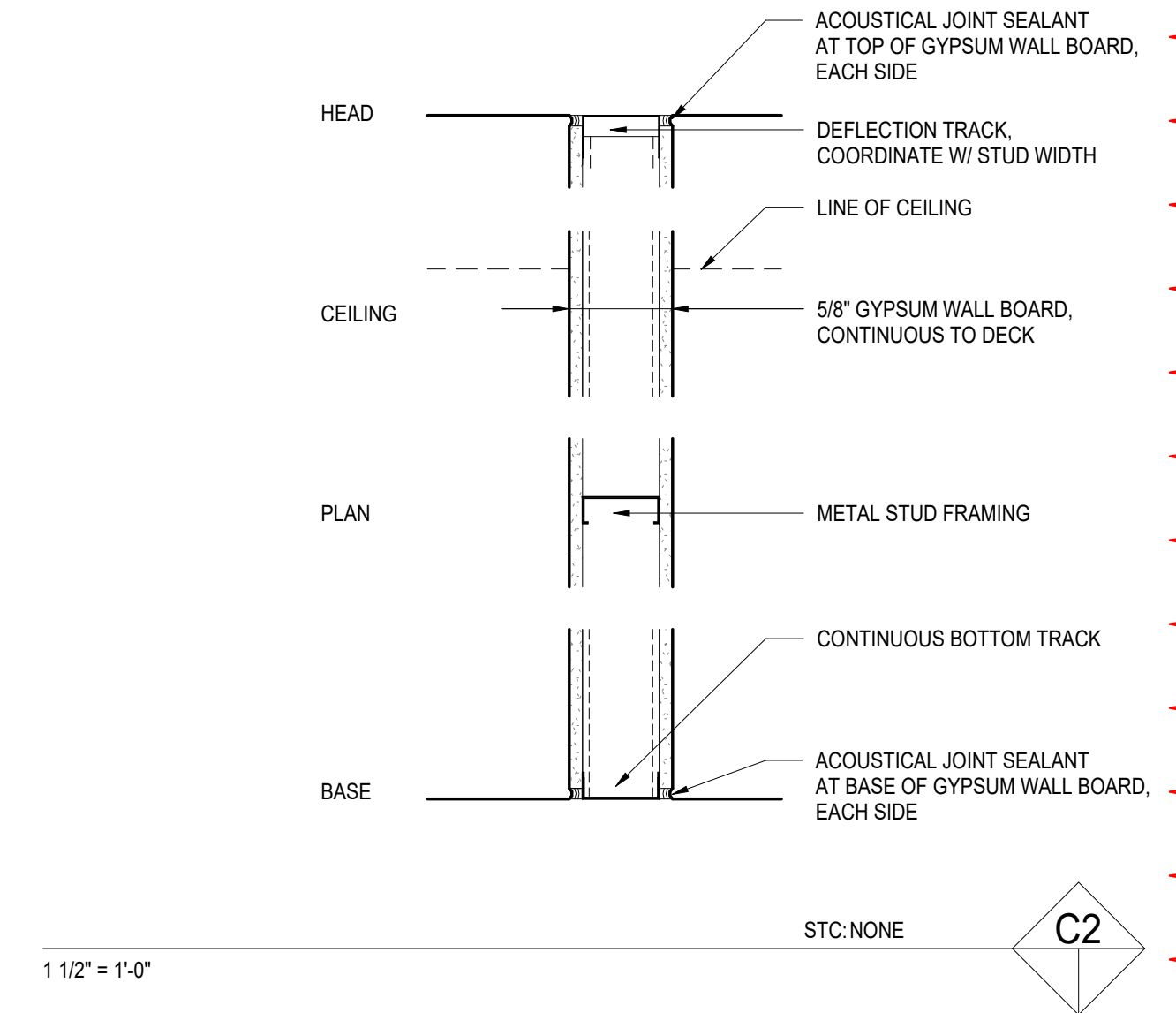
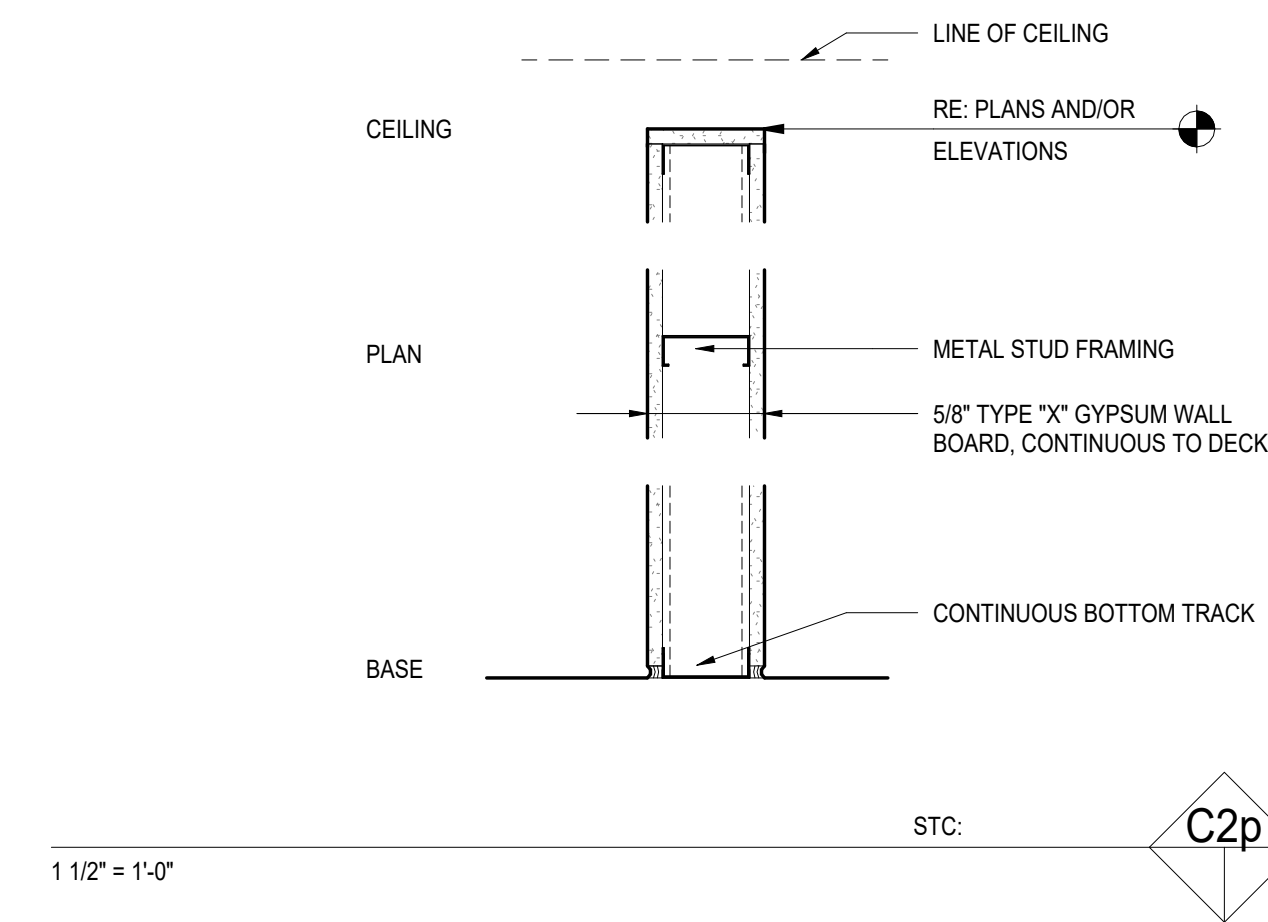
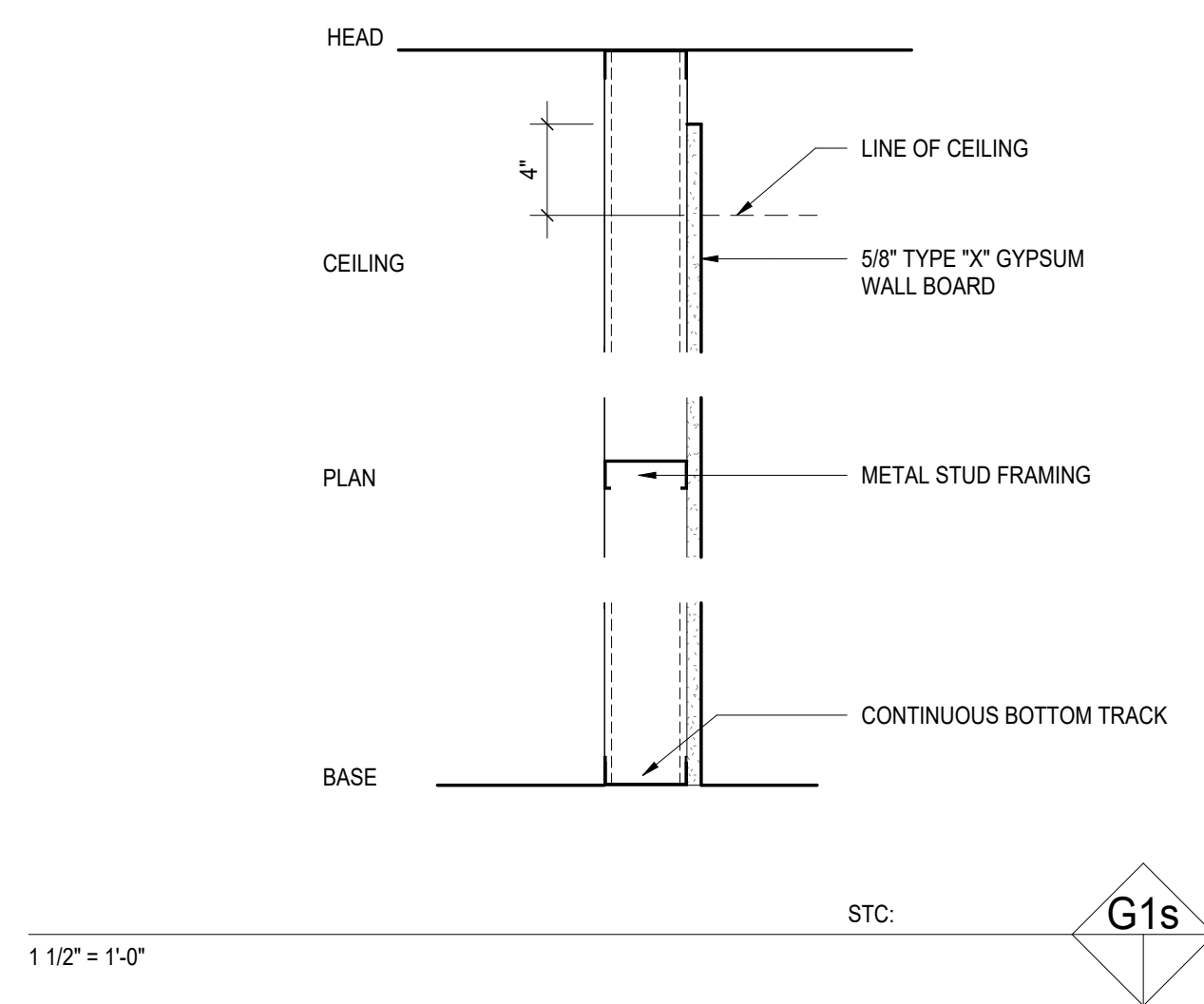
Registered Architect seal for Spencer-Alan Sommers.

Project information including Seal, Issue, Date, and Project Number.

LINCOLN HALL project name and address: 12th Ave SE, Aberdeen, SD 57401.

Project Number, Drawn By, Reviewed By, Approved By, and FINISH LEGEND & EQUIPMENT SCHEDULE.

A-501

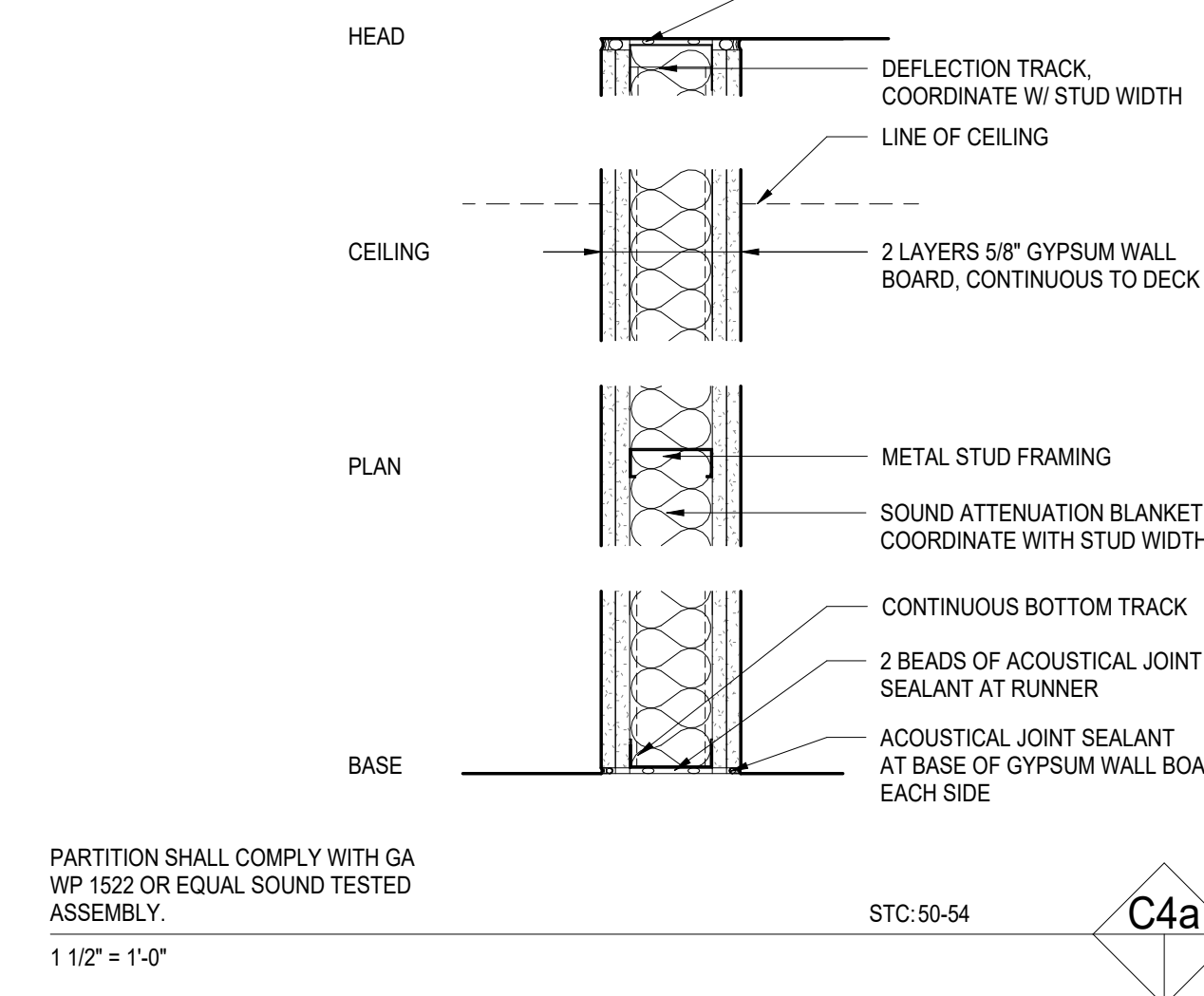
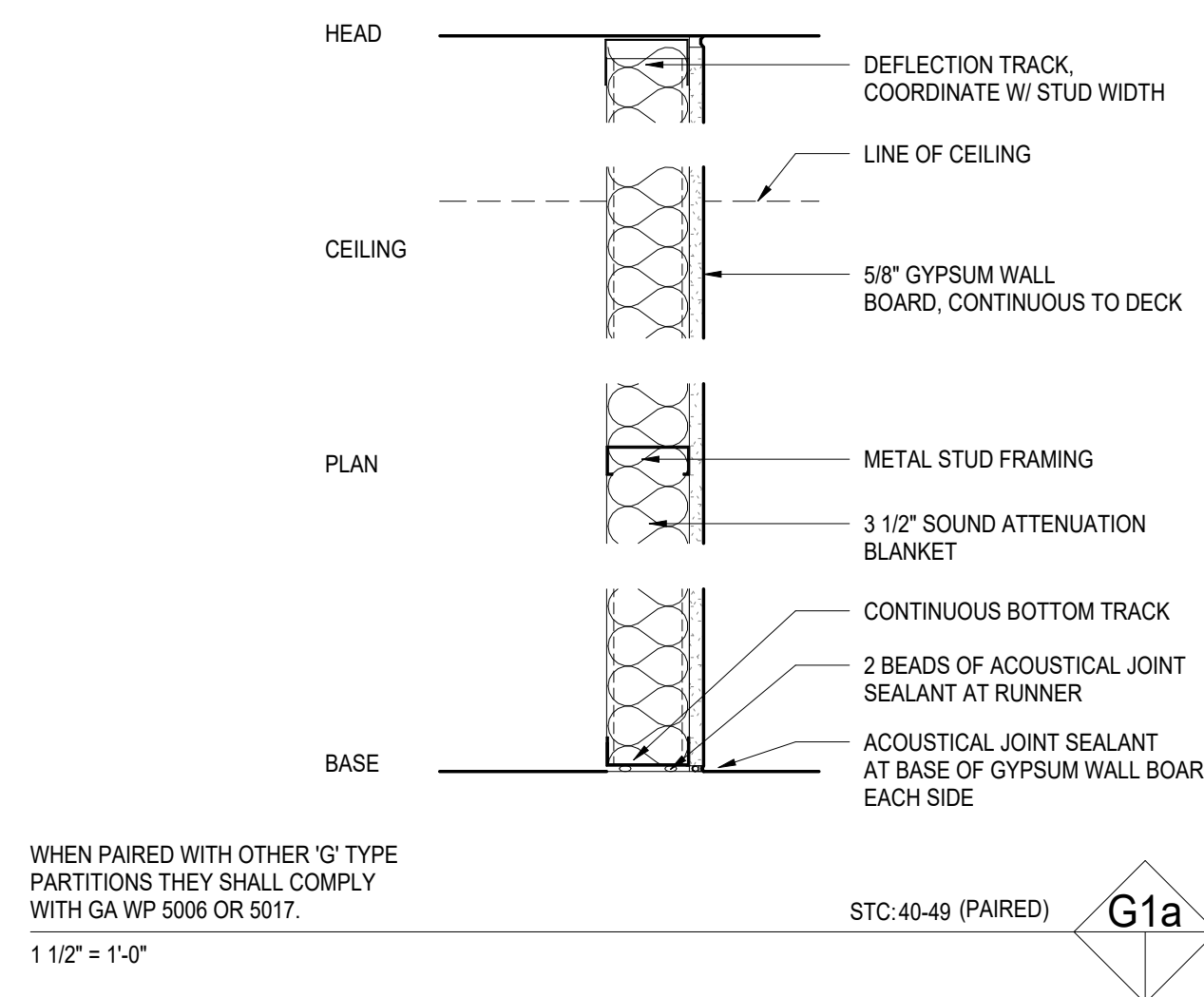
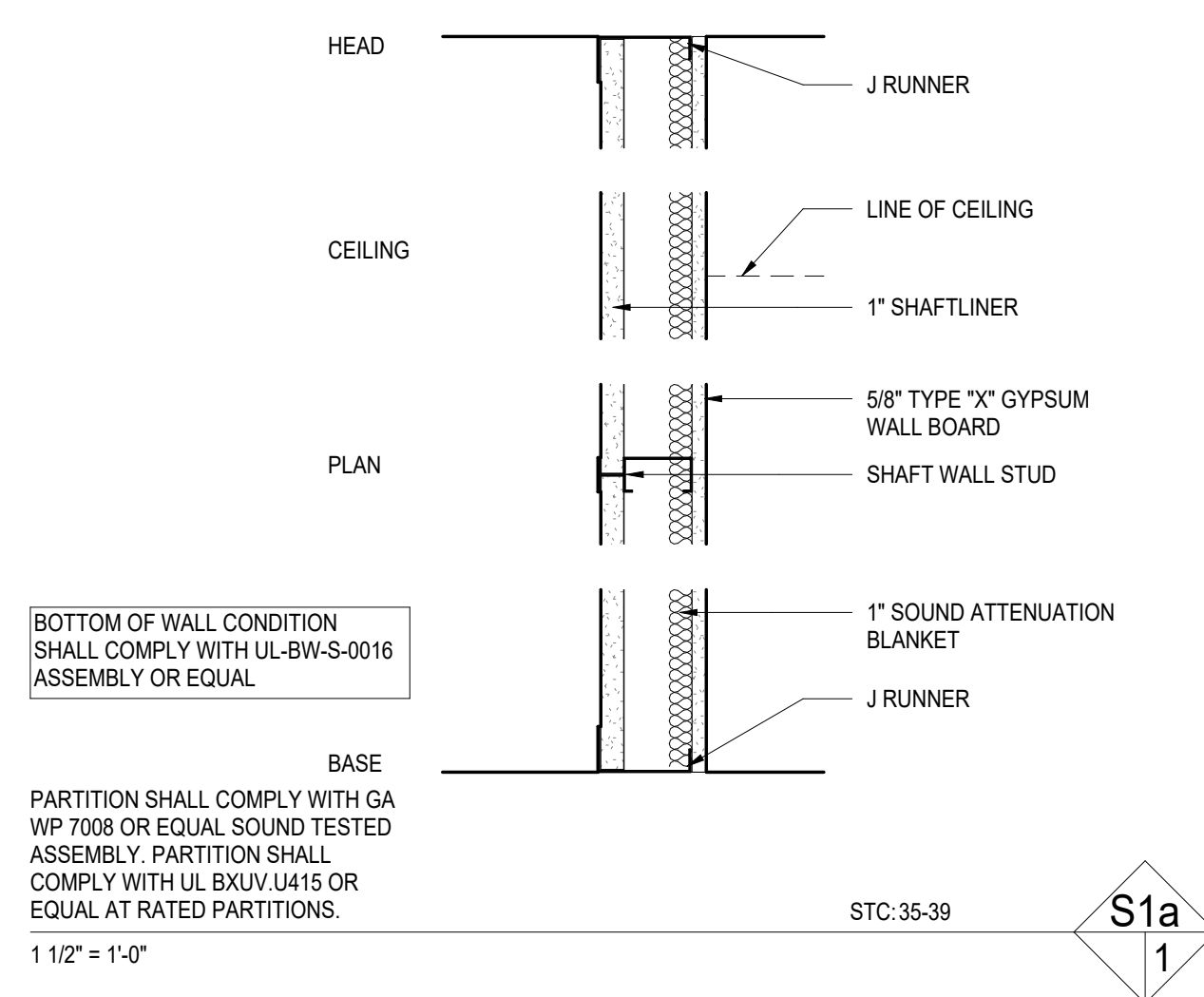


WHEN PAIRED WITH OTHER 'G' TYPE PARTITIONS THEY SHALL COMPLY WITH GA WP 5006 OR 5017. STC: 50-59 (PAIRED) **G2a**

STC: 45-49 **G1**

PARTITION SHALL COMPLY WITH GA WP 1052 OR EQUAL SOUND TESTED ASSEMBLY. STC: 45-49 **C3a**

PARTITION SHALL COMPLY WITH GA WP 1072 OR EQUAL SOUND TESTED ASSEMBLY. STC: 40-47 **C2a**



BOTTOM OF WALL CONDITION SHALL COMPLY WITH UL-BW-S-0016 ASSEMBLY OR EQUAL. PARTITION SHALL COMPLY WITH GA WP 7008 OR EQUAL SOUND TESTED ASSEMBLY. PARTITION SHALL COMPLY WITH UL BXUV-U415 OR EQUAL AT RATED PARTITIONS. STC: 35-39 **S1a**

WHEN PAIRED WITH OTHER 'G' TYPE PARTITIONS THEY SHALL COMPLY WITH GA WP 5006 OR 5017. STC: 40-49 (PAIRED) **G1a**

PARTITION SHALL COMPLY WITH GA WP 1522 OR EQUAL SOUND TESTED ASSEMBLY. STC: 50-54 **C4a**

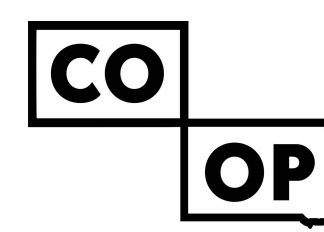
LEGEND - WALL TYPE TAG

WALL ASSEMBLY TYPE: C2 = 2 SIDED GYP PARTITION, 2 LAYERS C3 = 2 SIDED GYP PARTITION, 3 LAYERS C4 = 2 SIDED GYP PARTITION, 4 LAYERS G1 = 1 SIDED GYP PARTITION, 1 LAYER G2 = 1 SIDED GYP PARTITION, 2 LAYERS S1 = GYP SHAFT WALL, 1 LAYER S2 = GYP SHAFT WALL, 2 LAYERS F1 = GYP FURRING, 1 LAYER M = CMU MASONRY*	HEAD CONDITION: NO LETTER = TO DECK a = ACOUSTIC TO DECK OR CEILING JOIST b = ACOUSTIC, PARTITION STRUCTURE AND FINISH STOP AT 4" ABOVE CEILING c = PARTITION STRUCTURE AND FINISH STOP 4" ABOVE CEILING s = PARTITION FINISH STOPS 4" ABOVE CEILING, STRUCTURE TO DECK p = PARTIAL HEIGHT WALL	FIRE RATING: = NOT RATED s = SMOKE BARRIER 1 = 1 HOUR FIRE BARRIER 2 = 2 HOUR FIRE BARRIER
---	--	---

- GENERAL NOTES**
- REFER TO SPECIFICATIONS FOR LOCATIONS OF MOLD, MOISTURE RESISTANT AND CEMENTITIOUS BACKER UNITS.
 - REFER TO SPECIFICATIONS FOR GYPSUM BOARD FINISH LEVELS AND LOCATIONS WHERE SPECIFIED LEVELS ARE REQUIRED. EXISTING GYPSUM BOARD TO REMAIN EXPOSED SHALL BE REPAIRED AND REFINISHED AS NECESSARY TO ACHIEVE FINISH LEVELS SPECIFIED.
 - FOR FIRE-RESISTANCE RATED ASSEMBLIES PROVIDE MATERIALS AND CONSTRUCTION IDENTICAL TO THOSE IN THE INDICATED TESTED ASSEMBLY OR PROVIDE ALTERNATE EQUAL TEST FOR REVIEW.
 - FOR FIRE-RESISTANCE RATED ASSEMBLIES REFER TO TYPICAL PARTITION DETAILS FOR TOP OF WALL CONDITIONS.

ADD 902

ADD #02 4/23/2024



AndersonMasonDale Architects

Architect of Record
CO-OP Architecture
1108 S Main Street Suite #102
Aberdeen, SD 57401
Telephone: 605-224-4852
E-mail: tom@co-oparch.com

Associate Architect
AndersonMasonDale Architects, P.C.
3198 Speer Boulevard
Denver, CO 80211
Telephone: 303-294-9448
FAX: 303-294-0762
E-mail: bblanchard@amdarchitects.com

Civil Engineer
Associates
416 Production Street
Aberdeen, SD 57401
Telephone: 605-225-1212
E-mail: lucash@helmsengineering.com

Landscape Architect
424 N Main Ave, Suite 201
Sioux Falls, SD 57104
Telephone: 605-228-1305
E-mail: tpudwill@thinkconfluence.com

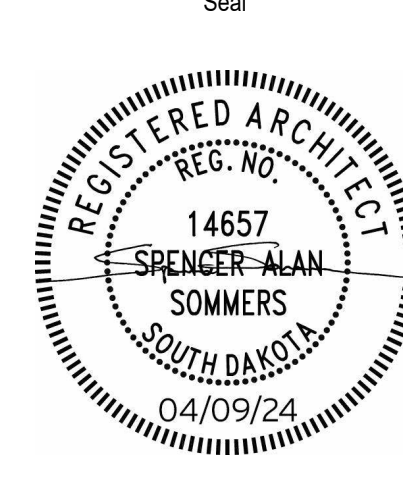
Structural Engineer
Associates, Inc.
6609 S. Lyncrest Place, Suite 110
Sioux Falls, SD 57106
Telephone: 605-243-2310
E-mail: jchristensen@riseincorp.com

Mech & Plumbing Engineer
Associates
801 railroad Ave SE
Aberdeen, South Dakota 57401
Telephone: 605-225-1344
E-mail: traviss@sieng.biz

Electrical Engineer
3314 Milwaukee Ave. NE
Aberdeen, SD 57401
Telephone: 605-225-1349
E-mail: thomas.j.heinz@megecorp.com

ARCHITECTURAL DRAWINGS ARE TO BE VIEWED IN COLOR FOR FULL AND COMPLETE INFORMATION

Seal Issue Date
100% CONSTRUCTION DOCUMENTS APRIL 9, 2024
ADD #02 4/23/2024



LINCOLN HALL

12th Ave SE, Aberdeen, SD 57401
21-261 AMD / 2160 CO-OP

Northern State University
1200 S Jay St
Aberdeen, South Dakota 57401
Telephone: 605-626-3011
E-mail:

Project Number: 21-261 AMD / 2160 CO-OP
Drawn By: AMD / CO-OP
Reviewed By: SHBB/AD
Approved By: CO-OP

PARTITION TYPES

A-602

4/23/2024 2:18:27 PM

April 23, 2024

Re: Lincoln Hall Project – Northern State University
Helms A-9264
OSE# R0122 -- 05X

Bid Opening: April 30, 2024

PROJECT ADDENDUM # 2

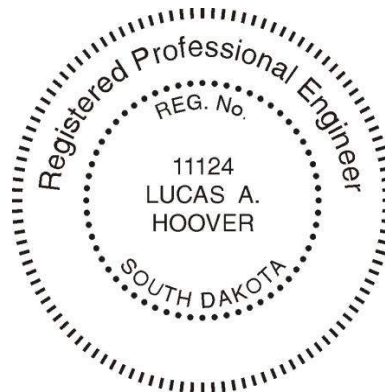
The following modifications are made to the plans and specifications for the Lincoln Hall Project – Northern State University.

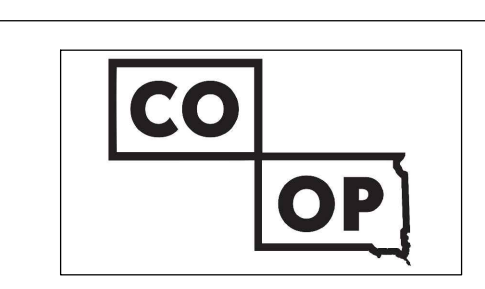
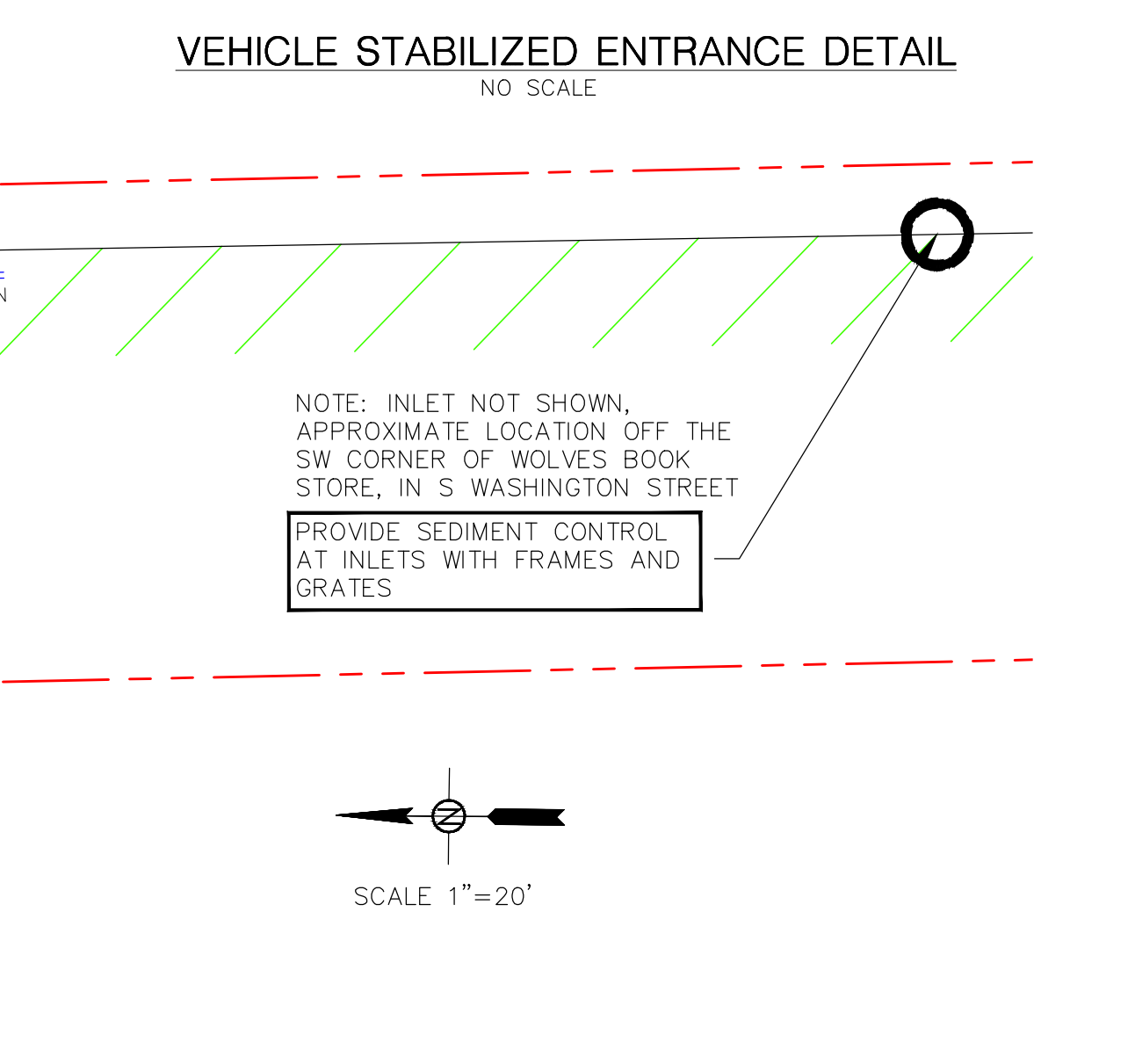
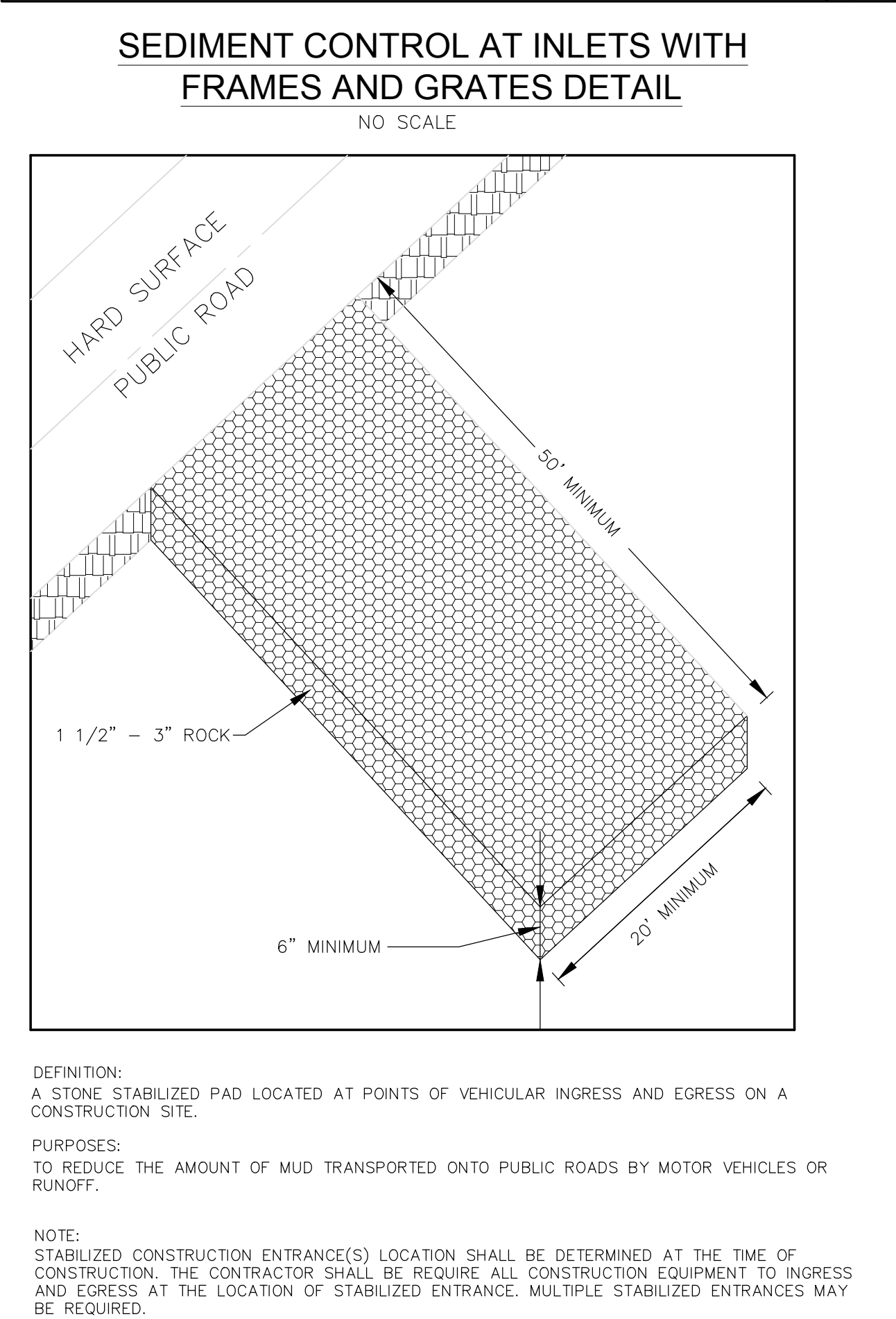
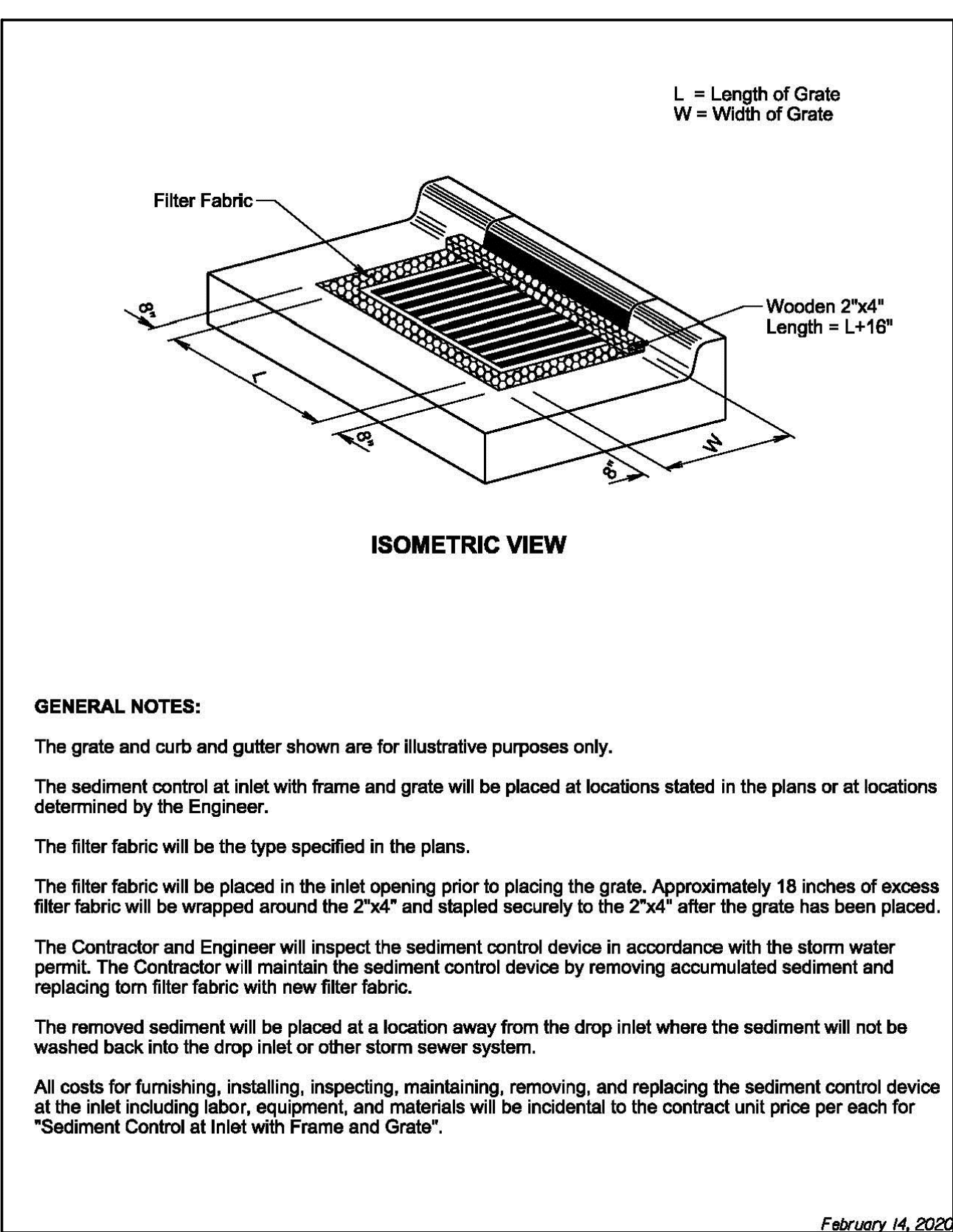
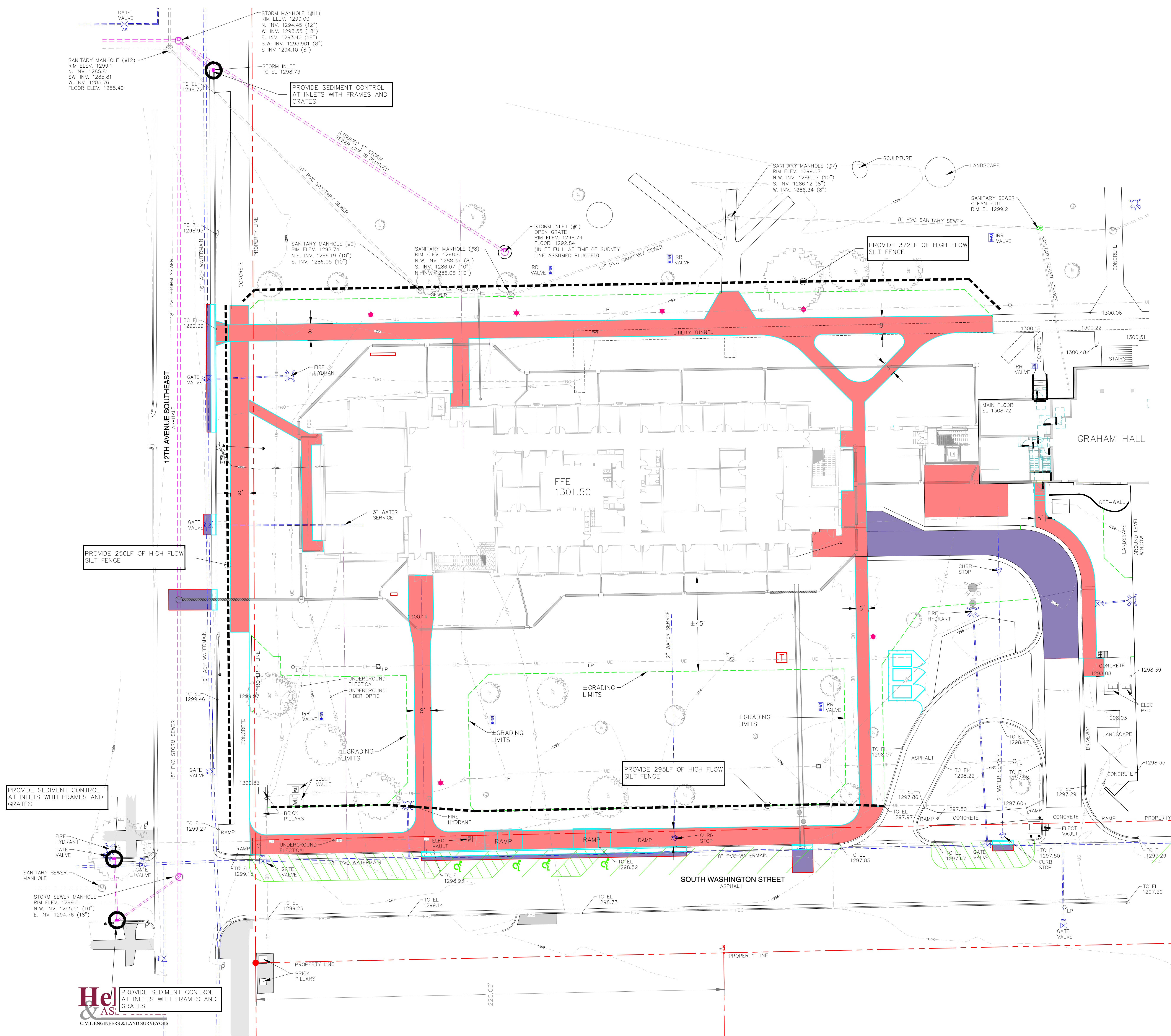
1.) Construction Civil Site Work Plans; Plan Sheets C-107 and C-108:

- Please add the enclosed civil site work plans sheet C-107 & C-108 Storm Water Pollution Prevention Plan to the project manual.

ALL OTHER ITEMS OF THE CIVIL PLANS AND SPECIFICATIONS REMAIN UNCHANGED.

BY 
PROJECT ENGINEER - HELMS AND ASSOCIATES





Architect of Record
 CO-OP Architecture
 1108 S Main Street Suite #102
 Aberdeen, SD 57401
 Telephone: 605-229-4932
 E-mail: tom@co-oparch.com

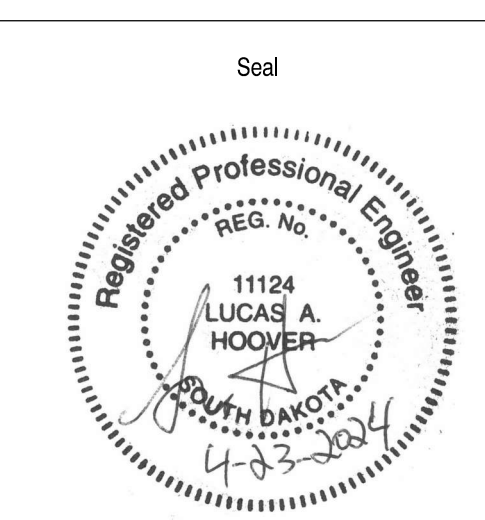
Civil Engineer
 Helms & Associates
 416 Production Street
 Aberdeen, SD 57401
 Telephone: 605-229-1212
 E-mail: lucas@helmsengineering.com

Structural Engineer
 Rise Structural Associates, Inc.
 6909 S. Lyncrest Place, Suite 110
 Sioux Falls, SD 57103
 Telephone: 605-229-1210
 E-mail: jchrisstensen@risecorp.com

Electrical Engineer
 IMEG Corporation
 3314 Milwaukee Ave. NE
 Aberdeen, SD 57401
 Telephone: 605-229-1349
 E-mail: thomas.j.heinz@imegcorp.com

REVISION

ADD ALTERNATES 20231219
 REDLINE CHANGES 20240417
 ADDENDUM #1 20240417



Seal Issue Date
 100% Construction Documents 9 APRIL 2024

LINCOLN HALL
 12th Ave SE, Aberdeen, SD 57401
 21-261
 Northern State University
 1300 S Jay St
 Aberdeen, South Dakota 57401
 Telephone: 605-626-3011
 E-mail:

Project Number: 21-261
 Drawn By: CDH
 Reviewed By: LAH
 Approved By: LAH
 Helms Job #: 8572-01

STORM WATER POLLUTION PREVENTION PLAN

STORMWATER POLLUTION PREVENTION PLAN CHECKLIST

General Permit Authorizing Stormwater Discharges Associated with Construction Activities

Under the South Dakota Surface Water Discharge System in compliance with the provisions of the South Dakota Water Pollution Control Act and the Administrative Rules of South Dakota (ARSD), Article 74.52, owners and operators of stormwater dischargers from construction activities, located in the state of South Dakota must be authorized to discharge in accordance with the conditions and requirements set forth in the General Permit.

The owner must obtain coverage under the general permit and all operators at the site must comply with the permit conditions. (The numbers left of the title headings are reference numbers to the GENERAL PERMIT AUTHORIZING STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITIES (General Stormwater Permit))

5.3 (2): STAFF TRAININGS/SWPPP IMPLEMENTATION
To promote stormwater management awareness specific for this project, the Contractor's Erosion Control Supervisor should provide correspondence of how the SWPPP will be implemented. The Contractor's Erosion Control Supervisor is responsible for providing this information at the preconstruction meeting and subsequently completing an attendance log, which should identify site-specific implementation of the SWPPP and the names of the personnel who attended the preconstruction meeting. Documentation of the preconstruction meeting will be filed with the SWPPP documents.

5.3 (3): DESCRIPTION OF CONSTRUCTION ACTIVITIES

- 5.3 (3a): Project Limits (See Title Sheet)
- 5.3 (3b): Project Description (See Title Sheet)
- 5.3 (3c): Site Map(s) (See Title Sheet and Plans)
- 5.3 (3d): Major Soil Disturbing Activities (check all that apply)
 - Clearing and grubbing
 - Excavation/Borrow
 - Filing
 - Other (describe): _____
- 5.3 (3e): Total Project Area: 2.75
- 5.3 (3f): Total Area to be Disturbed: 2.0 ac
- 5.3 (3g): Maximum Area to be Disturbed at One Time: 2.0 ac
- 5.3 (3h): Existing Vegetative Cover (%): 60%
- 5.3 (3i): Description of Vegetative Cover: grasses that are mowed
- 5.3 (3j): Soil Properties: USCS: SC or SH
- 5.3 (3k): Name of Receiving Water Body/Bodies: City of Aberdeen Municipal Storm Sewer System. Ultimately the James River.
- 5.3 (3l): Location of Construction Support Activity Areas: See front cover for Locations)

5.3 (4): ORDER OF CONSTRUCTION ACTIVITIES
The Contractor will enter the Estimated Start Date.

- Install perimeter protection where runoff may exit site.
- Install perimeter protection around stockpiles.
- Remove soil and topsoil.
- Install utilities and storm sewers.
- Install inlet and culvert protection after completing storm drainage and other utility installations.
- Final paving.
- Final grading and topsoil replacement.
- Removal of protection devices.
- Reseed all areas disturbed by removal activities.

5.3 (5): DESCRIPTION AND MAINTENANCE OF CONTROL MEASURES
All controls will be maintained in good working order. Necessary repairs will be initiated within 24 hours of the site inspection report. Include the technical reasoning for selecting each control. (check all that apply)

- Perimeter Controls (See Detail Plan Sheets)**
- Natural Buffers (within 50 ft of Waters of State)
 - Silt Fence
 - Erosion Control Wattles
 - Temporary Berm / Windrow
 - Stabilized Construction Entrances
 - Entrance/Exit Equipment Tire Wash
 - Other: _____

- Structural Erosion and Sediment Controls**
- Silt Fence
 - Temporary Berm / Windrow
 - Erosion Control Wattles
 - Temporary Sediment Barriers
 - Erosion Bales
 - Temporary Slope Drain
 - Turf Reinforcement Mat
 - Riprap
 - Gabions
 - Rock Check Dams
 - Sediment Traps/Basins
 - Culvert Inlet Protection
 - Transition Mats
 - Median Area Drain Inlet Protection
 - Curb Inlet Protection
 - Interceptor Ditch
 - Concrete Washout Facility
 - Work Platform
 - Temporary Water Barrier
 - Temporary Water Crossing
 - Permanent Stormwater Ponds
 - Permanent Open Vegetated Swales
 - Natural Depressions to allow for infiltration
 - Sequential Systems that combine several practices
 - Other: _____

- Dust Controls**
- Tarps & Wind Impervious Fabrics
 - Watering
 - Stockpile location/orientation
 - Dust Control Chlorides
 - Other: _____

- Dewatering BMPs**
- Sediment Basins
 - Dewatering bags
 - Weir Tanks
 - Temporary Diversion Channel
 - Other: _____

- Stabilization Practices (See Detail Plan Sheets)**
Stabilization measures shall begin the following work day whenever earth disturbing activity on any portion of the site has temporarily or permanently ceased. Temporary stabilization shall be completed as soon as practicable but no later than 14 days after initiating soil stabilization activities (3.16).

- Vegetation Buffer Strips
- Temporary Seeding (Cover Crop Seeding) if needed
- Permanent Seeding
- Sodding
- Planting (Woody Vegetation for Soil Stabilization)
- Mulching (Grass Hay or Straw)
- Fiber Mulching (Wood Fiber Mulch)
- Soil Stabilizer
- Bonded Fiber Matrix
- Fiber Reinforced Matrix
- Erosion Control Blankets
- Surface Roughening (e.g. tracking)
- Other: _____

- Wetland Avoidance**
Will construction and/or erosion and sediment controls impinge on regulated wetland? Yes No . If yes, the structural and erosion and sediment controls have been included in the total project wetland impacts and have been included in the 404-permit process with the USACE.

5.3 (6): PROCEDURES FOR INSPECTIONS

- Inspections will be conducted at least once every 7 days, and after a storm event of a ½ inch or more.
- All controls will be maintained in good working order. Necessary repairs will be initiated within 24 hours of the site inspection report.
- Silt fence will be inspected for depth of sediment and for tears to ensure the fabric is securely attached to the posts and that the posts are well anchored. Sediment buildup will be removed from the silt fence when it reaches ½ of the height of the silt fence.
- Sediment basins and traps will be checked. Sediment will be removed when depth reaches approximately 50 percent of the structure's capacity, at the conclusion of the construction.
- Check dams will be inspected for stability. Sediment will be removed when depth reaches ½ the height of the dam.

- All seeded areas will be checked for bare spots, washouts, and vigorous growth free of significant weed infestations.
- Inspection and maintenance reports will be included with the weekly progress report for each site inspection; this report will also be used to document changes to SWPPP. A copy of the completed inspection form will be filed with the SWPPP documents.
- The Contractor's Erosion Control Supervisor is responsible for inspections. Maintenance and repair activities are the responsibility of the Contractor. The Contractor's Erosion Control Supervisor will complete and provide a copy of the inspection and maintenance reports to the Owner & AE Team.

5.3 (7): POST-CONSTRUCTION STORMWATER MANAGEMENT

Stormwater Management will be handled by temporary controls outlined in "DESCRIPTION AND MAINTENANCE OF CONTROL MEASURES" above, and any permanent controls needed to meet permanent stormwater management needs in the post construction period will be shown in the plans and noted as permanent.

5.3 (8): POLLUTION PREVENTION PROCEDURES

5.3 (8A): Spill Prevention and Response Procedures

Material Management

- House Keeping**
- Only needed products will be stored on-site by the Contractor.
 - Except for bulk materials the contractor will store all materials under cover and/or in appropriate containers.
 - Products must be stored in original containers and labeled.
 - Material mixing will be conducted in accordance with the manufacturer's recommendations.
 - When possible, all products will be completely used before properly disposing of the container off-site.
 - The manufacturer's directions for disposal of materials and containers will be followed.
 - The Contractor's site superintendent will inspect materials storage areas regularly to ensure proper use and disposal.
 - Dust generated will be controlled in an environmentally safe manner.

Hazardous Materials

- Products will be kept in original containers unless the container is not resealable and provide secondary containment as applicable.
- Original labels and material safety data sheets will be retained in a safe place to relay important product information.
- In surplus product must be disposed of, manufacturer's label directions for disposal will be followed.
- Maintenance and repair of all equipment and vehicles involving oil changes, hydraulic system drain down, de-greasing operations, fuel tank drain down and removal, and other activities which may result in the accidental release of contaminants will be conducted on an impervious surface and under cover during wet weather to prevent the release of contaminants onto the ground.
- Wheel wash water will be collected and allowed to settle out suspended solids prior to discharge. Wheel wash water will not be discharged directly into any stormwater system or stormwater treatment system.
- Potential pH-modifying materials such as: bulk cement, cement kiln dust, fly ash, new concrete washings, concrete pumping, residuals from concrete saw cutting (either wet or dry), and mixer washout waters will be collected on site and managed to prevent contamination of stormwater runoff.

Spill Control Practices

- The primary objective in responding to a spill is to quickly contain the material(s) and prevent or minimize migration into stormwater runoff and conveyance systems. If the release has impacted on-site stormwater, it is critical to contain the released materials on-site and prevent their release into receiving waters. If a spill of pollutants threatens stormwater or surface water at the site, the spill response procedures outlined below must be implemented in a timely manner to prevent the release of pollutants.
- The Contractor's site superintendent will be notified immediately when a spill or threat of a spill is observed. The superintendent will assess the situation and determine the appropriate response.
- If spills represent an imminent threat of escaping erosion and sediment controls and entering receiving waters, personnel will be directed to respond immediately to contain the release and notify the superintendent after the situation has been stabilized.
- Spill kits containing appropriate materials and equipment for spill response and cleanup will be maintained by the Contractor at the site.
- If oil sheen is observed on surface water (e.g. settling ponds, detention ponds, swales), action will be taken immediately to remove the material causing the sheen. The Contractor will use appropriate materials to contain and absorb the spill. The source of the oil sheen will also be identified and removed or repaired as necessary to prevent further releases.
- If a spill occurs the superintendent or the superintendent's designees will be responsible for completing the spill reporting form and for reporting the spill to SDDANR.
- Personnel with primary responsibility for spill response and cleanup will receive training by the Contractor's site superintendent or designee. The training must include identifying the location of the spill kits and other spill response equipment and the use of spill response materials.
- Spill response equipment will be inspected and maintained as necessary to replace any materials used in spill response activities.

5.3 (8B): WASTE MANGAGEMENT PROCEDURES

Waste Disposal

- All liquid waste materials will be collected and stored in approved sealed containers. All trash and construction debris from the site will be deposited in the approved containers. Containers will be provided on all construction sites. Sanitary waste will be collected from the portable units which must be secured to prevent tipping and serviced in a timely manner by a licensed waste management Contractor or as required by any local regulations.

Hazardous Waste

- All hazardous waste materials will be disposed of in a manner specified by local or state regulations or by the manufacturer. Site personnel will be instructed in these practices, and the Contractor will be responsible for seeing that these practices are followed.

Sanitary Waste

- Portable sanitary facilities will be provided on all construction sites. Sanitary waste will be collected from the portable units which must be secured to prevent tipping and serviced in a timely manner by a licensed waste management Contractor or as required by any local regulations.

5.3 (9): CONSTRUCTION SITE POLLUTANTS

The following materials or substances are expected to present on the site during the construction period. These materials will be handled as noted under the heading "POLLUTION PREVENTION PROCEDURES" (check all that apply)

- Concrete and Portland Cement
- Detergents
- Paints
- Metals
- Bituminous Materials
- Petroleum Based Products
- Diesel Exhaust Fluid
- Cleaning Solvents
- Wood
- Cure
- Tardars
- Chemical Fertilizers
- Other: _____

Product Specific Practices

Petroleum Products
All on-site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled.

Fertilizers

Fertilizers will be applied only in the amounts specified by the Engineer. Once applied, fertilizers will be worked into the soil to limit the exposure to stormwater. Fertilizers will be stored in an enclosed area. The contents of partially used fertilizer bags will be transferred to sealable containers to avoid spills.

Paints

All containers will be tightly sealed and stored when not required for use. The excess will be disposed of according to the manufacturer's instructions and any applicable state and local regulations.

Concrete Trucks

Contractors will provide designated truck washout facilities on the site. These areas must be self-contained and not connected to any stormwater outlet of the site. Upon completion of construction, the area at the washout facility will be properly stabilized.

5.3 (10): NON-STORMWATER DISCHARGES

The following non-stormwater discharges are anticipated during the course of this project (check all that apply).

- Discharge from water line flushing

- Pavement wash-water, where no spills or leaks of toxic or hazardous materials have occurred.
- Uncontaminated ground water associated with dewatering activities.

5.3 (11): INFEASIBILITY DOCUMENTATION

If it is determined to be infeasible to comply with any of the requirements of the Stormwater Permit, the infeasibility determination must be thoroughly documented in the SWPPP.

5.4: SWPPP CERTIFICATIONS

Certification of Compliance with Federal, State, and Local Regulations

The Storm Water Pollution Prevention Plan (SWPPP) for this project reflects the requirements of all local municipal jurisdictions for storm water management and sediment and erosion control as established by ordinance, as well as other state and federal requirements for the sediment and erosion control plans, permits, notices or documentation as appropriate.

North State University

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Authorized Signature (See the General Permit, Section 7.4 (1))

Prime Contractor

This section is to be executed by the General Contractor after the award of the contract. This section may be executed any time there is a change in the Prime Contractor of the project.

I certify under penalty of law that this document and all attachments will be revised or maintained under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Authorized Signature

CONTACT INFORMATION

The following personnel are duly authorized representatives and have signatory authority for modifications made to the SWPPP.

Contractor Information:

Prime Contractor Name: _____

Contractor Contact Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Office Phone: _____ Field: _____

Cell Phone: _____ Fax: _____

Erosion Control Supervisor

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Office Phone: _____ Field: _____

Cell Phone: _____ Fax: _____

Project Engineer

Name: Lucas Hoover, P.E.

Business Address: 416 Production St. N.

Job Office Location: Aberdeen, SD

City: Aberdeen State: SD Zip: 57402

Office Phone: (605) 225-1212 Field: _____

Cell Phone: (605) 216-8106 Fax: (605) 225-3189

SDDANR Contact Spill Report

- Business Hours Monday-Friday (605) 773-3296
- Nights and Weekends (605) 773-3231

SDDANR Contact for Hazardous Materials

- (605) 773-3153

National Response Center Hotline

- (800) 424-8802

SDDANR Stormwater Contact Information

- SDDANR Stormwater (800) 737-8676
- Surface Water Quality Program (605) 773-3351

5.1: REQUIRED SWPPP MODIFICATIONS

5.5 (1): Conditions Requiring SWPPP Modification

The SWPPP must be modified, including the site map(s), in response to any of the following conditions:

- When a new operator responsible for implementation of any part of the SWPPP begins work on the site.
- When Changes to construction plans, sediment and erosion control measures, or any best management practices on site that are no longer accurately reflected in the SWPPP. This included changes made in response to corrective actions triggered by inspections.
- To reflect areas on the site map where operations control has been transferred (including the date of the transfer) or has been covered under a new permit since installing coverage under this general permit.
- If inspections by site staff, local officials, SDDANR, or U.S. EPA determine that SWPPP modifications are necessary for compliance with Stormwater Permit.
- To reflect any revisions to applicable federal, state, or local requirements that affect the control measures implemented at the site.
- If approved by the Secretary, to reflect any changes in chemical water treatment systems or controls, including the use of a different water treatment chemical, age rates, different areas, or methods of applications.

5.5 (2): Deadlines for SWPPP Modification

Any required revisions to the SWPPP must be completed within 7 calendar days following any of the items listed above.

5.5 (3): Documentation of Modifications to the Plan

All SWPPP modification records are required to be maintained showing the dates of when the modification occurred. The records must include the name of the person authorizing each change and a brief summary of all changes.

5.5 (4): Required Notice to Other Operators

All modification made to you SWPPP must be signed and certified as required in the General Stormwater Permit Section 7.4.

5.5 (5): Required Notice to Other Operators

If there are multiple operators at the site, the Contractor's Erosion Control Supervisor must notify each operator that may be impacted by the change to the SWPPP within 24 hours.

When modifications as described above occur, the SWPPP will be modified to provide appropriate protection to disturbed areas, all storm water structures, and adjacent waters. The Project Engineer will modify the SWPPP and drawings on the plans will be modified to reflect the needed changes. Copies of the

SWPPP modifications will be given to the Contractor Erosion Control Supervisor and a copy will be emailed Owner.

6.1 SPECIAL CONDITIONS - NOT APPLICABLE

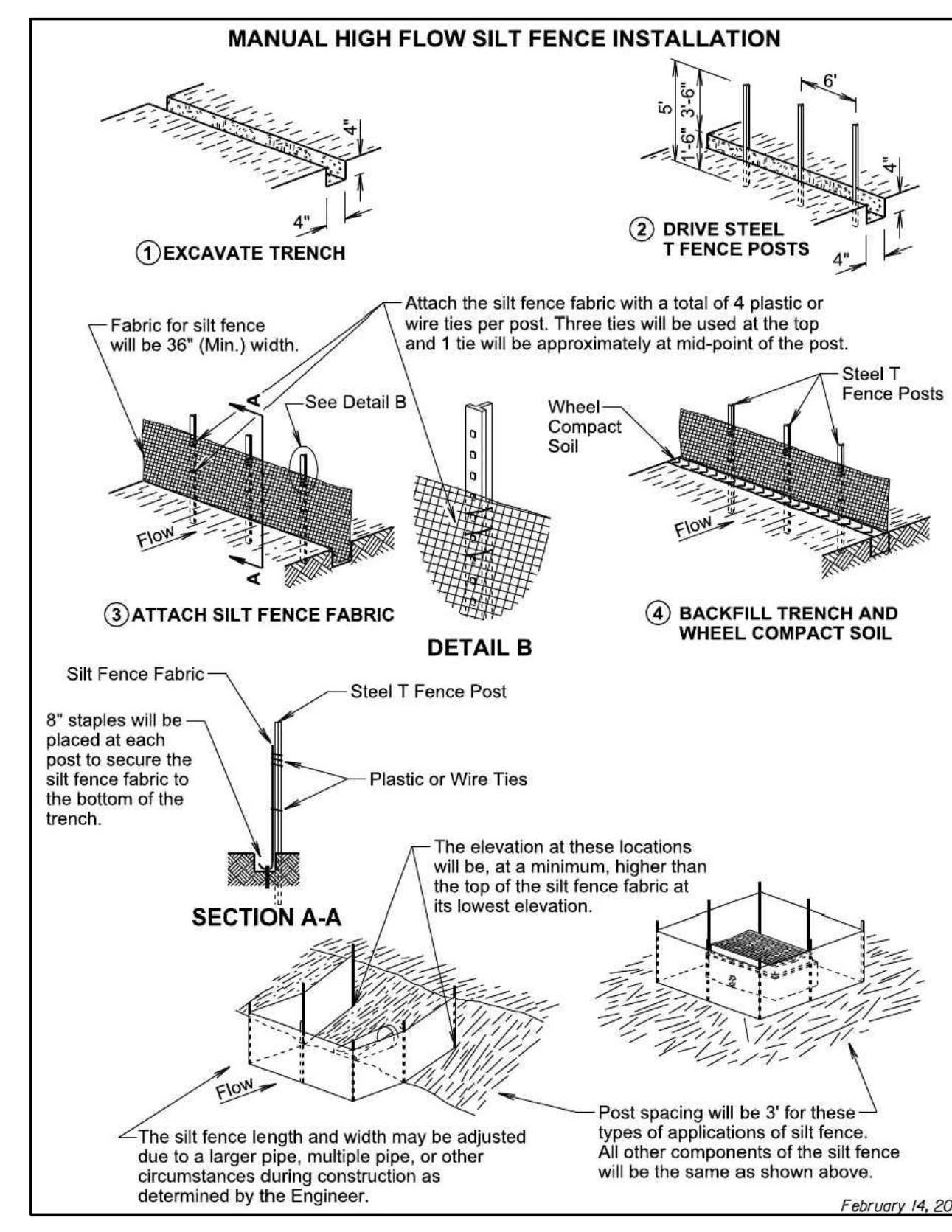
7.3 EMERGENCY SPILL NOTIFICATION

In the event of a spill, the Contractor's site superintendent will make the appropriate notification(s), consistent with the following procedures:

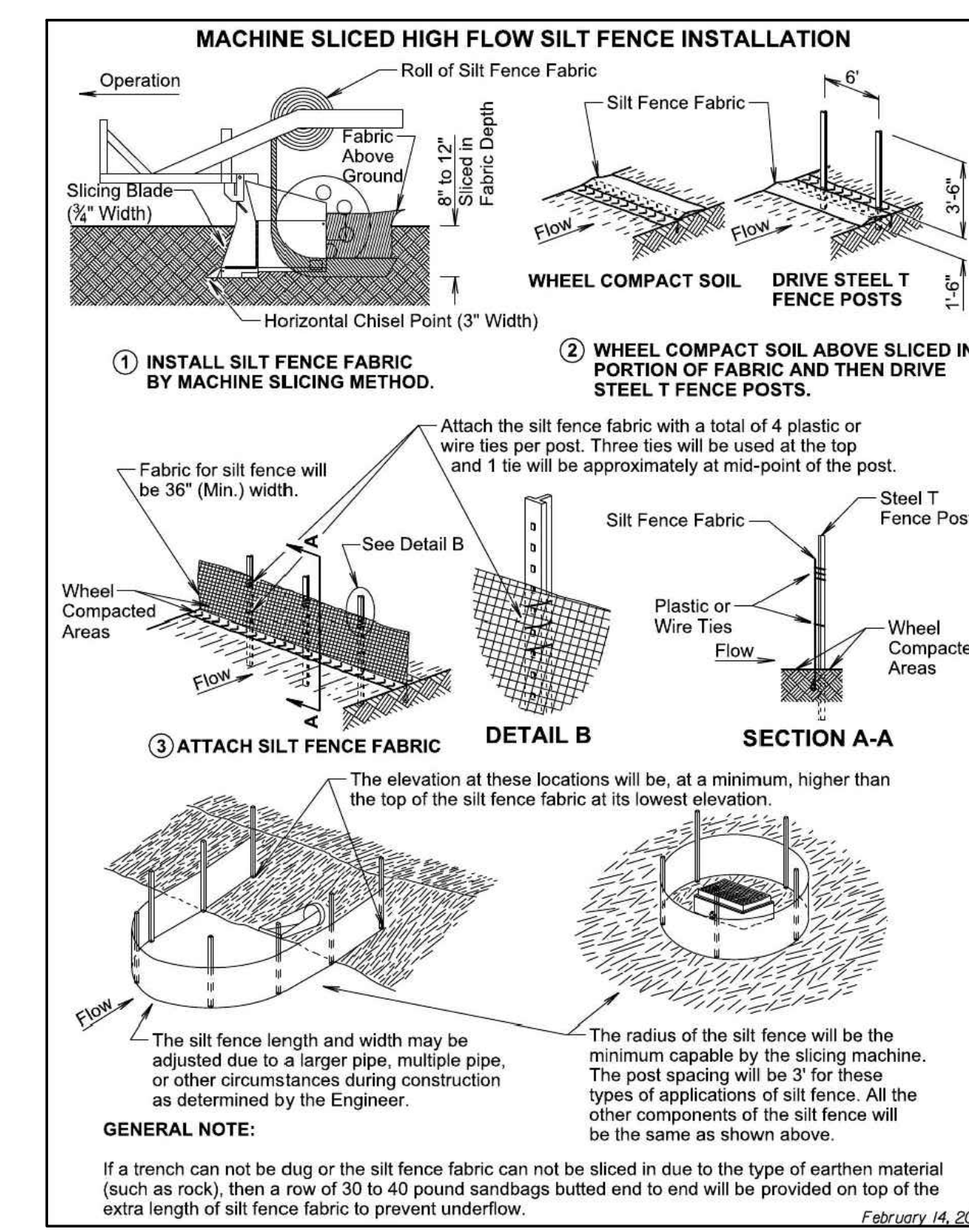
A release or spill of regulated substance (includes petroleum and petroleum products) must be reported to SDDANR immediately if any one of the following conditions exists:

- The release or spill threatens or is able to threaten waters of the state (surface water or ground water)
- The release or spill causes an immediate danger to human health or safety
- The release or spill exceeds 25 gallons.
- The release or spill causes a sheen on surface water
- The release or spill of any substance that exceeds the ground water quality standards of ARSD Chapter 74.54:01
- The release or spill of any substance that exceeds the surface water quality standards of ARSD Chapter 74.54:01
- The release or spill of any substance that harms or threatens to harm wildlife or aquatic life.
- The release or spill of crude oil in field activities under SDCL 45-9 is greater than 1 barrel (42 gallons), or
- The release or spill is required to be reported according to Superfund Amendments and Reauthorization Act (SARA) Title III List of Lists. Consolidated List of Chemicals Subject to Reporting under the Emergency Planning and Community Right to Know Act, US Environmental Protection Agency.

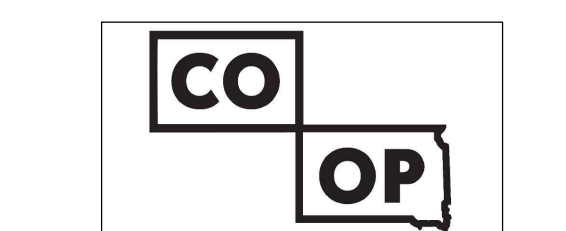
To report a release or spill, call SDDANR at 605-773-3296 during regular office hours (8 a.m. to 5 p.m. Central Standard Time). To report the release after hours, on weekends or holidays, call South Dakota Emergency Management at 605-773-3231. Reporting the release to SDDANR does not meet any obligation for reporting to other state, local, or federal agencies. Therefore, you must also contact local authorities to determine the local reporting requirements for release. A written report of the unauthorized release of any regulated substance, including quantity discharged, and the location of the discharge shall be sent to the SDDANR within 14 days of the discharge.



HIGH FLOW SILT FENCE DETAIL NO SCALE



HIGH FLOW SILT FENCE DETAIL NO SCALE



Architect of Record
CO-OP Architecture
1108 S Main Street Suite #102
Aberdeen, SD 57401
Telephone: 605-225-4932
E-mail: tom@co-oparch.com

Associate Architect
AndersonMasonDale Architects, P.C.
3198 Speer Boulevard
Denver, CO, 80211
Telephone: 605-291-9448
FAX: 303-294-0762
E-mail: bblanchard@amdarchitects.com

Civil Engineer
Helms & Associates
416 Production Street
Aberdeen, SD 57401
Telephone: 605-225-1212
E-mail: lucash@helmsengineering.com

Landscape Architect
Confluence
524 N Main Ave, Suite 201
Sioux Falls, SD 57104
Telephone: 605-225-4344
E-mail: pudwill@thinkconfluence.com

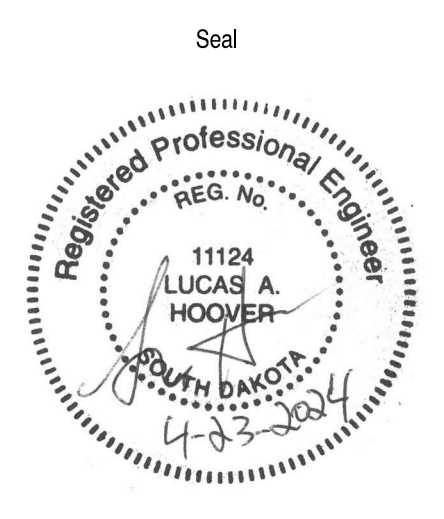
Structural Engineer
Rose Structural Associates, Inc.
6909 S. Lyncrest Place, Suite 110
Sioux Falls, SD 57108
Telephone: 605-225-1344
E-mail: jchristensen@rsainc.com

Mech & Plumbing Engineer
Sichmiller Engineering
801 railroad Ave SE
Aberdeen, South Dakota 57401
Telephone: 605-225-3344
E-mail: travise@secong.biz

Electrical Engineer
IMEG Corporation
3314 Milwaukee Ave, NE
Aberdeen, SD 57401
Telephone: 605-225-1349
E-mail: thomas.jhelms@imegcorp.com

REVISION

ADD ALTERNATES 20231219
REDLINE CHANGES
APPENDUM #1 20240417



Seal Issue Date
100% Construction Documents 9 APRIL 2024

LINCOLN HALL
12th Ave SE, Aberdeen, SD 57401
21-261
Northern State University
1300 S Jay St
Aberdeen, South Dakota 57401
Telephone: 605-626-3011
E-mail:

Project Number: 21-281
Drawn By: CDH
Reviewed By: LAH
Approved By: LAH
Helms Job #: 8572-01

STORM WATER POLLUTION PREVENTION PLAN NOTES

REVISION SUMMARY

Project Name: NSU – Lincoln Hall

Project No: 21261

Project Bid Address: Aberdeen, SD

Addendum No: 2

Addendum Date: 4/23/2024

The following changes, for the above referenced project, have been made to the contract documents. All contractors are responsible for reviewing proposed changes and of notifying the Construction &/or Project Manager of any/all cost changes to their contract.

Description of the Proposed Changes:

Plan Revisions

1. Sheet S002
 - a. Pier schedule was updated
2. Sheet S101
3. Sheet S201
 - a. Column callouts on grid 7 & C.7,D.4
4. Sheet S601
 - a. Detail 15 not used

All work shall be performed equal to original contract specifications.

ATTACHMENTS: Sheets S002, S101, S201, S601

WALL FOOTING SCHEDULE		
MARK	SIZE	REINFORCEMENT
TS1	2'-0" x 1'-0"	(2) #5 CONT.
WF1	2'-0" x 1'-0"	(2) #5 CONT.
WF3	2'-0" x 1'-0"	(3) #5 CONT.
WF4	4'-0" x 1'-0"	REF. DTL.

COLD-FORMED HEADER SCHEDULE					
MARK	HEADER	JAMB STUDS	BRG.	SILL	REMARKS
H1	600S162-43	(1) 600S162-68	NONE	(1) 600T125-43 WHERE OCCURS	2, 3, 4.
H2	600S200-68	(2) 600S162-54 BACK-TO-BACK	NONE	(1) 600T125-43 WHERE OCCURS	2, 4.
H3	(2) 600S162-43 BOX HEADER W/ 600T125-43 TOP & BOT.	(2) 600S200-68 BACK-TO-BACK	NONE	(1) 600T125-43 WHERE OCCURS	1, 4.

NOTES:
 1. SEE 8/5606 FOR BOX HEADER ASSEMBLY & JAMB CONNECTION.
 2. SEE 7/5606 FOR SINGLE MEMBER HEADER ASSEMBLY & JAMB CONNECTION.
 3. SEE 8/5606 FOR SILL CONNECTION TO JAMB.
 4. SEE 9/5606 FOR MULTIPLE STUD CONNECTION DETAIL.

PIER SCHEDULE				
MARK	SIZE	VERT. REINF.	TIES	T/PIER
P1	18" x 18"	(4) #6	#4 @ 12" O.C.	99'-4"
P2	18" x 24"	(8) #6	#4 @ 12" O.C.	99'-4"
P3	18" x 28"	(8) #6	#4 @ 12" O.C.	99'-4"
P4	18" x 36"	(12) #6	#4 @ 12" O.C.	99'-4"
P5	24" x 24"	(8) #6	#4 @ 12" O.C.	99'-4"
P6	22" x 30"	(12) #6	#4 @ 12" O.C.	99'-4"
P7	22" x 36"	(8) #6	#4 @ 12" O.C.	99'-4"

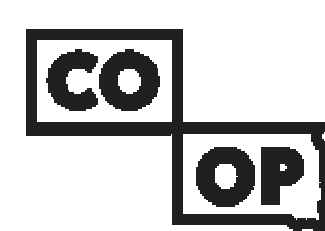
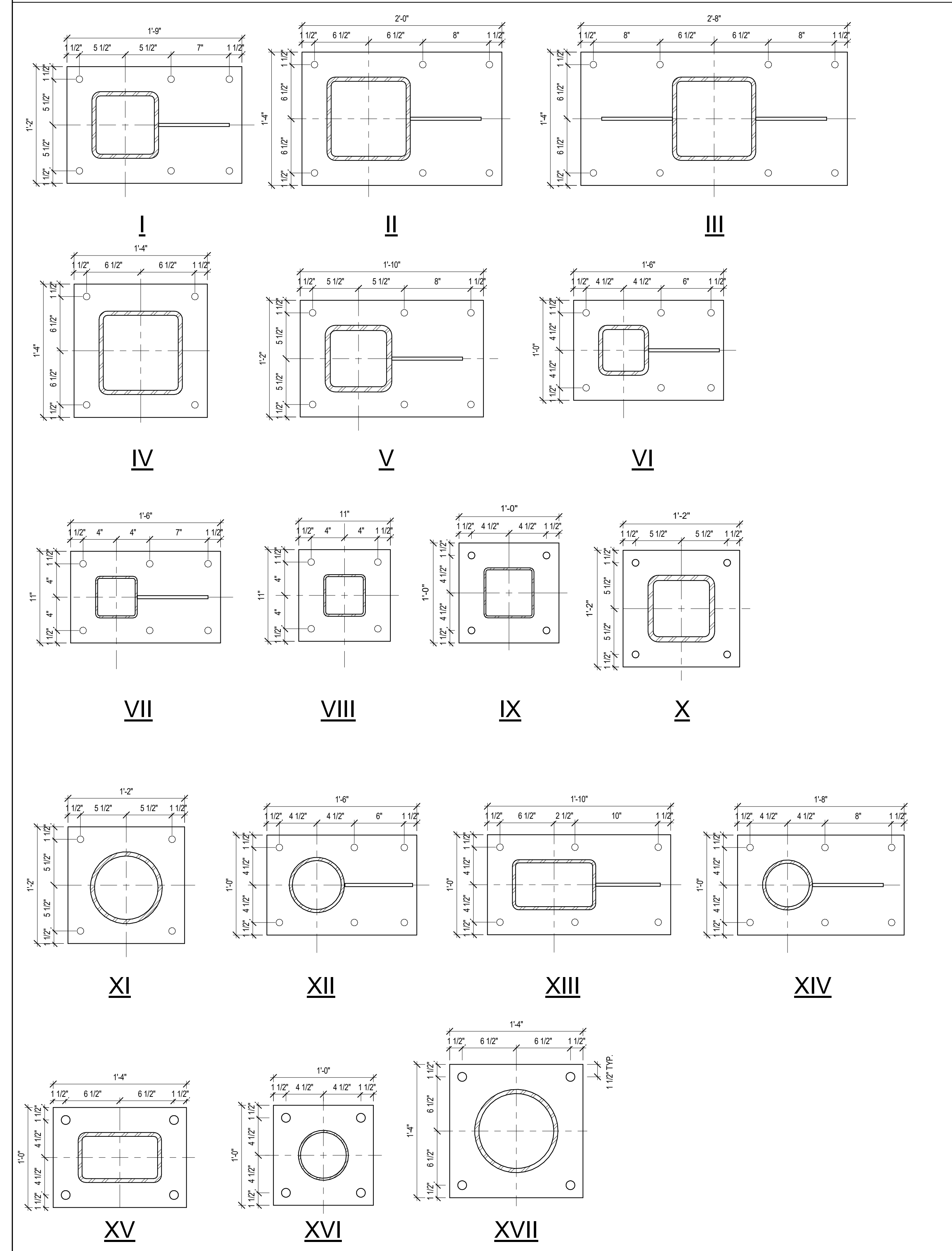
LINTEL SCHEDULE				
	OPENING TYPE	LINTEL	DETAIL	REMARKS
L-1	12" CMU	SINGLE 16" DP. BOND BEAM w/ (2) #5 BOTT., (2) #5 TOP, #4 TIES @ 12" O.C.		
L-2	8" CMU	SINGLE 16" DP. BOND BEAM w/ (2) #5 BOTT., (2) #5 TOP, #4 VERT. @ 12" O.C.		

NOTES:
 1. PROVIDE MIN. 8" BEARING ON BLOCK AT ALL LINTELS.

PAD FOOTING SCHEDULE		
MARK	SIZE	REINFORCEMENT
F	11'-3" x 13'-2" @ 1'-0"	(3) #5/2-6" EA. WAY
F1	3'-0" x 3'-0" x 1'-0"	(3) #5/2-6" EA. WAY
F2	4'-0" x 4'-0" x 1'-0"	(5) #5/4-6" EA. WAY
F3	5'-0" x 5'-0" x 1'-0"	(6) #5/4-6" EA. WAY
F4	6'-0" x 6'-0" x 1'-0"	(7) #5/5-6" EA. WAY
F5	7'-0" x 7'-0" x 1'-4"	(8) #5/5-6" EA. WAY
F6	8'-0" x 8'-0" x 1'-4"	(9) #5/7-6" EA. WAY
F7	9'-0" x 9'-0" x 1'-4"	(11) #5/8-6" EA. WAY

COLUMN SCHEDULE						
MARK	TYPE	BASEPLATE		ANCHOR BOLTS	REMARKS	
		THICKNESS	DIAGRAM			
C1	HSS 6X8X5/8	1 3/8"	I	(4) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C2	HSS 6X8X1/2	1 3/8"	I	(4) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C3	HSS 10X10X1/2	2"	II	(8) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C4	HSS 10X10X5/8	2"	III	(8) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C5	HSS 10X10X1/2	2"	IV	(4) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C6	HSS 6X8X5/8	1 3/8"	V	(6) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C7	HSS 6X8X1/4	1 3/8"	VI	(6) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C8	HSS 6X8X5/8	1 3/8"	VI	(6) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C9	HSS 5X5X1/4	1 3/8"	VII	(6) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C10	HSS 5X5X3/8	1 3/8"	VII	(6) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C11	HSS 5X5X1/4	1"	VIII	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C12	HSS 5X5X3/8	1"	VIII	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C13	HSS 5X5X1/2	1"	VIII	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C14	HSS 6X6X3/8	1 1/4"	IX	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C15	HSS 6X6X1/2	1 1/4"	IX	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C16	HSS 6X6X1/4	1"	IX	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C17	HSS 6X6X5/8	1 1/4"	X	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C18	HSS 6X6X1/4	1"	X	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C19	HSS8.625X.5	1 3/8"	XI	(4) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C20	HSS8.625X.375	1 3/8"	XII	(6) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C21	HSS10X8X1/2	1 3/8"	XIII	(6) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C22	HSS8X.375	1 3/8"	XIV	(4) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C23	HSS10X8X1/2	1 1/4"	XV	(4) 1" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X3/8" PLATE WASHERS		
C24	HSS6X.25	1"	XVI	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C25	HSS8.625X.25	1"	XI	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C26	HSS8.625X.375	1 1/4"	XI	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		
C27	HSS10X.5	1 1/4"	XVII	(4) 3/4" DIA. THREADED RODS EMBEDDED 9" INTO CONC. USE 3"X1/4" PLATE WASHERS		

NOTES:
 • T.O.C. EL. 99'-4" (U.N.O.)
 • COLUMNS WITH AN "X" IN THE CALLOUT GET HEADER OFF BY A BEAM. THEREFORE NO BASE PLATE IS REQUIRED, & USE A 1/4" FILLET WELD ALL AROUND FROM COL. TO BEAM



Architect of Record
 CO-OP Architecture
 1108 S Main Street Suite #102
 Aberdeen, SD 57401
 Telephone: 605-259-4852
 E-mail: tom@co-oparch.com

Associate Architect
 AndersonMasonDale Architects, P.C.
 3198 Speer Boulevard
 Denver, CO 80211
 Telephone: 303-299-9448
 FAX: 303-294-0762
 E-mail: bblanchard@amdarchitects.com

Civil Engineer
 Helms & Associates
 416 Production Street
 Aberdeen, SD 57401
 Telephone: 605-225-1212
 E-mail: lucash@helmsengineering.com

Landscape Architect
 Confluence
 524 N Main Ave, Suite 201
 Sioux Falls, SD 57106
 Telephone: 605-259-1205
 FAX: 605-259-1205
 E-mail: lpudwill@thinkconfluence.com

Structural Engineer
 Rise Structural Associates, Inc.
 6909 S. Lyncrest Place, Suite 110
 Sioux Falls, SD 57106
 Telephone: 605-225-1340
 E-mail: thomas.hernz@riseincorp.com

Mech & Plumbing Engineer
 Sichmeller Engineering
 801 railroad Ave SE
 Aberdeen, South Dakota 57401
 Telephone: 605-225-0344
 E-mail: traviss@siceng.biz

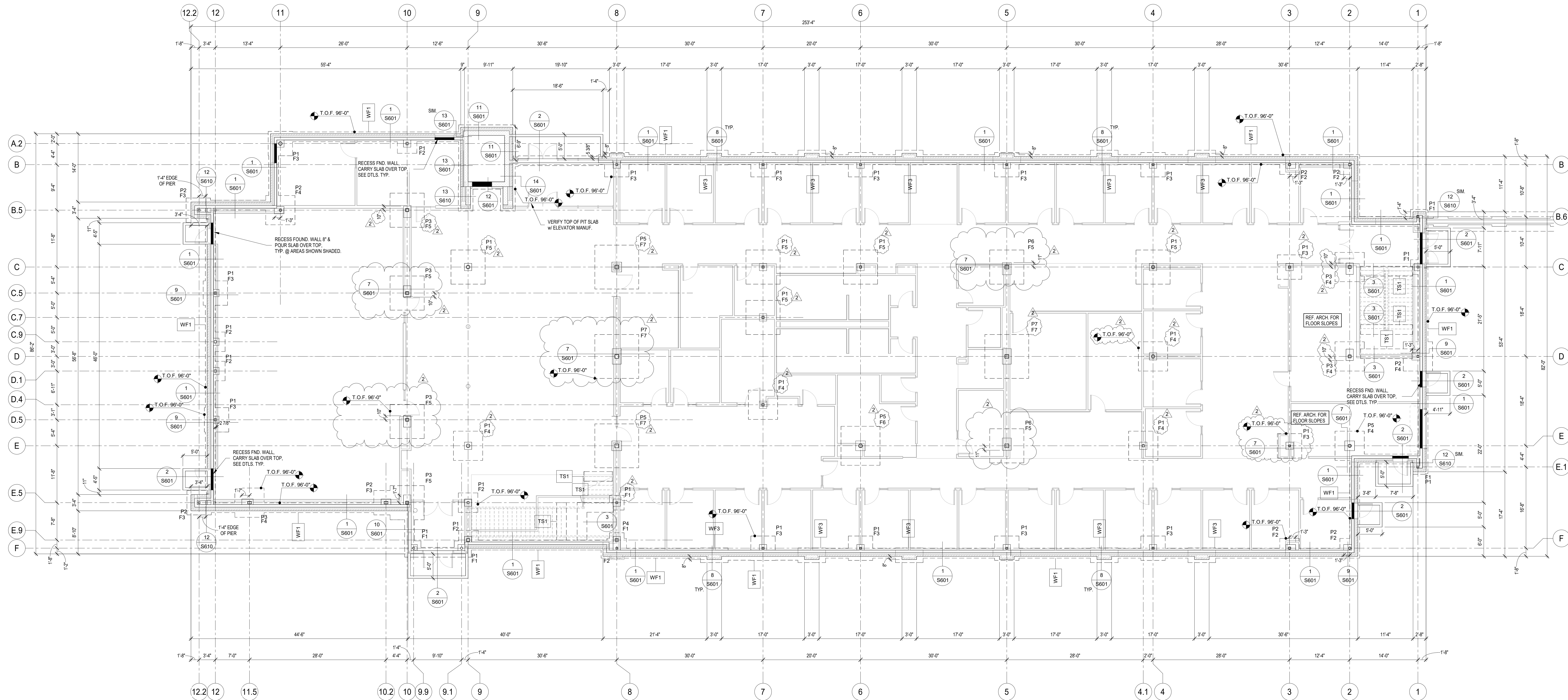
Electrical Engineer
 IMEG Corporation
 3314 Milwaukee Ave. NE
 Aberdeen, SD 57401
 Telephone: 605-225-1340
 E-mail: thomas.hernz@imegcorp.com

Seal	Issue	Date
	100% CD ADDENDUM #02	09 APRIL 2024 23 APRIL 2024



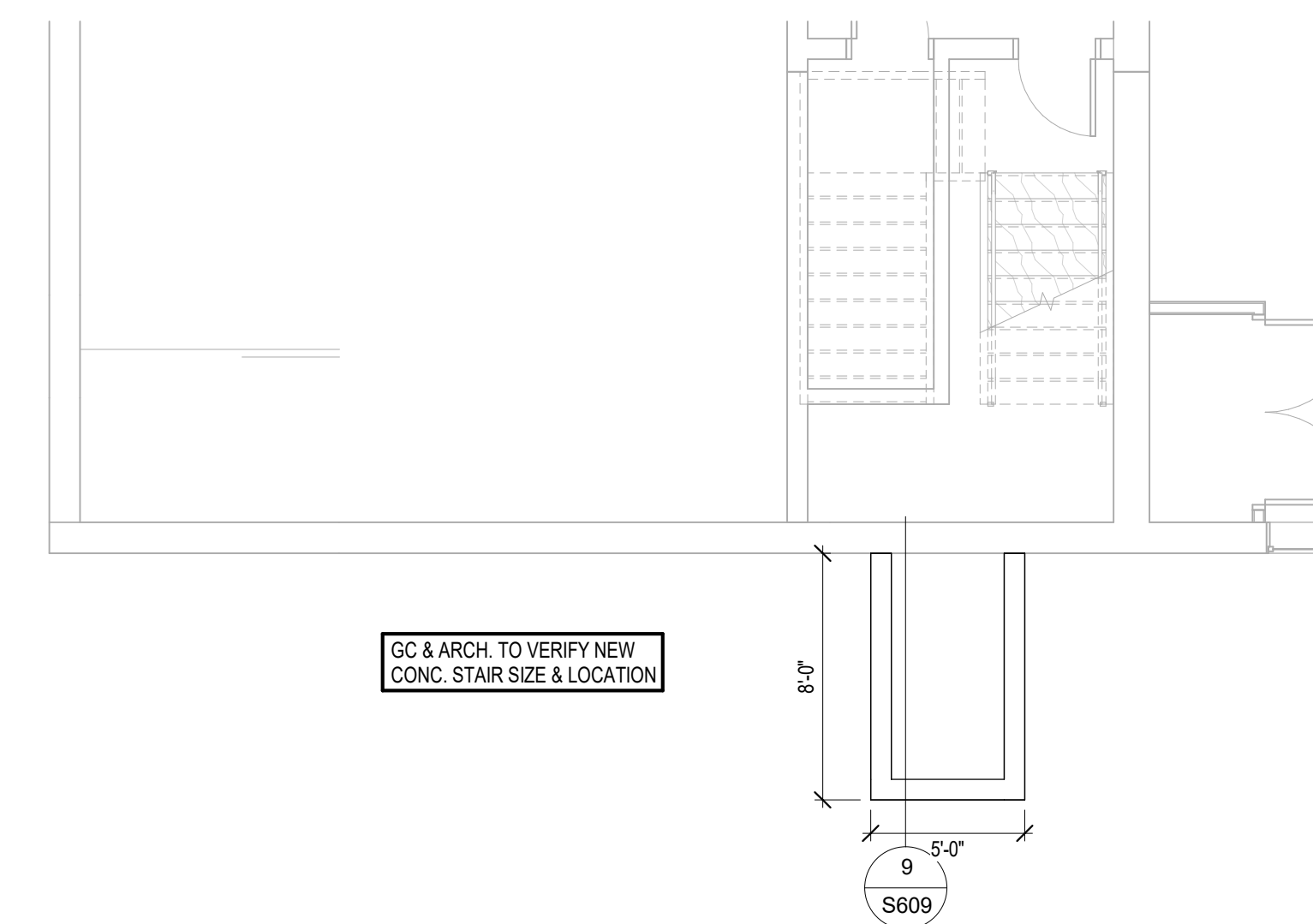
LINCOLN HALL
 12th Ave SE, Aberdeen, SD 57401
 21-261
 Northern State University
 1200 S. Jay St.
 Aberdeen, South Dakota 57401
 Telephone: 605-626-3011
 E-mail:

Project Number:	21-261
Drawn By:	CRG
Reviewed By:	JGM
Approved By:	JUC



1 FOOTING & FOUNDATION PLAN
 1/8" = 1'-0"
 F.F.E. = 100'-0"

- NOTES:
- CONC. SLAB TO BE 4" w/ FIBERMESH REINFORCEMENT ON VAPOR BARRIER (REF. ARCH.) ON 6" DRAINAGE FILL ON APPROVED SUBGRADE.
 - CONTRACTOR TO SUBMIT CONTROL JOINT LAYOUT FOR ARCH./ENGINEER APPROVAL.
 - SEE STRUCTURAL NOTES FOR SIZING/SPACING LIMITATIONS.
 - SEE 4 & 5 ON SHEET S401 FOR TYPICAL CONTROL JOINT DETAILS.
 - SEE 6/S401 FOR TYPICAL CORNER WALL REINFORCING.



2 GRAHAM HALL CONC. STAIR REPLACEMENT
 3/16" = 1'-0"

Seal Issue Date
 100% CD 09 APRIL 2024
 ADDENDUM #02 23 APRIL 2024



LINCOLN HALL

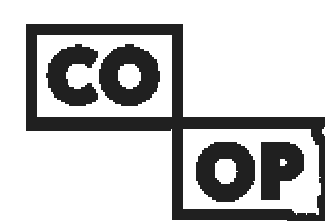
12th Ave SE, Aberdeen, SD 57401
 21-261

Northern State University
 1200 S. Jay St.
 Aberdeen, South Dakota 57401
 Telephone: 605-626-3011
 E-mail:

Project Number: 21-261
 Drawn By: CRC
 Reviewed By: JGM
 Approved By: JUC

FOOTING & FOUNDATION PLAN

S101



AndersonMasonDale Architects

Architect of Record
 CO-OP Architecture
 1108 S Main Street Suite #102
 Aberdeen, SD 57401
 Telephone: 605-224-4852
 E-mail: tom@co-oparch.com

Associate Architect
 AndersonMasonDale Architects, P.C.
 3198 Speer Boulevard
 Denver, CO 80211
 Telephone: 303-294-9448
 FAX: 303-294-0762
 E-mail: bblanchard@amdarchitects.com

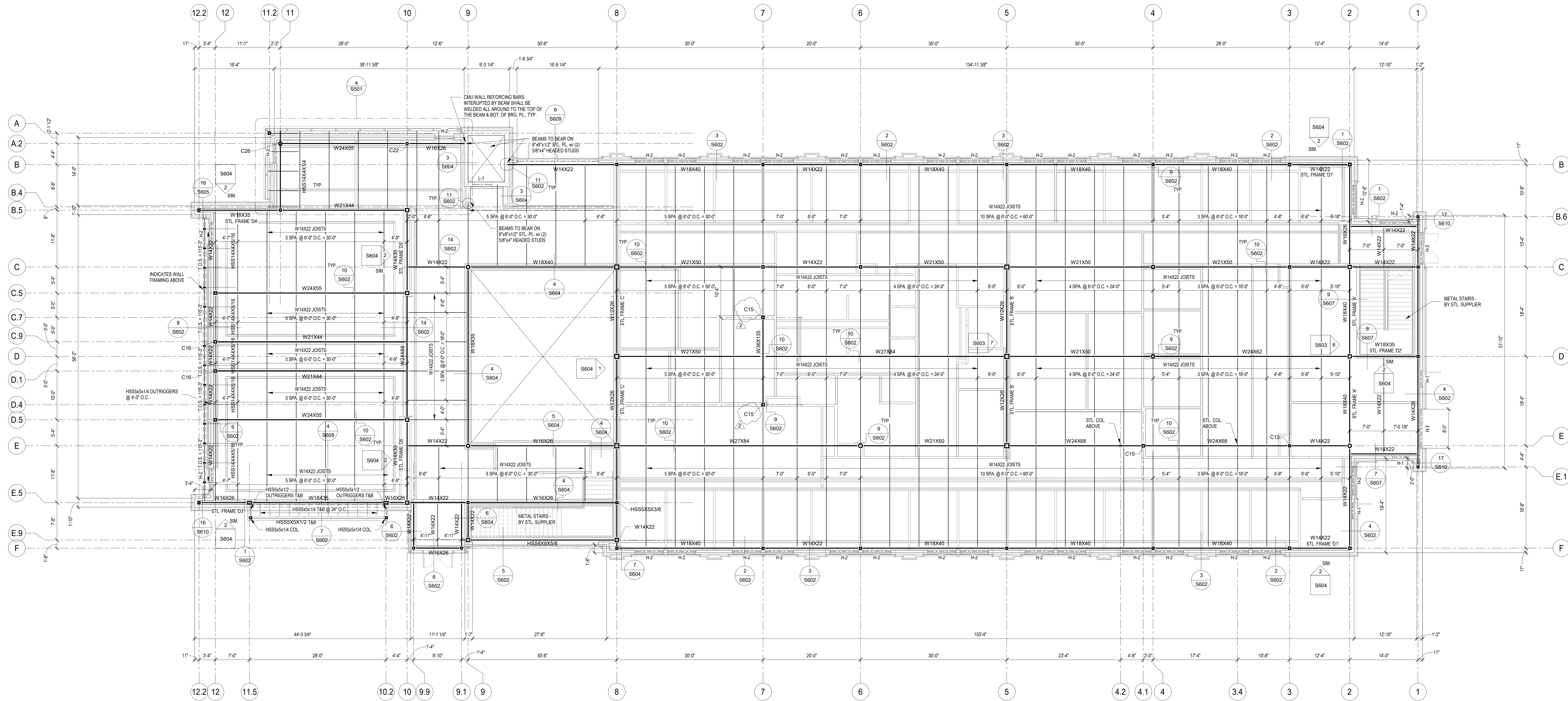
Civil Engineer
 Helms & Associates
 416 Production Street
 Aberdeen, SD 57401
 Telephone: 605-225-1212
 E-mail: lucash@helmsengineering.com

Landscape Architect
 Confluence
 524 N Main Ave, Suite 201
 Sioux Falls, SD 57104
 Telephone: 605-259-1205
 E-mail: lputwall@thinkconfluence.com

Structural Engineer
 Rise Structural Associates, Inc.
 6909 S. Lyncrest Place, Suite 110
 Sioux Falls, SD 57106
 Telephone: 605-225-1340
 E-mail: jchristensen@riseincorp.com

Mech & Plumbing Engineer
 Sichmoller Engineering
 801 railroad Ave SE
 Aberdeen, South Dakota 57401
 Telephone: 605-225-0344
 E-mail: travis@siceng.biz

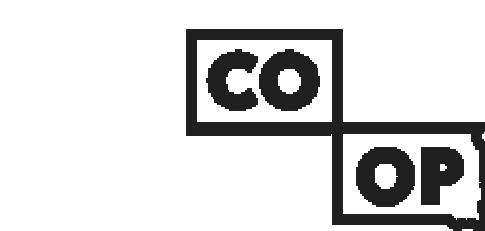
Electrical Engineer
 IMEG Corporation
 3314 Milwaukee Ave. NE
 Aberdeen, SD 57401
 Telephone: 605-225-1340
 E-mail: thomas.hernz@imegcorp.com



1 SECOND FLOOR FRAMING PLAN

1/8" = 1'-0"

- NOTES:
- EXTERIOR WALLS TO BE 60S162-43 @ 16" O.C. w/ BRIDGING @ 48" O.C.
 - T.O.S. = 115'-0" (UNLESS NOTED OTHERWISE)
 - 2-1/2" CONC. SLAB ON 1.5WU 20 GA. COMPOSITE DECK (4" OVERALL) REIN. SLAB w/ 6XW1.4W1.4 W.W.F.
 - STEEL DECK TO BE FASTENED IN A 364 PATTERN w/ 5/8" DIA. PUDDLE WELDS & #12 SIDE LAP FASTENERS SCREWS @ 24" O.C.
 - ALL STEEL FLOOR BEAMS w/ COMPOSITE DECK TO HAVE 3/4" DIA. x 2-1/2" HAS'S WELDED TO THE TOP FLANGE @ 12" O.C. MAX.
 - USE L4x4x5/16 ANGLE TO FORM OUT ALL OPENINGS IN THE CONC. ON MTL. DECK FLOOR WHERE REQ.



AndersonMasonDale Architects

Architect of Record
CO-OP Architecture
1108 S Main Street Suite #102
Aberdeen, SD 57401
Telephone: 605-294-9482
E-mail: tom@co-oparch.com

Associate Architect
AndersonMasonDale Architects, P.C.
3198 Speer Boulevard
Denver, CO 80211
Telephone: 303-294-9448
FAX: 303-294-0762
E-mail: bblanchard@amdarchitects.com

Civil Engineer
Helms & Associates
416 Production Street
Aberdeen, SD 57401
Telephone: 605-294-1212
E-mail: lucash@helmsengineering.com

Landscape Architect
Confluence
524 N Main Ave, Suite 201
Sioux Falls, SD 57104
Telephone: 605-294-1205
E-mail: lpudwil@thinkconfluence.com

Structural Engineer
Rise Structural Associates, Inc.
6909 S. Lyncrest Place, Suite 110
Sioux Falls, SD 57109
Telephone: 605-743-3310
E-mail: jchristensen@riseincorp.com

Mech & Plumbing Engineer
Sichmiller Engineering
801 railroad Ave SE
Aberdeen, South Dakota 57401
Telephone: 605-225-3344
E-mail: traviss@siceng.biz

Electrical Engineer
IMEG Corporation
3314 Milwaukee Ave. NE
Aberdeen, SD 57401
Telephone: 605-225-1349
E-mail: thomas.henz@imegcorp.com

Seal Issue Date
100% CD 09 APRIL 2024
ADDENDUM #02 23 APRIL 2024

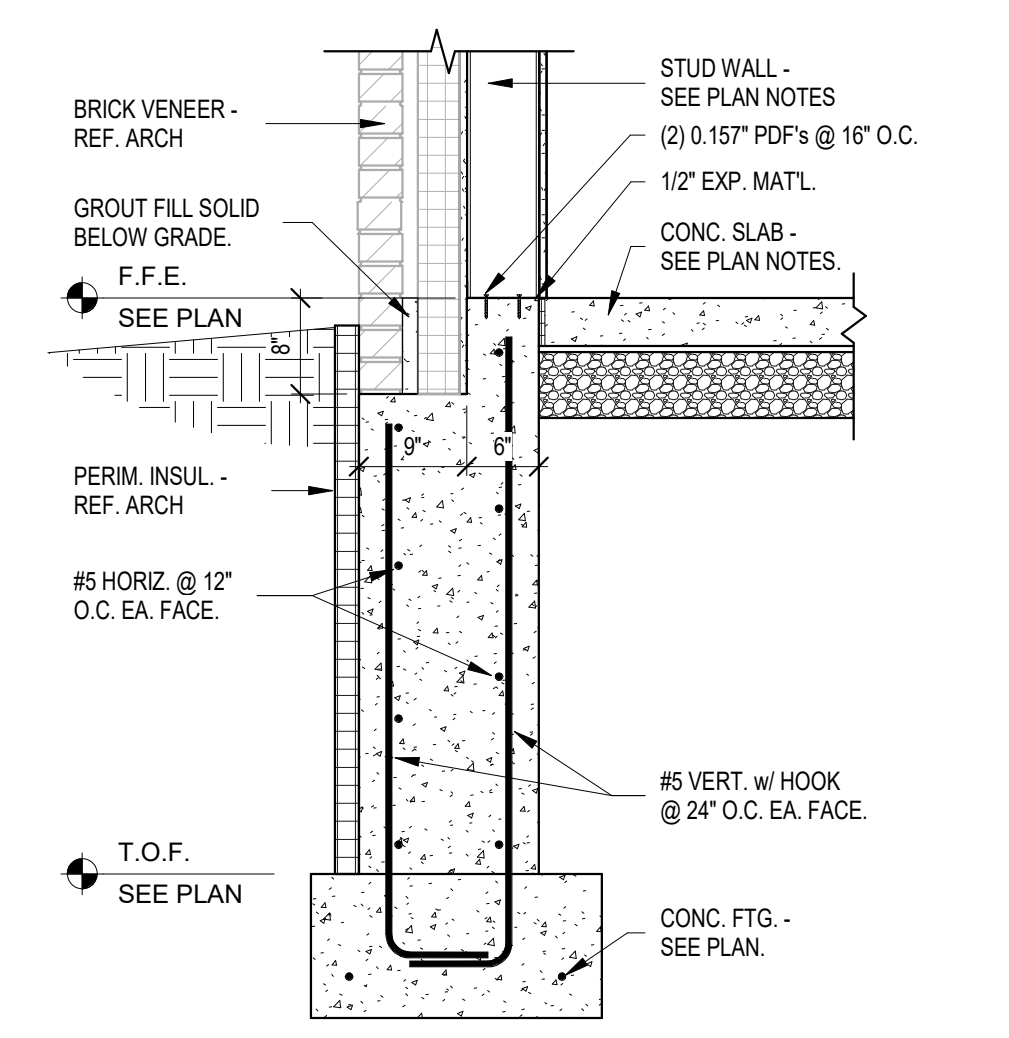
LINCOLN HALL
12th Ave SE, Aberdeen, SD 57401
21-261
Northern State University
1303 S Jay St
Aberdeen, South Dakota 57401
Telephone: 605-626-3011
E-mail:

Project Number: 21-261
Drawn By: CRC
Reviewed By: JGM
Approved By: JUC

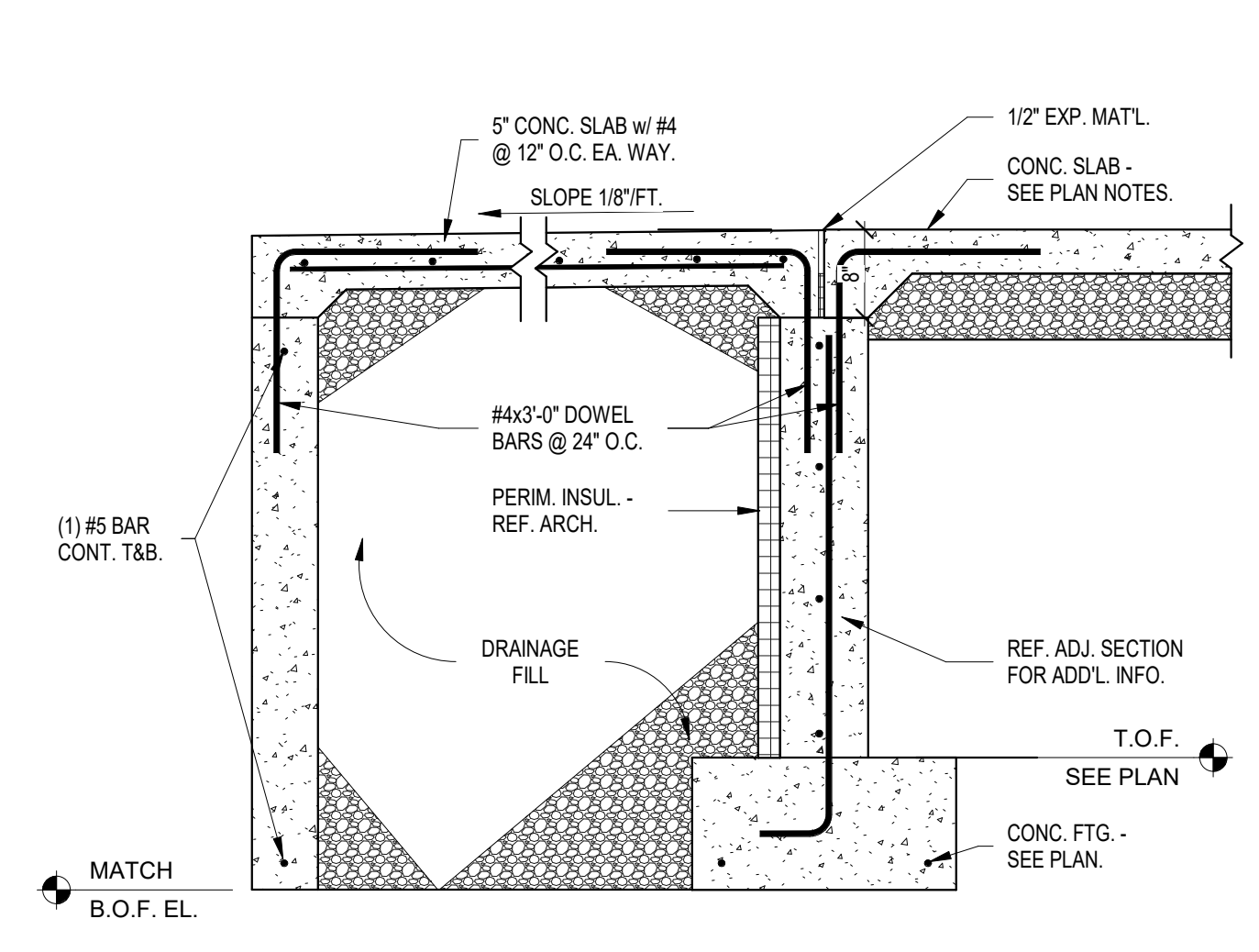
SECOND FLOOR FRAMING PLAN

S201

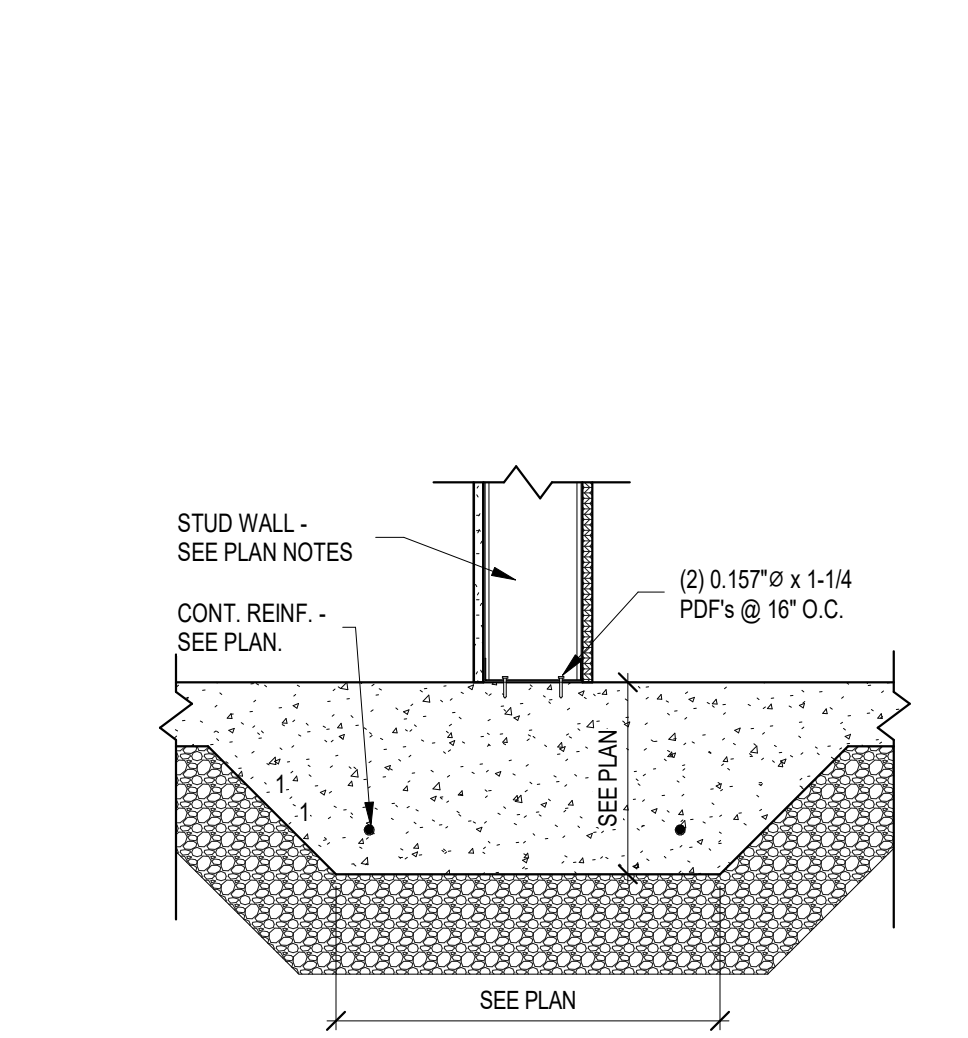
ADDENDUM 23 APRIL 2024
M #02
4/23/2024 3:55:36 PM



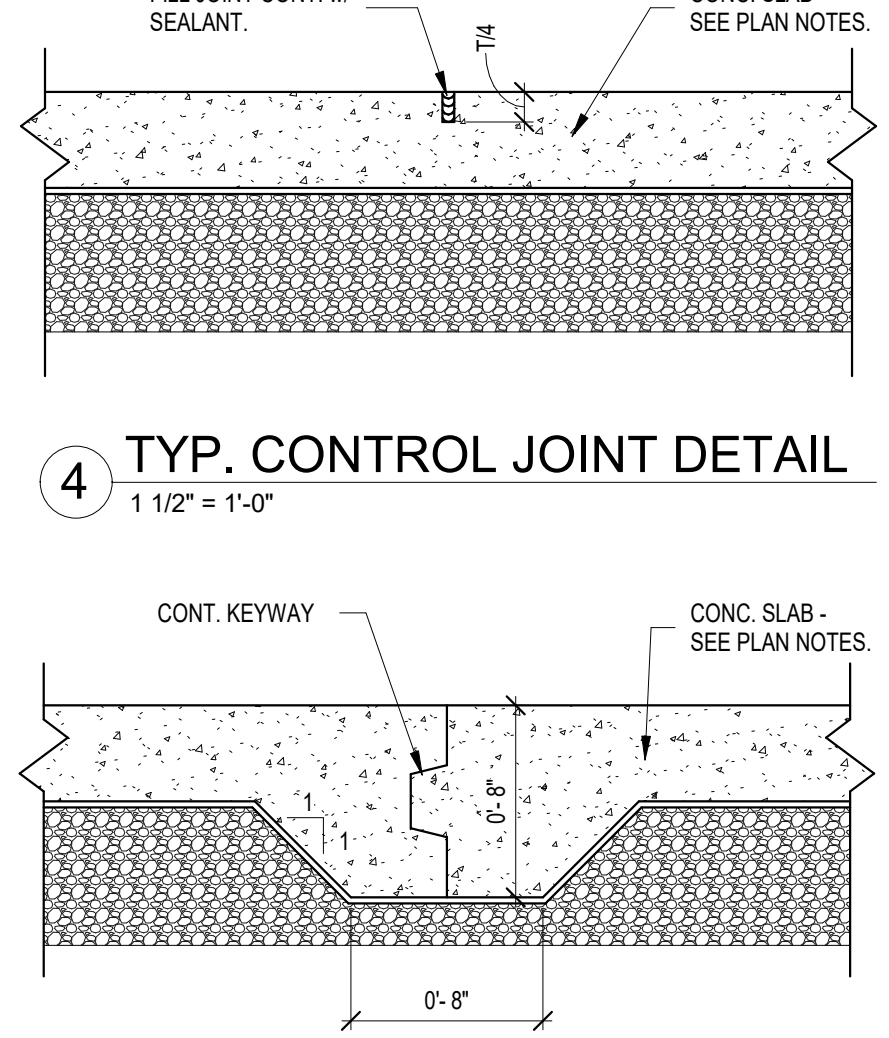
1 TYP. FOUND. WALL w/ BRICKLEDGE
3/4" = 1'-0"



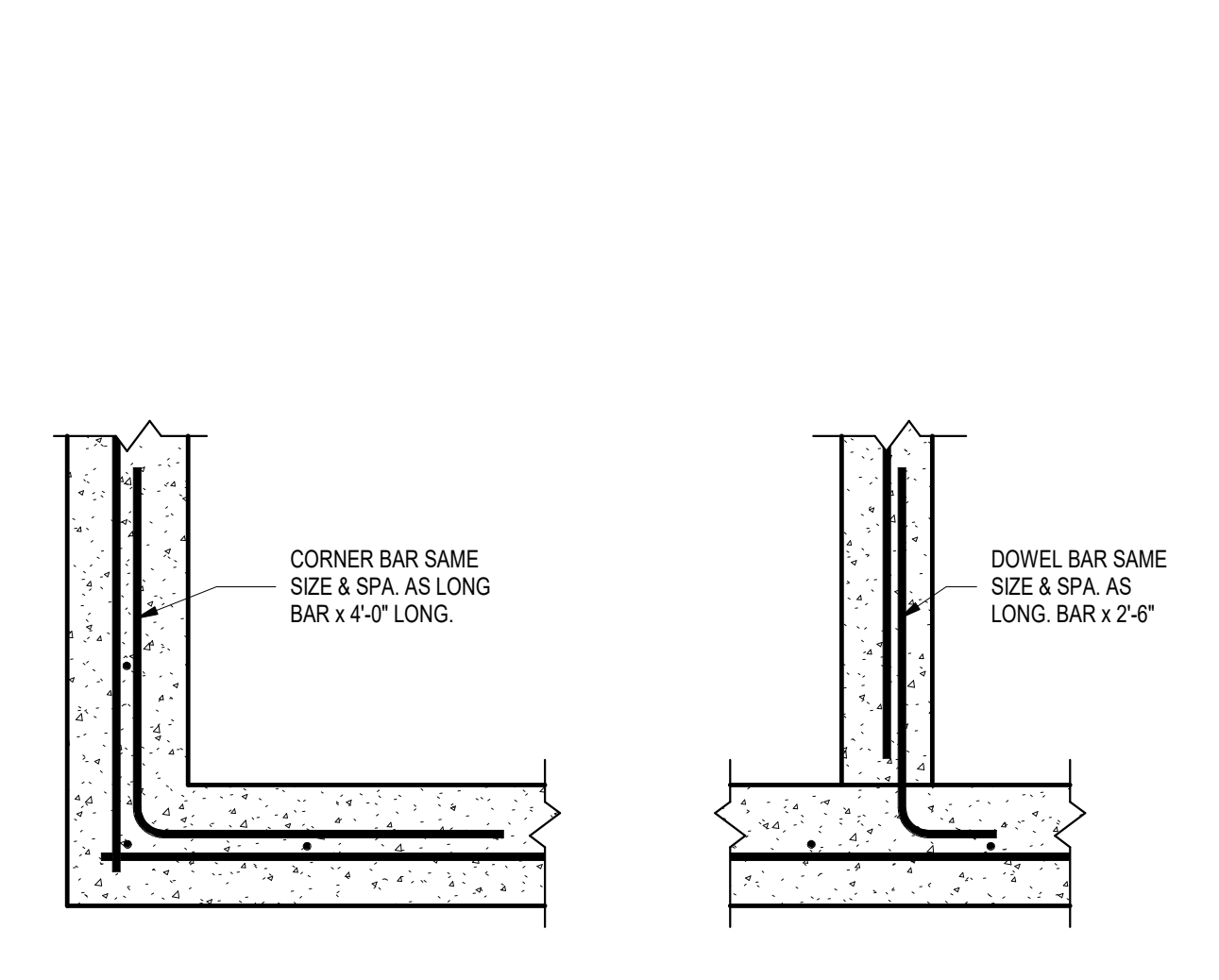
2 FROST STOOP SECTION
3/4" = 1'-0"



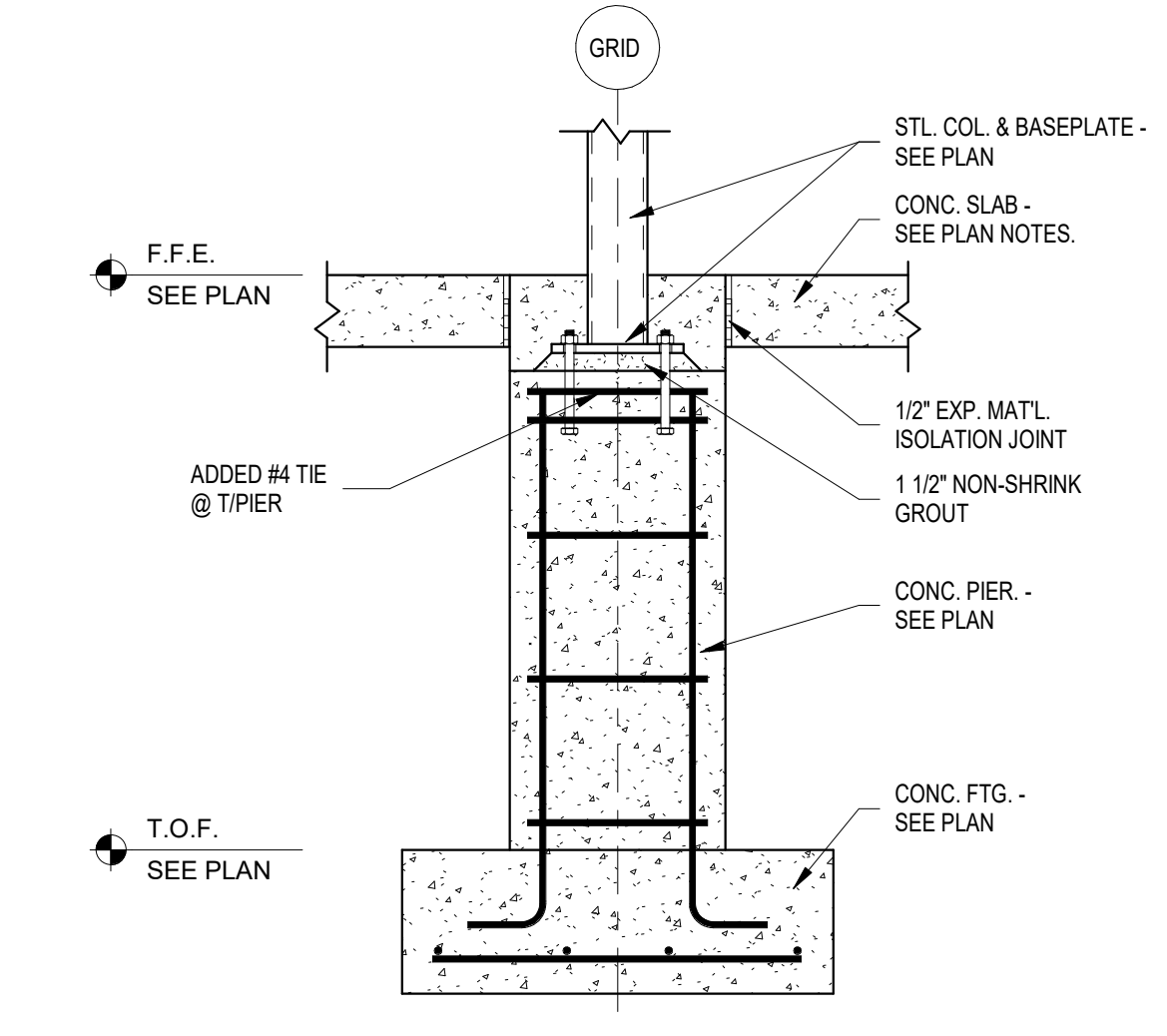
3 THICKENED SLAB DETAIL
1" = 1'-0"



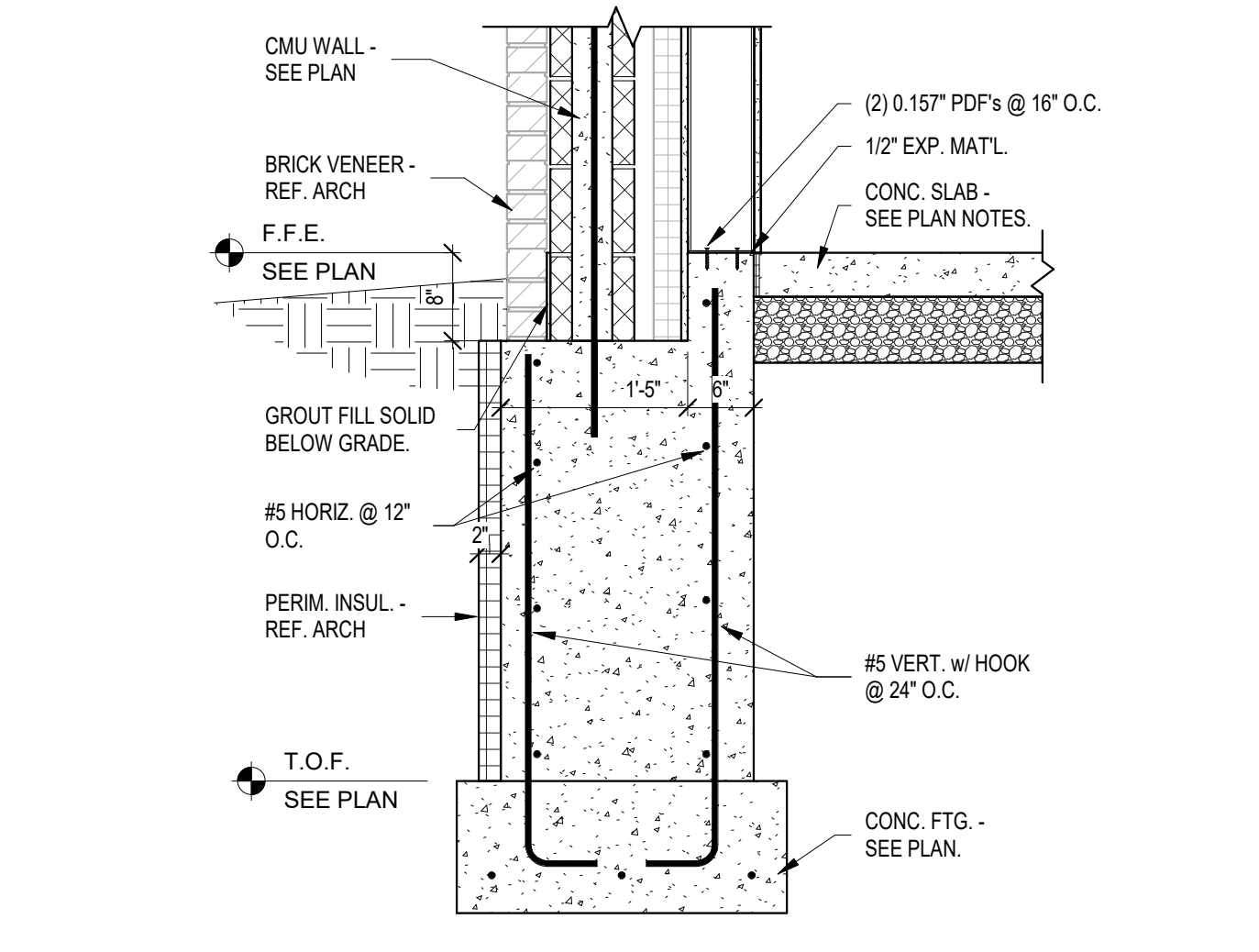
4 TYP. CONTROL JOINT DETAIL
1 1/2" = 1'-0"



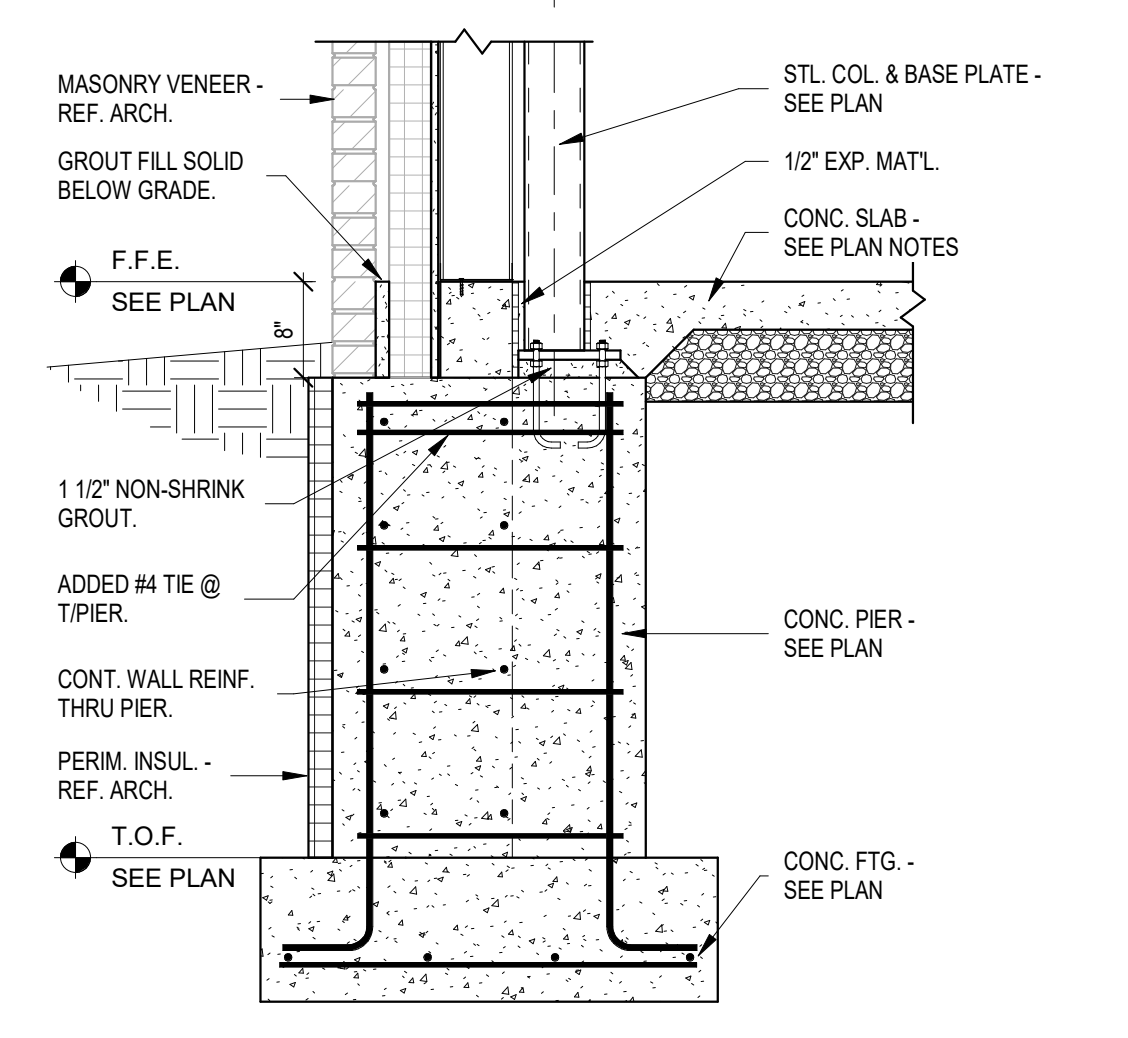
6 TYP. WALL CORNER REINF. DETAILS
1" = 1'-0"



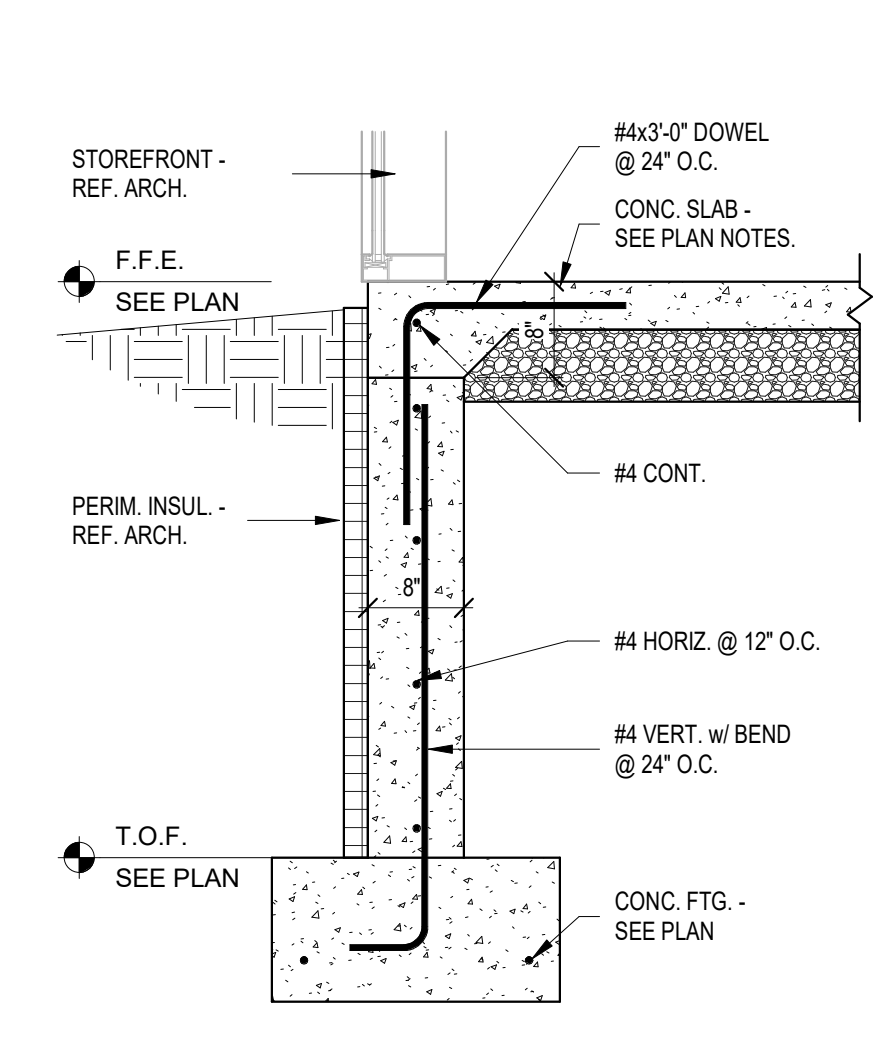
7 INT. PIER DTL. @ STL. COL.
3/4" = 1'-0"



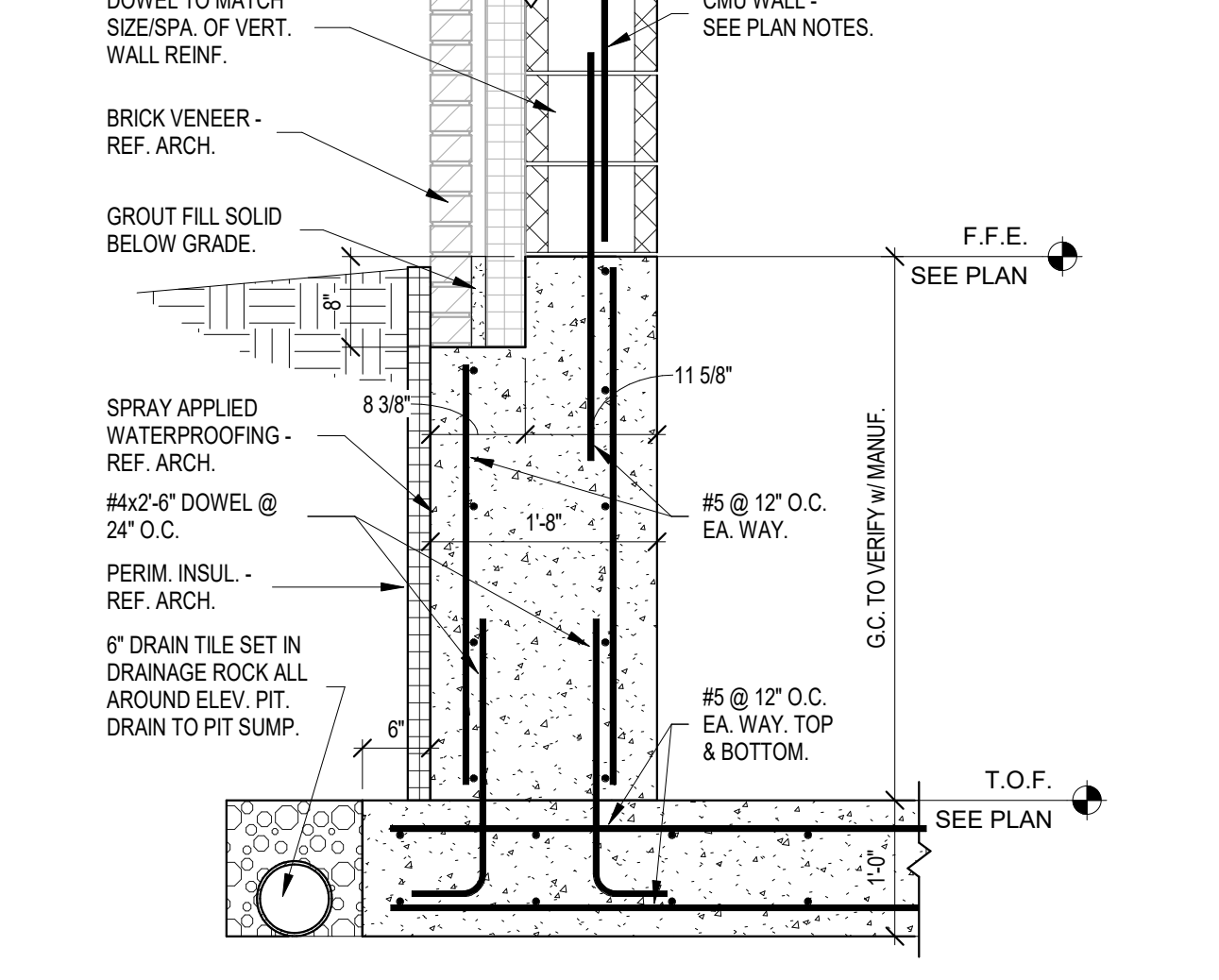
8 FOUND. WALL w/ BRICKLEDGE, CMU, & LG STUD
3/4" = 1'-0"



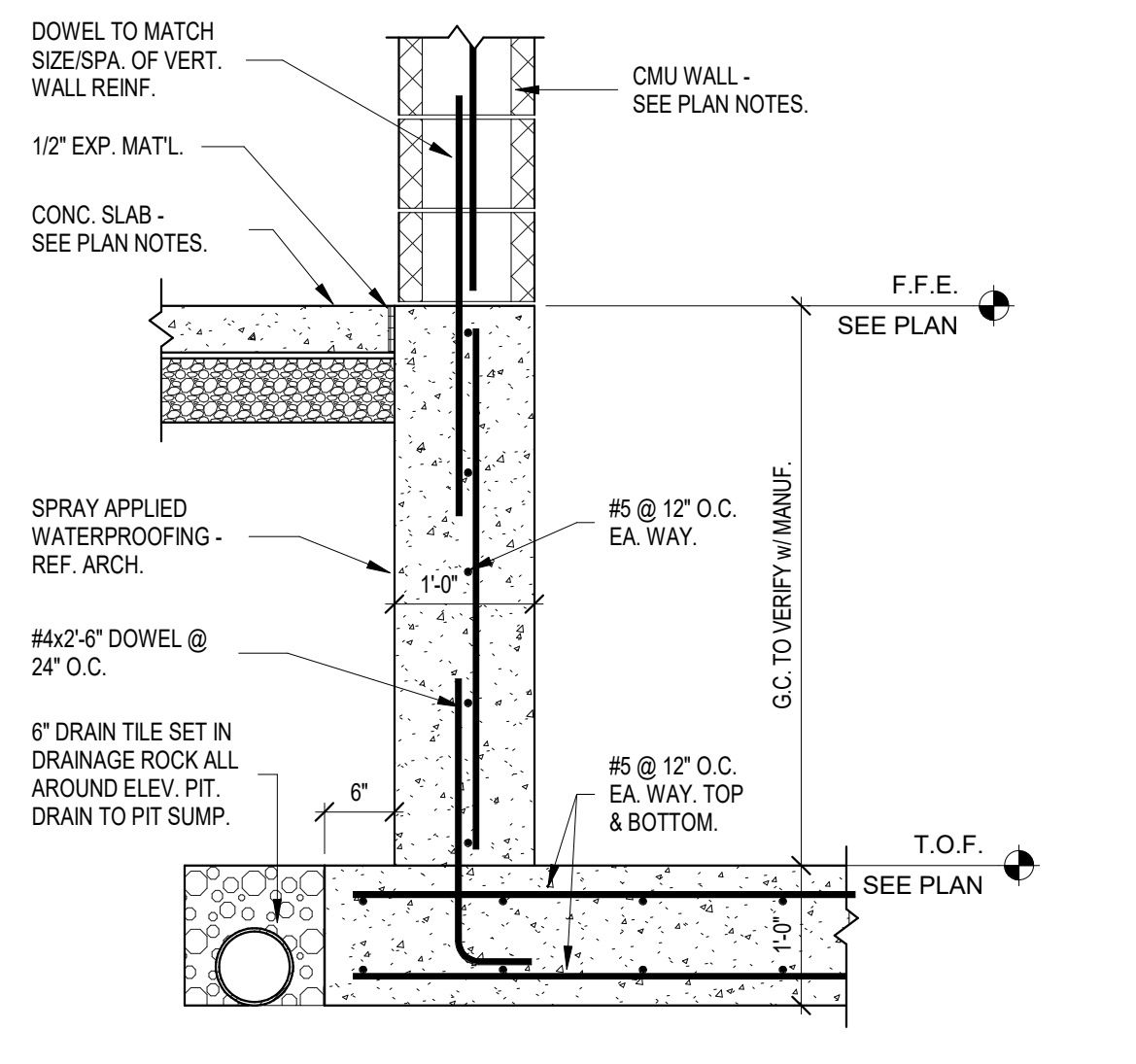
9 EXT. PIER @ BRICKLEDGE
3/4" = 1'-0"



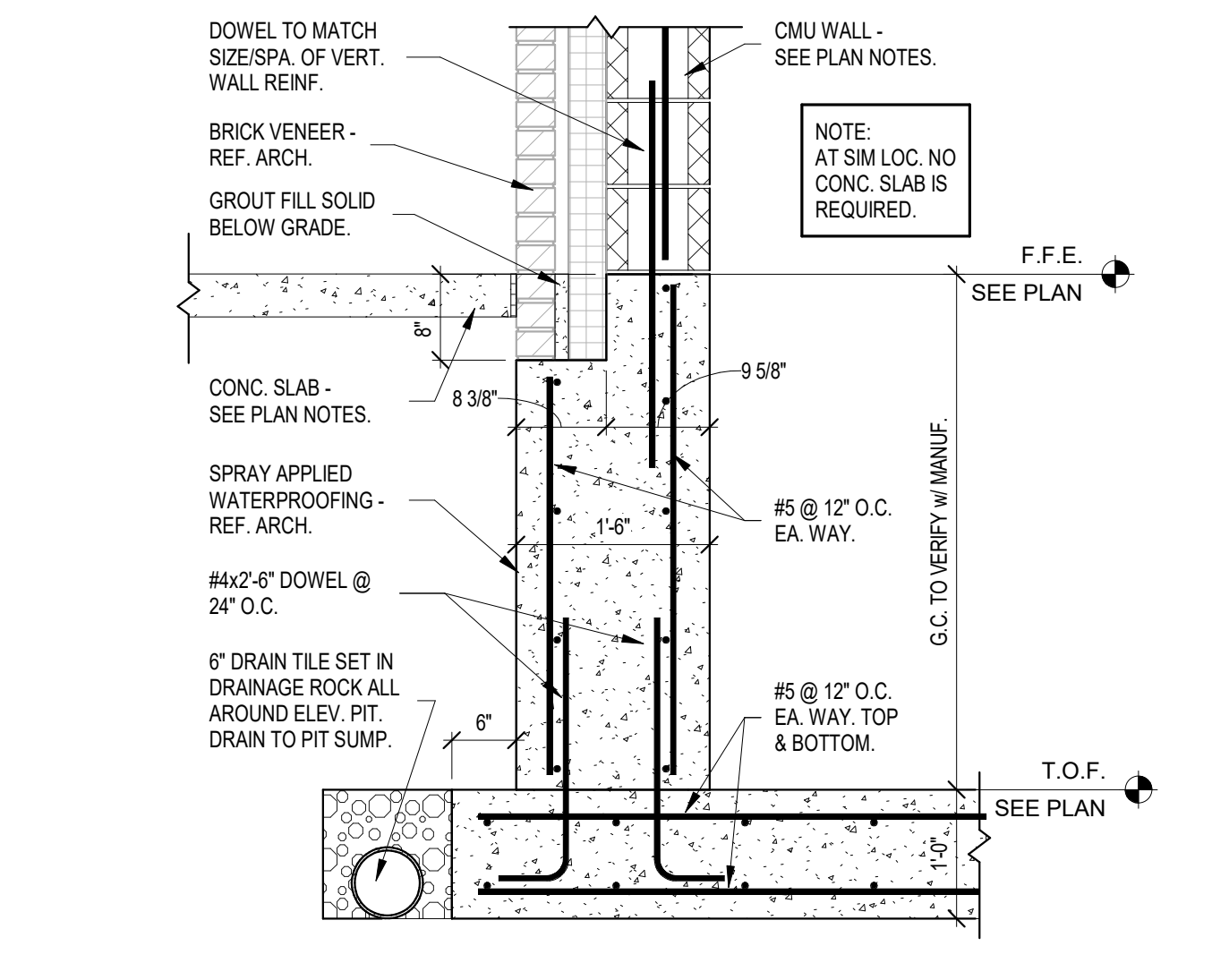
10 FOUND. SECTION @ WDW. WALL
3/4" = 1'-0"



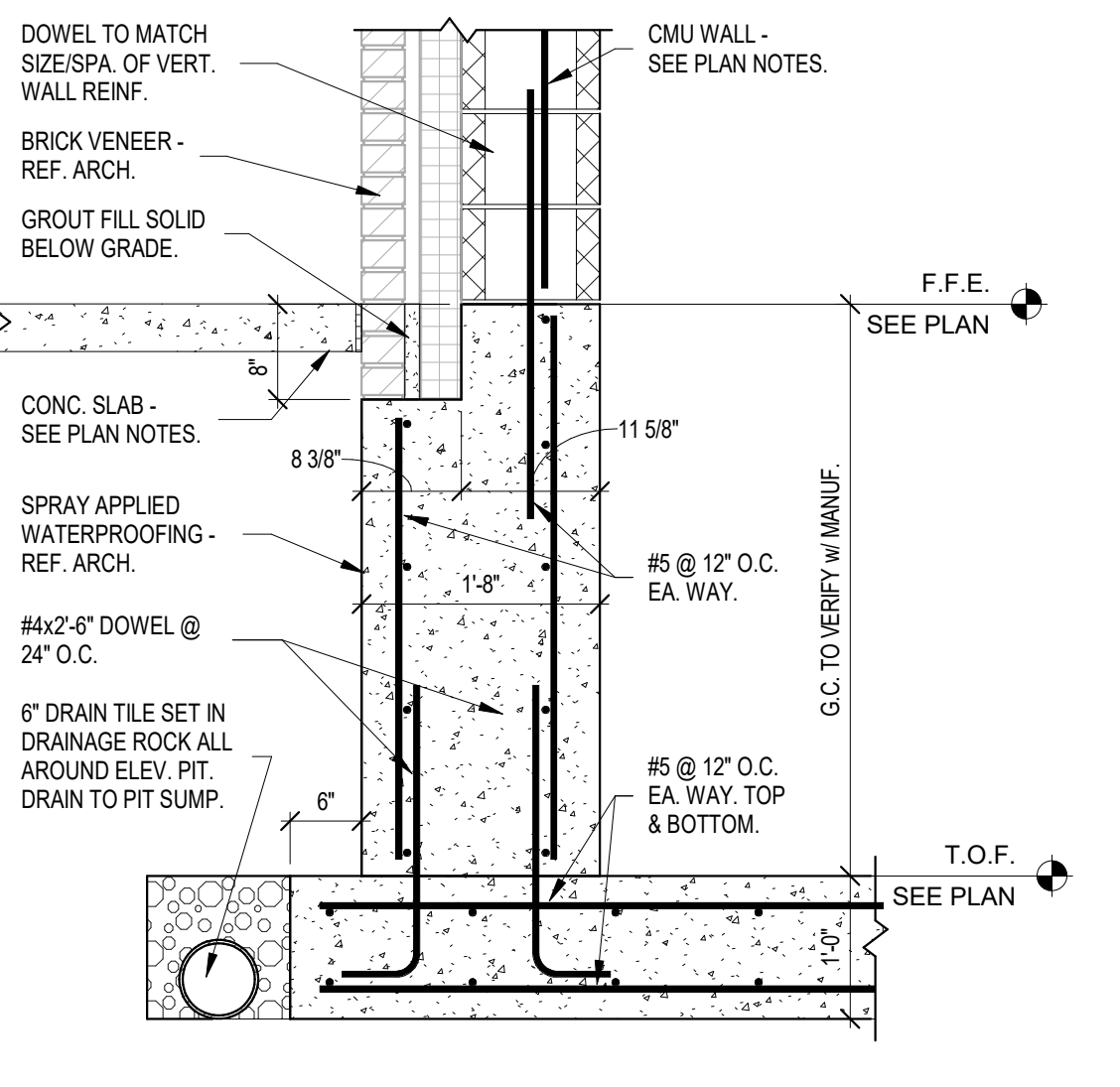
11 EXT. ELEV. PIT SECTION 1
3/4" = 1'-0"



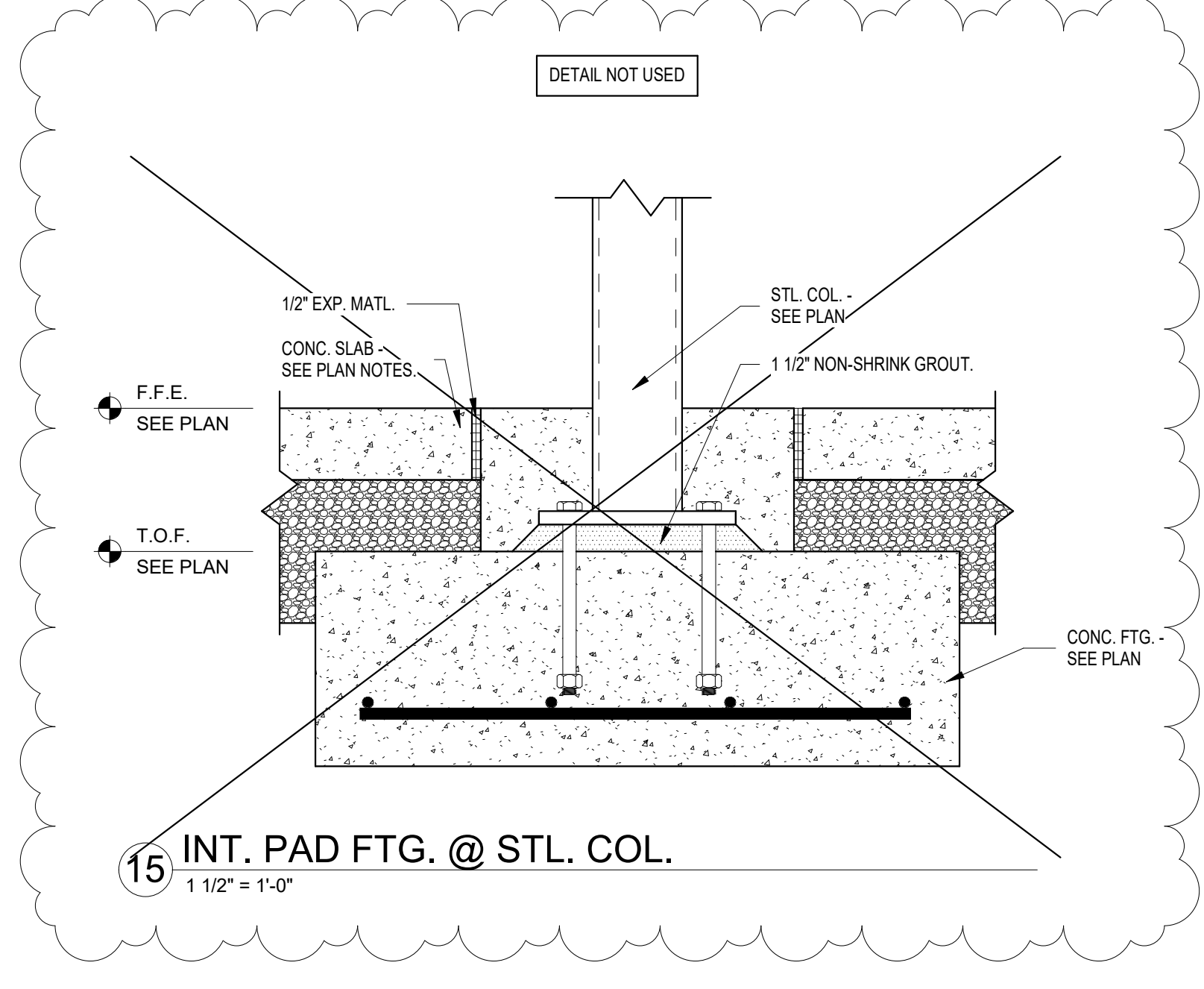
12 INT. ELEV. PIT SECTION 1
3/4" = 1'-0"



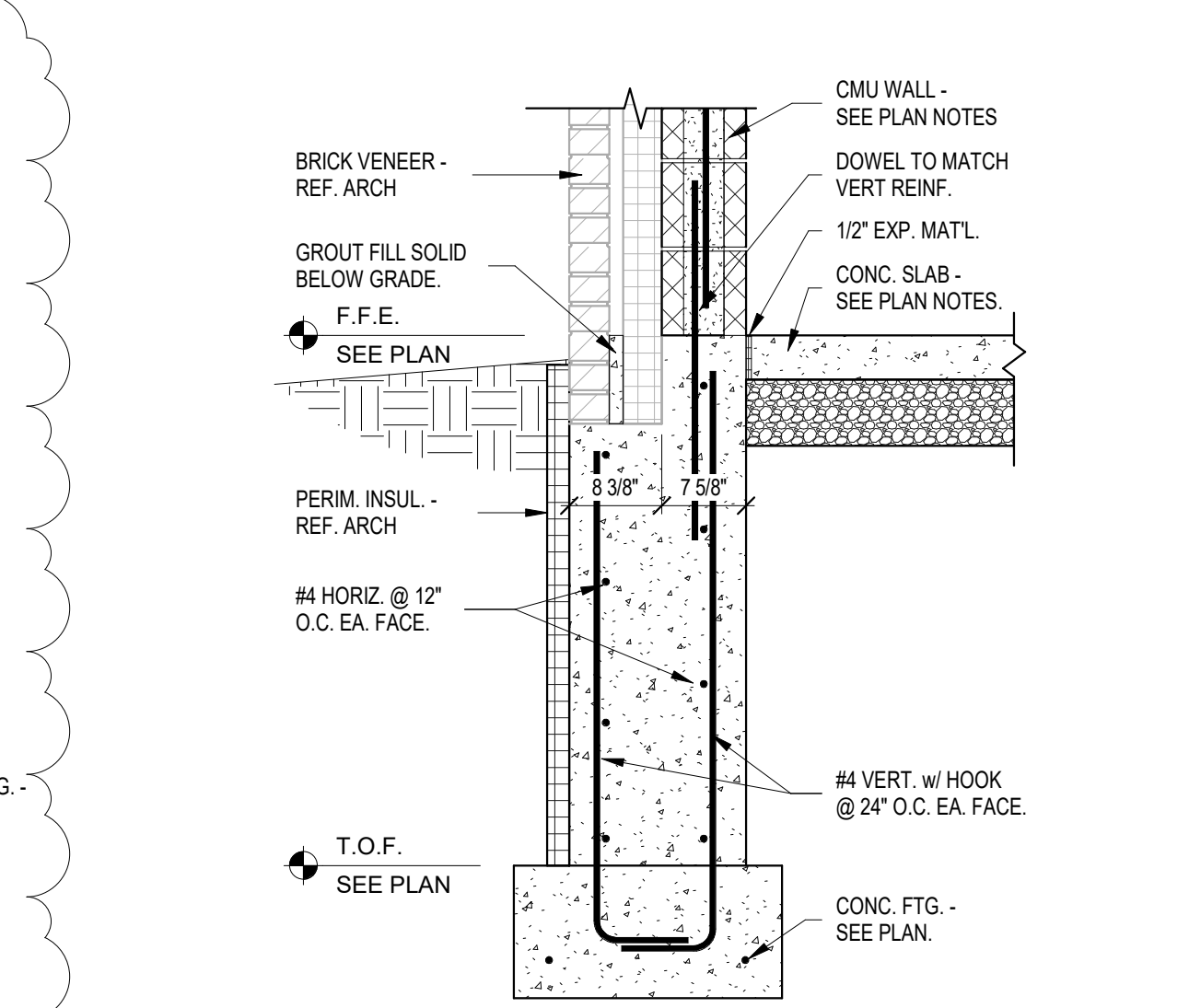
13 INT. ELEV. PIT SECTION 2
3/4" = 1'-0"



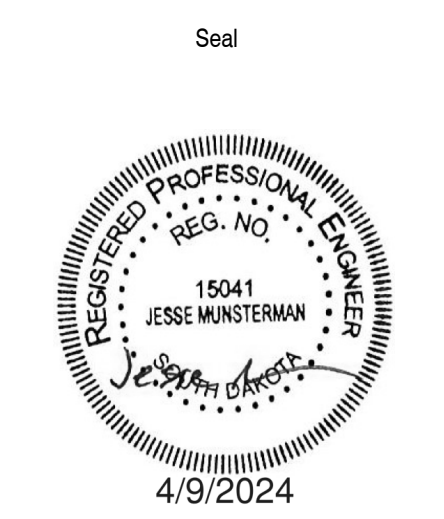
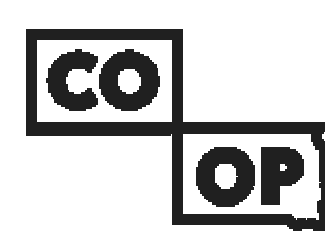
14 INT. ELEV. PIT SECTION 3
3/4" = 1'-0"



15 INT. PAD FTG. @ STL. COL.
1 1/2" = 1'-0"



16 TYP. FOUND. WALL w/ BRICKLEDGE
3/4" = 1'-0"



Addendum No. M-2
To Mechanical Plans and Specifications:
Lincoln Hall Business & Nursing School
Northern State University
Aberdeen, South Dakota

Addendum Dated: April 23, 2024

Original Plans & Specifications Dated: April 9, 2024

SCOPE OF THIS ADDENDUM: The following becomes part of the original plans and specifications, taking precedence over the items that may conflict. The bidder shall note receipt and make acknowledgement of the addendum on the bid form, incorporating its provision in the bid.

PLAN AND SPECIFICATION CHANGES AND CLARIFICATIONS:

1. Clarification to domestic piping materials: All sanitary waste and vent piping routed in return air plenums must be cast iron. Insulated PVC will not be acceptable in return air plenums for sanitary waste and vent piping.
2. Sheet M701 – Mechanical Details (2 of 4)
 - a. Water Header Piping Diagram – PC to provide & install a winterization drain valve/threaded plug fitting on piping serving lawn irrigation downstream of double check backflow preventer in Water Entry 160. Coordinate the exact plug with the lawn irrigation contractor.

APPROVED EQUALS:

The following list of equipment manufacturers shall be added to the approved equals listed on the plan sheet schedules and considered as approved equals subject to meeting all requirements of the plans and specifications – final acceptance subject to shop drawing approval.

1. Water Heaters: Bradford White

Sichmeller Engineering
(605) 225-4344

Attachments: None



**Addendum #2
TO CONTRACT DOCUMENTS
FOR NORTHERN STATE LINCOLN HALL
12th Ave SE, Aberdeen, SD 57401**

OWNER: Northern State University
1200 S. Jay St., Aberdeen, SD 57401

ARCHITECT: CO-OP Architecture
1108 S Main Street Suite #102
Aberdeen, SD 57401
Telephone: 6052620243
Spencer Sommers
spencer@co-oparch.com

ENGINEER: IMEG
3001 Broadway St. NE, Suite 601
Minneapolis, MN 55413
Office: 612-540-5000

IMEG Project No.: 21008080.00

DATE: April 23, 2024

SPECIFICATION CHANGES:

Revisions were made to the following specification sections:

Specification Section 260500 - BASIC ELECTRICAL REQUIREMENTS

Specification SECTION 26 05 03 - THROUGH PENETRATION FIRESTOPPING

Specification SECTION 26 05 05 - ELECTRICAL DEMOLITION FOR REMODELING

- A. Note that demolition scope for Lincoln Hall demolition is to make the building safe for demolition of entire building that is the scope of the General Contractor.

Specification SECTION 26 05 13 - WIRE AND CABLE

Specification SECTION 26 05 33 - CONDUIT AND BOXES

Specification SECTION 26 05 53 - ELECTRICAL IDENTIFICATION

Specification SECTION 26 09 33 - LIGHTING CONTROL SYSTEMS

Specification SECTION 26 27 26 - WIRING DEVICES

Specification SECTION 28 31 01 - FIRE ALARM AND DETECTION SYSTEMS ADDRESSABLE

DRAWING CHANGES:

SHEET E500 – ELECTRICAL SCHEDULES

- 1. Revised Floorbox schedule

End Add #2

SECTION 26 05 00 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Requirements applicable to all Division 26 Sections. Also refer to Division 1 - General Requirements. This section is also applicable to Interior Communications Pathways Section 27 05 28. This section is also applicable to Fire Alarm and Detection Systems Section 28 31 00.
- B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

1.2 REFERENCES

- A. NFPA 70 - National Electrical Code (NEC)

1.3 SCOPE OF WORK

- A. This Specification and the associated drawings govern furnishing, installing, testing and placing into satisfactory operation the Electrical Systems.
- B. The Contractor shall furnish and install all new materials as indicated on the drawings, and/or in these specifications, and all items required to make the portion of the Electrical Work a finished and working system.
- C. Separate contracts will be awarded for the following work.
- D. All work will be awarded under a single General Contract. The division of work listed below is for the Contractor's convenience and lists normal breakdown of the work.
- E. Separate contracts will be awarded for the following work. The division of work listed below is for the contractors' convenience and lists a normal breakdown of the work. Please refer to the Construction Manager's scope statements for complete scope of work description.
- F. Description of Systems shall be as follows:
 - 1. Electrical power system to and including luminaires, equipment, motors, devices, etc.
 - 2. Electrical power service system from the Campus Utility Company to and including service entrance equipment, distribution and metering.
 - 3. Grounding system.
 - 4. Fire alarm system.
 - 5. Wiring system for temperature control system as shown on the drawings.
 - 6. Wiring of equipment furnished by others.
 - 7. Removal work and/or relocation and reuse of existing systems and equipment.
 - 8. Telecommunications rough-in, as shown on drawings, for installation of telecommunications equipment by others under separate contract.
 - 9. Technology Systems as described in Division 27/28 and on the T-series documents as described in the Suggested Matrix of Scope Responsibility.
 - 10. Furnish and install firestopping systems for penetrations of fire-rated construction associated with this Contractor's work.
- G. Work Not Included:
 - 1. Telecommunications cabling will be by Division 27, in raceways and conduits furnished and installed as part of the Electrical work.
 - 2. Temperature control wiring for plumbing and HVAC equipment (unless otherwise

indicated) will be by other Contractors.

1.4 OWNER FURNISHED PRODUCTS

- A. Contractor shall make all electrical system connections shown on the drawings **or** required for fully functional units.
- B. Contractor is responsible for all damage to Owner furnished equipment caused during installation.

1.5 WORK SEQUENCE

- A. All work that will produce excessive noise or interference with normal building operations, as determined by the Owner, shall be scheduled with the Owner. It may be necessary to schedule such work during unoccupied hours. The Owner reserves the right to determine when restricted construction hours are required.

1.6 DIVISION OF WORK BETWEEN MECHANICAL, ELECTRICAL, & CONTROL CONTRACTORS

- A. Division of work is the responsibility of the Prime Contractor. Any scope of work described at any location on the contract document shall be sufficient for including said requirement in the project. The Prime Contractor shall be solely responsible for determining the appropriate subcontractor for the described scope. In no case shall the project be assessed an additional cost for scope that is described on the contract documents on bid day. The following division of responsibility is a guideline based on typical industry practice.
- B. Definitions:
 - 1. "Mechanical Contractors" refers to the Contractors listed in Division 21/22/23 of this Specification.
 - 2. "Technology Contractors" refers to the Contractors furnishing and installing systems listed in Division 27/28 of this Specification.
 - 3. Motor Power Wiring: The single phase or 3 phase wiring extending from the power source (transformer, panelboard, feeder circuits, etc.) through disconnect switches and motor controllers to, and including the connections to the terminals of the motor.
 - 4. Motor Control Wiring: The wiring associated with the remote operation of the magnetic coils of magnetic motor starters or relays, or the wiring that permits direct cycling of motors by means of devices in series with the motor power wiring. In the latter case, the devices are usually single phase, have "Manual-Off-Auto" provisions, and are usually connected into the motor power wiring through a manual motor starter.
 - 5. Control devices such as start-stop push buttons, thermostats, pressure switches, flow switches, relays, etc., generally represent the types of equipment associated with motor control wiring.
 - 6. Motor control wiring is single phase and usually 120 volts. In some instances, the voltage will be the same as the motor power wiring. When the motor power wiring exceeds 120 volts, a control transformer is usually used to give a control voltage of 120 volts.
 - 7. Temperature Control Wiring: The wiring associated with the operation of a motorized damper, solenoid valve or motorized valve, etc., either modulating or two-position, as opposed to wiring that directly powers or controls a motor used to drive equipment such as fans, pumps, etc. This wiring will be from a 120-volt source and may continue as 120 volt, or be reduced in voltage (24 volt), in which case a control transformer shall be furnished as part of the temperature control wiring.
 - 8. Control Motor: An electric device used to operate dampers, valves, etc. It may be two-position or modulating. Conventional characteristics of such a motor are 24 volts, 60 cycles, 1 phase, although other voltages may be encountered.
 - 9. Low Voltage Technology Wiring: The wiring associated with the technology systems, used for analog or digital signals between equipment.
 - 10. Telecommunications/Technology Rough-in: Relates specifically to the backboxes, necessary plaster rings and other miscellaneous hardware required for the installation or

mounting of telecommunications/technology information outlets.

C. General:

1. The purpose of these Specifications is to outline the Electrical and Mechanical Contractors' responsibilities related to electrical work required for items such as temperature controls, mechanical equipment, fans, chillers, compressors, etc. The exact wiring requirements for much of the equipment cannot be determined until the systems have been selected and submittals approved. Therefore, the electrical drawings show only known wiring related to such items. All wiring not shown on the electrical drawings, but required for mechanical systems, is the responsibility of the Mechanical Contractor.
2. Where drawings require Electrical Contractor to wire between equipment furnished by Mechanical Contractor, such wiring shall terminate at terminals provided in the equipment. Mechanical Contractor shall furnish complete wiring diagrams and supervision to Electrical Contractor and designate terminal numbers for correct wiring.
3. Control low (24V) and control line (120V) voltage wiring, conduit, and related switches and relays required for the automatic control and/or interlock of motors and equipment, including final connection, are to be furnished and installed under Divisions 21, 22 and 23. Materials and installation to conform to Class 1 or 2 requirements.
4. The Electrical Contractor shall establish electrical utility elevations prior to fabrication and installation. The Electrical Contractor shall coordinate utility elevations with other trades. When a conflict arises, priority shall be as follows:
 - a. Luminaires.
 - b. Gravity flow piping, including steam and condensate.
 - c. Electrical bus duct.
 - d. Sheet metal.
 - e. Cable trays, including access space.
 - f. Other piping.
 - g. Conduits and wireway.

D. Mechanical Contractor's Responsibility:

1. Assumes responsibility for internal wiring of all equipment furnished by the Mechanical Contractor.
2. Assumes all responsibility for miscellaneous items furnished by the Mechanical Contractor that require wiring but are not shown on the electrical drawings or specified in the Electrical Specification. If items such as relays, flow switches, or interlocks are required to make the mechanical system function correctly or are required by the manufacturer, they are the responsibility of the Mechanical Contractor.
3. Assumes all responsibility for Temperature Control wiring, if the Temperature Control Contractor is a Subcontractor to the Mechanical Contractor.
4. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

E. Temperature Control Contractor's or Subcontractor's Responsibility:

1. Wiring of all devices needed to make the Temperature Control System functional.
2. Verifying any control wiring on the electrical drawings as being by the Electrical Contractor. All wiring required for the Control System, but not shown on the electrical drawings, is the responsibility of the Temperature Control Contractor or Subcontractor.
3. Coordinating equipment locations (such as PE's, EP's, relays, transformers, etc.) with the Electrical Contractor, where wiring of the equipment is by the Electrical Contractor.

F. Electrical Contractor's Responsibility:

1. Furnishes and installs all combination starters, manual starters and disconnect devices

shown on the Electrical Drawings or indicated to be by the Electrical Contractor in the Mechanical Drawings or Specifications.

2. Installs and wires all remote-control devices furnished by the Mechanical Contractor or Temperature Control Contractor when so noted on the Electrical Drawings.
3. Furnishes and installs motor control and temperature control wiring, when noted on the drawings.
4. Furnishes, installs, and connects all relays, etc., for automatic shutdown of certain mechanical equipment (supply fans, exhaust fans, etc.) upon actuation of the Fire Alarm System.
5. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

G. General (Electrical/Technology):

1. "Electrical Contractor" as referred to herein shall be responsible for scope listed in Division 27/28 of this specification when the "Suggested Matrix of Scope Responsibility" indicated work shall be furnished and installed by the EC. Refer to the Contract Documents for this "Suggested Matrix of Scope Responsibility".
2. The purpose of these Specifications is to outline the Electrical and Technology Contractor's work responsibilities as related to Telecommunications Rough-in, conduit, cable tray, power wiring and Low Voltage Technology Wiring.
3. The exact wiring requirements for much of the equipment cannot be determined until the systems have been purchased and submittals approved. Therefore, only known wiring, conduits, raceways and electrical power related to such items is shown on the Technology drawings. Other wiring, conduits, raceways, junction boxes and electrical power not shown on the Technology Drawings but required for operation of the systems is the responsibility of the Technology Contractor and included in said Contractor's bid.
4. Where Electrical Contractor is required to install conduit, conduit sleeves and/or power connections in support of Technology systems, the final installation shall not be until a coordination meeting between the Electrical Contractor and the Technology Contractor has convened to determine the exact location and requirements of the installation.
5. Where the Electrical Contractor is required to install cable tray that will contain Low Voltage Technology Wiring, installation shall not begin prior to a coordination review of the cable tray shop drawings by the Technology Contractor.

H. Technology Contractor's Responsibility:

1. Assumes all responsibility for the low voltage technology wiring of all systems, including cable support where open cable is specified.
2. Assumes all responsibility for all required backboxes, conduit and power connections not specifically shown as being furnished and installed by the Electrical Contractor on the "Suggested Matrix of Scope Responsibility".
3. Assumes all responsibility for providing and installing all ladder rack and other cable management hardware (as defined herein).
4. Responsible for providing the Electrical Contractor with the required grounding lugs or other hardware for each piece of technology equipment which is required to be bonded to the telecommunications ground bar.
5. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

1.7 COORDINATION DRAWINGS

A. Definitions:

1. Coordination Drawings: A compilation of the pertinent layout and system drawings that show the sizes and locations, including elevations, of system components and required

access areas to ensure that no two objects will occupy the same space. This is to be considered asbuilt drawings and the contractor is responsible for coordinating with all other disciplines.

- a. Mechanical trades shall include, but are not limited to, mechanical equipment, ductwork, fire protection systems, plumbing piping, medical gas systems, hydronic piping, steam and steam condensate piping, and any item that may impact coordination with other disciplines.
 - b. Electrical trades shall include, but are not limited to, electrical equipment, conduit 1.5" and larger, conduit racks, cable trays, pull boxes, transformers, raceway, busway, lighting, ceiling-mounted devices, and any item that may impact coordination with other disciplines.
 - c. Technology trades shall include, but are not limited to, technology equipment, racks, conduit 1.5" and larger, conduit racks, cable trays, ladder rack, pull boxes, raceway, ceiling-mounted devices, and any item that may impact coordination with other disciplines.
 - d. Maintenance clearances and code-required dedicated space shall be included.
 - e. The coordination drawings shall include all underground, underfloor, in-floor, in chase, and vertical trade items.
2. Spaces with open/cloud ceiling architecture shall indicate the overhead utilities and locate equipment as required to maintain clearance above lights. The intent for the installation is to maintain a maximum allowable vertical clearance and an organized/clean manner in the horizontal. Notify Architect/Engineer of the maximum clearance which can be maintained. Failure to comply will result in modifications with no cost to Owner.
 - a. In cloud ceiling architecture, when open cabling/wire and/or cable tray crosses gaps between ceiling clouds and/or walls, cabling is to transition to conduits to span the gaps in order to conceal cabling from below.
 3. The contractors shall use the coordination process to identify the proper sequence of installation of all utilities above ceilings and in other congested areas, to ensure an orderly and coordinated end result, and to provide adequate access for service and maintenance.

B. Participation:

1. The contractors and subcontractors responsible for work defined above shall participate in the coordination drawing process.
2. One contractor shall be designated as the Coordinating Contractor for purposes of preparing a complete set of composite electronic CAD coordination drawings that include all applicable trades, and for coordinating the activities related to this process. The Coordinating Contractor for this project shall be the Mechanical Contractor.
 - a. The Coordinating Contractor shall utilize personnel familiar with requirements of this project and skilled as draftspersons/CAD operators, competent to prepare the required coordination drawings.
3. Electronic CAD drawings shall be submitted to the Coordinating Contractor for addition of work by other trades. IMEG will provide electronic file copies of ventilation drawings for contractor's use if the contractor signs and returns an "Electronic File Transfer" waiver provided by IMEG. IMEG will not consider blatant reproductions of original file copies an acceptable alternative for coordination drawings.

C. Drawing Requirements:

1. The file format and file naming convention shall be coordinated with and agreed to by all contractors participating in the coordination process and the Owner.

- a. Scale of drawings:
 - 1) General plans: 1/4 Inch = 1'-0" (minimum).
 - 2) Mechanical, electrical, communication rooms, and including the surrounding areas within 10 feet: 1/2 Inch = 1'-0" (minimum).
 - 3) Shafts and risers: 1/2 Inch = 1'-0" (minimum).
 - 4) Sections of shafts and mechanical and electrical equipment rooms: 1/4 Inch = 1'-0" (minimum).
 - 5) Sections of congested areas: 1/2 Inch = 1'-0" (minimum).
2. Ductwork layout drawings shall be the baseline system for other components. Ductwork layout drawings shall be modified to accommodate other components as the coordination process progresses.
3. There may be more drawings required for risers, top and bottom levels of mechanical rooms, and shafts.

D. General:

1. Coordination drawing files shall be made available to the A/E and Owner's Representative. The A/E will only review identified conflicts and give an opinion, but will not perform as a coordinator.
2. A plotted set of coordination drawings shall be available at the project site.
3. Coordination drawings are not shop drawings and shall not be submitted as such.
4. The contract drawings are schematic in nature and do not show every fitting and appurtenance for each utility. Each contractor is expected to have included in the bid sufficient fittings, material, and labor to allow for adjustments in routing of utilities made necessary by the coordination process and to provide a complete and functional system.
5. The contractors will not be allowed additional costs or time extensions due to participation in the coordination process.
6. The contractors will not be allowed additional costs or time extensions for additional fittings, reroutings or changes of duct size, that are essentially equivalent sizes to those shown on the drawings and determined necessary through the coordination process.
7. The A/E reserves the right to determine space priority of equipment in the event of spatial conflicts or interference between equipment, piping, conduit, ducts, and equipment provided by the trades.
8. Changes to the contract documents that are necessary for systems installation and coordination shall be brought to the attention of the A/E.
9. Access panels shall preferably occur only in gypsum board walls or plaster ceilings where indicated on the drawings.
 - a. Access to mechanical, electrical, technology, and other items located above the ceiling shall be through accessible lay-in ceiling tile areas.
 - b. Potential layout changes shall be made to avoid additional access panels.
 - c. Additional access panels shall not be allowed without written approval from the A/E at the coordination drawing stage.
 - d. Providing additional access panels shall be considered after other alternatives are reviewed and discarded by the A/E and the Owner's Representative.
 - e. When additional access panels are required, they shall be provided without additional cost to the Owner.
10. Complete the coordination drawing process and obtain sign-off of the drawings by all contractors prior to installing any of the components.
11. Conflicts that result after the coordination drawings are signed off shall be the responsibility of the contractor or subcontractor who did not properly identify their work requirements, or installed their work without proper coordination.
12. Updated coordination drawings that reflect as-built conditions may be used as record documents.

1.8 QUALITY ASSURANCE

- A. Contractor's Responsibility Prior to Submitting Pricing/Bid Data:
1. The Contractor is responsible for constructing complete and operating systems. The Contractor acknowledges and understands that the Contract Documents are a two-dimensional representation of a three-dimensional object, subject to human interpretation. This representation may include imperfect data, interpreted codes, utility guides, three-dimensional conflicts, and required field coordination items. Such deficiencies can be corrected when identified prior to ordering material and starting installation. The Contractor agrees to carefully study and compare the individual Contract Documents and report at once in writing to the Architect/Engineer any deficiencies the Contractor may discover. The Contractor further agrees to require each subcontractor to likewise study the documents and report at once any deficiencies discovered.
 2. The Contractor shall resolve all reported deficiencies with the Architect/Engineer prior to awarding any subcontracts, ordering material, or starting any work with the Contractor's own employees. Any work performed prior to receipt of instructions from the Architect/Engineer will be done at the Contractor's risk.
- B. Qualifications:
1. Only products of reputable manufacturers as determined by the Architect/Engineer are acceptable.
 2. All Contractors and subcontractors shall employ only workmen who are skilled in their trades. At all times, the number of apprentices at the job site shall be less than or equal to the number of journeymen at the job site.
- C. Compliance with Codes, Laws, Ordinances:
1. Conform to all requirements of the City/State of Aberdeen, SD Codes, Laws, Ordinances and other regulations having jurisdiction.
 2. Conform to all published standards of Northern State University.
 3. If there is a discrepancy between the codes and regulations and these specifications, the Architect/Engineer shall determine the method or equipment used.
 4. If the Contractor notes, at the time of bidding, that any parts of the drawings or specifications do not comply with the codes or regulations, Contractor shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time for this procedure, Contractor shall submit with the proposal a separate price to make the system comply with the codes and regulations.
 5. All changes to the system made after the letting of the contract to comply with codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.
 6. If there is a discrepancy between manufacturer's recommendations and these specifications, the manufacturer's recommendations shall govern.
 7. If there are no local codes having jurisdiction, the current issue of the National Electrical Code shall be followed.
- D. Permits, Fees, Taxes, Inspections:
1. Procure all applicable permits and licenses.
 2. Abide by all laws, regulations, ordinances, and other rules of the State or Political Subdivision where the work is done, or as required by any duly constituted public authority.
 3. Pay all charges for permits or licenses.
 4. Pay all fees and taxes imposed by State, Municipal, and other regulatory bodies.
 5. Pay all charges arising out of required inspections by an authorized body.
 6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized agency/consultant.

7. Where applicable, all fixtures, equipment and materials shall be listed by Underwriter's Laboratories, Inc. or a nationally recognized testing organization.
8. Pay all telephone company charges related to the service or change in service.

E. Examination of Drawings:

1. The drawings for the electrical work are completely diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment, outlets, etc., and the approximate sizes of equipment.
2. Contractor shall determine the exact locations of equipment and rough-ins, and the exact routing of raceways to best fit the layout of the job. Conduit entry points for electrical equipment including, but not limited to, panelboards, switchboards, switchgear and unit substations, shall be determined by the Contractor unless noted in the contract documents.
3. Scaling of the drawings will not be sufficient or accurate for determining these locations.
4. Where job conditions require reasonable changes in arrangements and locations, such changes shall be made by the Contractor at no additional cost to the Owner.
5. Because of the scale of the drawings, certain basic items, such as junction boxes, pull boxes, conduit fittings, etc., may not be shown, but where required by other sections of the specifications or required for proper installation of the work, such items shall be furnished and installed.
6. If an item is either shown on the drawings or called for in the specifications, it shall be included in this contract.
7. The Contractor shall determine quantities and quality of material and equipment required from the documents. Where discrepancies arise between drawings, schedules and/or specifications, the greater and better-quality number shall govern.
8. Where used in electrical documents the word "furnish" shall mean supply for use, the word "install" shall mean connect up complete and ready for operation, and the word "provide" shall mean to supply for use and connect up complete and ready for operation.
9. Any item listed as furnished shall also be installed unless otherwise noted.
10. Any item listed as installed shall also be furnished unless otherwise noted.

F. Electronic Media/Files:

1. Construction drawings for this project have been prepared utilizing Revit.
2. Contractors & Subcontractors may request electronic media files of the contract drawings &/or copies of the specifications. Specifications will be provided in PDF format.
3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by IMEG.
4. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.
5. Electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.
6. The drawings prepared by IMEG for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.
7. The use of these CAD documents by the Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.
8. The information is provided to expedite the project and assist the Contractor with no guarantee by IMEG as to the accuracy or correctness of the information provided. IMEG accepts no responsibility or liability for the Contractor's use of these documents.

G. Field Measurements:

1. Verify all pertinent dimensions at the job site before ordering any conduit, conductors, wireways, bus duct, fittings, etc.

1.9 SUBMITTALS

- A. Submittals shall be required for the following items, and for additional items where required elsewhere in the specifications or on the drawings.

1. Submittals list:

Referenced Section	Submittal Item	Coordination Drawing
26 05 03	Through Penetration Firestopping	
26 05 17	Electric Heat Trace	
26 05 53	Electrical Identification	
26 05 73	Power System Study	
26 09 33	Lighting Control System	
26 20 00	Service Entrance	
26 24 13	Switchboards	Yes
26 24 16	Panelboards	Yes
26 27 26	Wiring Devices	Ceiling mount
26 28 16	Disconnect Switches	Yes
26 43 00	Surge Protection Devices	
26 51 00	Lighting	Yes
26 51 19	LED Lighting	Yes
26 52 15	Emergency Lighting Inverter	Yes
28 31 00	Fire Alarm and Detection Systems	Yes

- B. General Submittal Procedures: In addition to provisions of Division 1, the following are required:

1. Transmittal: Each transmittal shall include the following:

- a. Date
- b. Project title and number
- c. Contractor's name and address
- d. Division of work (e.g., electrical, plumbing, heating, ventilating, etc.)
- e. Description of items submitted and relevant specification number
- f. Notations of deviations from the contract documents
- g. Other pertinent data

2. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:

- a. Date
- b. Project title and number
- c. Architect/Engineer
- d. Contractor and subcontractors' names and addresses
- e. Supplier and manufacturer's names and addresses
- f. Division of work (e.g., electrical, plumbing, heating, ventilating, etc.)
- g. Description of item submitted (using project nomenclature) and relevant specification number
- h. Notations of deviations from the contract documents
- i. Other pertinent data
- j. Provide space for Contractor's review stamps

3. Composition:

- a. Submittals shall be submitted using specification sections and the project nomenclature for each item.
- b. Individual submittal packages shall be prepared for items in each specification section. All items within a single specification section shall be packaged together where possible. An individual submittal may contain items from multiple specifications sections if the items are intimately linked (e.g., pumps and motors).
- c. All sets shall contain an index of the items enclosed with a general topic description

on the cover.

4. Content: Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; wiring and control diagrams; dimensions; shipping and operating weights; shipping splits; service clearances; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.
5. Contractor Approval Stamp:
 - a. Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed.
 - b. Unstamped submittals will be rejected.
 - c. Contractor review shall include, but not be limited to, verification of the following:
 - 1) Only approved manufacturers are used.
 - 2) Addenda items have been incorporated.
 - 3) Catalog numbers and options match those specified.
 - 4) Performance data matches that specified.
 - 5) Electrical characteristics and loads match those specified.
 - 6) Equipment connection locations, sizes, capacities, etc. have been coordinated with other affected trades.
 - 7) Dimensions and service clearances are suitable for the intended location.
 - 8) Equipment dimensions are coordinated with support steel, housekeeping pads, openings, etc.
 - 9) Constructability issues are resolved (e.g., weights and dimensions are suitable for getting the item into the building and into place, sinks fit into countertops, etc.).
 - d. The Contractor shall review, stamp and approve all subcontractors' submittals as described above.
 - e. The Contractor's approval stamp is required on all submittals. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.
6. Submittal Identification and Markings:
 - a. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
 - b. The Contractor shall clearly indicate the size, finish, material, etc.
 - c. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is intended.
 - d. All marks and identifications on the submittals shall be unambiguous.
7. Schedule submittals to expedite the project. Coordinate submission of related items.
8. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.
9. Reproduction of contract documents alone is not acceptable for submittals.
10. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.
11. Submittals not required by the contract documents may be returned without review.
12. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals and one resubmittal for each product. If the first submittal is incomplete or

does not comply with the drawings and/or specifications, the Contractor issue a resubmittal. If additional resubmittals need review, the contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.

13. Submittals shall be reviewed and approved by the Architect/Engineer before releasing any equipment for manufacture or shipment.
14. Contractor's responsibility for errors, omissions or deviation from the contract documents in submittals is not relieved by Architect/Engineer approval.
15. Schedule shall allow for adequate time to perform orderly and proper review of submittals, including time for consultants and Owner if required, and resubmittals by Contractor if necessary, and to cause no delay in Work or in activities of Owner or other contractors.
 - a. Allow at least two weeks for Architect/Engineer review and processing of each submittal, excluding mailing.
16. Architect/Engineer reserves the right to withhold action on a submittal which, in the Architect/Engineer™™s opinion, requires coordination with other submittals until related submittals are received. The Architect/Engineer will notify the Contractor, in writing, when they exercise this right.

C. Electronic Submittal Procedures:

1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.
 - a. Submittal file name: 26 XX XX.description.YYYYMMDD
 - b. Transmittal file name: 26 XX XX.description.YYYYMMDD
5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.

1.10 CHANGE ORDERS

- A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders shall be broken down by sheet or associated individual line item indicated in the change associated narrative, whichever provides the most detailed breakdown. Change orders with inadequate breakdown will be rejected.
- B. Itemized pricing with unit cost shall be provided from all distributors and associated subcontractors.
- C. Change order work shall not proceed until authorized.

1.11 PRODUCT DELIVERY, STORAGE, HANDLING and MAINTENANCE

- A. Exercise care in transporting and handling to avoid damage to materials. Store materials on the site to prevent damage.

- B. Keep all materials clean, dry and free from damaging environments.
- C. Coordinate the installation of heavy and large equipment with the General Contractor and/or Owner. If the Electrical Contractor does not have prior documented experience in rigging and lifting similar equipment, he/she shall contract with a qualified lifting and rigging service that has similar documented experience. Follow all equipment lifting and support guidelines for handling and moving.
- D. Contractor is responsible for moving equipment into the building and/or site. Contractor shall review site prior to bid for path locations and any required building modifications to allow movement of equipment. Contractor shall coordinate the work with other trades.

1.12 NETWORK / INTERNET CONNECTED EQUIPMENT

- A. These specifications may require certain equipment or systems to have network, Internet and/or remote access capability ("Network Capability"). Any requirement for Network Capability shall be interpreted only as a functional capability and is not to be construed as authority to connect or enable any Network Capability. Network Capability may only be connected or enabled with the express written consent of the Owner.
- B. The following network connected equipment shall be equipped with restricted access protocols:
 - 1. Adjustable trip overcurrent protection devices
 - 2. Power monitoring and control
 - 3. Electrical controls
 - 4. Lighting control system
 - 5. Variable frequency drives
 - 6. Fire alarm and automatic detection

1.13 WARRANTY

- A. Provide one-year warranty for all fixtures, equipment, materials, and workmanship.
- B. The warranty period for all work in this specification Division shall commence on the date of Substantial Completion or successful system performance whichever occurs later. The warranty may also commence if a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization of the Owner. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner.
- C. Warranty requirements extend to correction, without cost to the Owner, of all work found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage due to defects or nonconformance with contract documents excluding repairs required as a result of improper maintenance or operation, or of normal wear as determined by the Architect/Engineer.

1.14 INSURANCE

- A. Contractor shall maintain insurance coverage as set forth in Division 1 of these specifications.

1.15 GREEN GLOBES REQUIREMENTS

- A. This project is pursuing a GREEN GLOBES rating. A certification in accordance with USGBC LEED Rating System for [New Construction v4]<Insert>. The Contractor shall provide all services and documentation necessary to achieve this rating.

1.16 PROJECT COMMISSIONING

- A. Contractor shall work with Commissioning Agent (CxA) as described in Section 01 91 00 and provide all services necessary for compliance with LEED Prerequisite EAp1, Fundamental Commissioning, and EAc3 Enhanced Commissioning.
- B. Contractor shall work with the Commissioning Agent (CxA) as described in Section 01 91 00 and provide all services as described in the Commissioning Plan.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All items of material having a similar function (e.g., safety switches, panelboards, switchboards, contactors, motor starters, dry type transformers) shall be of the same manufacturer unless specifically stated otherwise on drawings or elsewhere in specifications.

PART 3 - EXECUTION

3.1 JOBSITE SAFETY

- A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or the employees and subconsultants at a construction site, shall relieve the Contractor and any other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

3.2 EXCAVATION, FILL, BACKFILL, COMPACTION

- A. General:
 - 1. Prior to commencement of any excavation or digging, Contractor shall verify all underground utilities with regional utility locator. Provide prior notice to locator before excavations. Contact information for most regional utility locaters can be found by calling 811.
 - 2. Contractor shall do all excavating, filling, backfilling, compacting, and restoration in connection with the work.
- B. Excavation:
 - 1. Make all excavations to accurate, solid, undisturbed earth, and to proper dimensions.
 - 2. If excavations are carried in error below indicated levels, concrete of same strength as specified for the foundations or thoroughly compacted sand-gravel fill, as determined by the Architect/Engineer shall be placed in such excess excavations under the foundation. Place thoroughly compacted, clean, stable fill in excess excavations under slabs on grade, at the Contractor's expense.
 - 3. Trim bottom and sides of excavations to grades required for foundations.
 - 4. Protect excavations against frost and freezing.
 - 5. Take care in excavating not to damage surrounding structures, equipment or buried pipe. Do not undermine footing or foundation.

6. Perform all trenching in a manner to prevent cave-ins and risk to workmen.
7. Where original surface is pavement or concrete, the surface shall be saw cut to provide clean edges and assist in the surface restoration.
8. If satisfactory bearing soil is not found at the indicated levels, immediately notify the Architect/Engineer or their representative, and do no further work until the Architect/Engineer or their representative gives further instructions.
9. Excavation shall be performed in all ground conditions, including rock, if encountered. Bidders shall visit the premises and determine the soil conditions by actual observations, borings, or other means. Cost of all such inspections, borings, etc., shall be borne by the bidder.
10. If a trench is excavated in rock, a compacted bed with a depth of 3" (minimum) of sand and gravel shall be used to support the conduit unless masonry cradles or encasements are used.
11. Mechanical excavation of the trench to line and grade of the conduit or to the bottom level of masonry cradles or encasements is permitted, unless otherwise indicated on the electrical drawings.
12. Mechanical excavation of the trench to line and grade where direct burial cables are to be installed is permitted provided the excavation is made to a depth to permit installation of the cable on a fine sand bed at least 3 inches deep.

C. Dewatering:

1. Furnish, install, operate and remove all dewatering pumps and pipes needed to keep trenches and pits free of water.

D. Underground Obstructions:

1. Known underground piping, conduit, feeders, foundations, and other obstructions in the vicinity of construction are shown on the drawings. Review all Bid Documents for all trades on the project to determine obstructions indicated. Take great care in making installations near underground obstructions.
2. If objects not shown on the drawings are encountered, remove, relocate, or perform extra work as directed by the Architect/Engineer.

E. Fill and Backfilling:

1. No rubbish or waste material is permitted for fill or backfill.
2. Provide all necessary sand and/or CA6 for backfilling.
3. Native soil materials may be used as backfill if approved by the Geotechnical Engineer.
4. Dispose of the excess excavated earth as directed.
5. Backfill materials (native soil material, sand, and/or CA6) shall be suitable for required compaction, clean and free of perishable materials, frozen earth, debris, earth with a high void content, and stones greater than 4 inches in diameter. Water is not permitted to rise in unbackfilled trenches.
6. Backfill all trenches and excavations immediately after installing of conduit, or removing forms, unless other protection is directed.
7. Around piers and isolated foundations and structures, backfill and fill shall be placed and consolidated simultaneously on all sides to prevent wedge action and displacement. Spread fill and backfill materials in 6" uniform horizontal layers with each layer compacted separately to required density.
8. For conduits that are not concrete encased, lay all conduits on a compacted bed of sand at least 3" deep. Backfill around conduits with sand, in 6" layers and compact each layer.
9. Conduits that are concrete encased or in a ductbank, conduit spacers, and cradles shall be installed on a bed of compacted CA-6 gravel. Refer to conduit section for backfilling and ductbank requirements.
10. Backfill with native soil material (if approved) or sand up to grade for all conduits under slabs or paved areas. All other conduits shall have sand backfill to 6" above the top of the conduit.

11. Place all backfill above the sand in uniform layers not exceeding 6" deep. Place then carefully and uniformly tamp each layer to eliminate lateral or vertical displacement.
12. Where the fill and backfill will ultimately be under a building, floor or paving, each layer of fill shall be compacted to 95% of the maximum density as determined by AASHTO Designation T-99 or ASTM Designation D-698. Moisture content of soil at time of compaction shall not exceed plus or minus 2% of optimum moisture content as determined by AASHTO T-99 or ASTM D-698 test.
13. After backfilling of trenches, no superficial loads shall be placed on the exposed surface of the backfill until a period of 48 hours has elapsed.

F. Surface Restoration:

1. Where trenches are cut through graded, planted or landscaped areas, the areas shall be restored to the original condition. Replace all planting and landscaping features removed or damaged to its original condition. At least 6" of topsoil shall be applied where disturbed areas are to be seeded or sodded. All lawn areas shall be sodded unless seeding is called out in the drawings or specifications.
2. Concrete or asphalt type pavement, seal coat, rock, gravel or earth surfaces removed or damaged shall be replaced with comparable materials and restored to original condition. Broken edges shall be saw cut and repaired as directed by Architect/Engineer.

3.3 ARCHITECT/ENGINEER OBSERVATION OF WORK

A. The contractor shall provide seven (7) calendar days' notice to the Architect/Engineer prior to:

1. Placing fill over underground and underslab utilities.
2. Covering exterior walls, interior partitions and chases.
3. Installing hard or suspended ceilings and soffits.

B. The Architect/Engineer will review the installation and provide a written report noting deficiencies requiring correction. The contractor's schedule shall account for these reviews and show them as line items in the approved schedule.

C. Above-Ceiling Final Observation:

1. All work above the ceilings must be complete prior to the Architect/Engineer's review. This includes, but is not limited to:
 - a. All junction boxes are closed and identified in accordance with Section 26 05 53 Electrical Identification.
 - b. Luminaires, including ceiling-mounted exit and emergency lights, are installed and operational.
 - c. Luminaire whips are supported above the ceiling.
 - d. Conduit identification is installed in accordance with Section 26 05 53 Electrical Identification.
 - e. Luminaires are suspended independently of the ceiling system when required by these contract documents.
 - f. All wall penetrations have been sealed.
2. To prevent the Above-Ceiling Final Observation from occurring too early, the Contractor shall review the status of the work and certify, in writing, that the work is ready for the Above-Ceiling Final Observation.
3. It is understood that if the Architect/Engineer finds the ceilings have been installed prior to this review and prior to seven days elapsing, the Architect/Engineer may not recommend further payments to the contractor until full access has been provided.

3.4 PROJECT CLOSEOUT

- A. The following paragraphs supplement the requirements of Division 1.
- B. IDPH Pre-Occupancy Requirements:
 - 1. Each Contractor must submit all forms and certifications required by IDPH relating to their work at 85% completion of the project or when directed by the Owner/Architect/Engineer.
- C. Final Jobsite Observation:
 - 1. To prevent the Final Jobsite Observation from occurring too early, the Contractor shall review the completion status of the project and certify that the job is ready for the final jobsite observation.
 - 2. Attached to the end of this section is a typical list of items that represent the degree of job completeness expected prior to requesting a review. The Contractor shall sign the attached certification and return it to the Architect/Engineer so that the final observation can be scheduled.
 - 3. It is understood that if the Architect/Engineer finds the job not ready for the final observation and additional trips and observations are required to bring the project to completion, the cost of the additional time and expenses incurred by the Architect/Engineer will be deducted from the Contractor's final payment.
 - 4. Contractor shall notify Architect/Engineer 48 hours prior to installation of ceilings or lay-in ceiling tiles.
- D. The following must be submitted before Architect/Engineer recommends final payment:
 - 1. Operation and maintenance manuals with copies of approved shop drawings.
 - 2. Record documents including reproducible drawings and specifications.
 - 3. A report documenting the instructions given to the Owner's representatives complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of this Contractor and shall be signed by the Owner's representatives.
 - 4. Provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections. Deliver to and place in location as directed and submit receipt to Architect/Engineer.
 - 5. Inspection and testing report by the fire alarm system manufacturer.
 - 6. Start-up reports on all equipment requiring a factory installation or start-up.
- E. Circuit Directories:
 - 1. Provide custom typed circuit directory for each branch circuit panelboard. Provide updated custom typed circuit directory for each existing branch circuit panelboard with new or revised circuits per the scope of work. Label shall include equipment name or final approved room name, room number, and load type for each circuit (examples: SUMP SP-1 or ROOM 101 RECEIPT). Revise directory to reflect circuit changes required to balance phase loads. Printed copies of the bid document panel schedules are not acceptable as circuit directories.

3.5 OPERATION AND MAINTENANCE MANUALS

- A. General:
 - 1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review and approval. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.
 - 2. Approved O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least 10 days prior to instruction of operating personnel.

B. Electronic Submittal Procedures:

1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.
2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.
 - a. O&M file name: O&M.div26.contractor.YYYYMMDD
 - b. Transmittal file name: O&Mtransmittal.div26.contractor.YYYYMMDD
5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.
6. Provide the Owner with an approved copy of the O&M manual on compact discs (CD), digital video discs (DVD), or flash drives with a permanently affixed label, printed with the title "Operation and Maintenance Instructions", title of the project and subject matter of disc/flash drive when multiple disc/flash drives are required.
7. All text shall be searchable.
8. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.

C. Operation and Maintenance Instructions shall include:

1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses and point of contacts. Website URLs and email addresses shall be active links in the electronic submittal.
2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.
3. Copies of all final approved shop drawings and submittals. Include Architect's/Engineer's shop drawing review comments. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.
4. Copies of all factory inspections and/or equipment startup reports.
5. Copies of warranties.
6. Schematic wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.
7. Dimensional drawings of equipment.
8. Detailed parts lists with lists of suppliers.
9. Operating procedures for each system.
10. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.
11. Repair procedures for major components.
12. Replacement parts and service material requirements for each system and the frequency of service required.
13. Instruction books, cards, and manuals furnished with the equipment.
14. Include record drawings of the one-line diagrams for each major system. The graphic for each piece of equipment shown on the one-line diagram shall be an active link to its associated Operation & Maintenance data.
15. Copies of all panel schedules in electronic Microsoft Excel spreadsheet (.xlsx) file. Each panelboard shall be a separate tab in the workbook.

3.6 INSTRUCTING OWNER REPRESENTATIVE

- A. Adequately instruct the Owner designated representatives in the maintenance, care, and operation of the complete systems installed under this contract.
- B. Provide verbal and written instructions to the Owner's representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.
- C. Contractor shall make a DVD video recording of instructions to the Owner while explaining the system so additional personnel may view the instructions at a later date. The video recording shall be the property of the Owner.
- D. The Owner has the option to make a video recording of all instructions. Coordinate schedule of instructions to facilitate this recording.
- E. The instructions shall include:
 - 1. Maintenance of equipment.
 - 2. Start-up procedures for all major equipment.
 - 3. Description of emergency system operation.
- F. Notify the Architect/Engineer of the time and place for the verbal instructions to be given to the Owner's representative so a representative can be present if desired.
- G. Minimum hours of instruction time for each item and/or system shall be as indicated in each individual specification section.
- H. Operating Instructions:
 - 1. Contractor is responsible for all instructions to the Owner's representatives for the electrical and specialized systems.
 - 2. If the Contractor does not have staff that can adequately provide the required instructions, the Contractor shall include in the bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

3.7 RECORD DOCUMENTS

- A. The following paragraphs supplement Division 1 requirements.
- B. Maintain at the job site a separate and complete set of electrical drawings and specifications with all changes made to the systems clearly and permanently marked in complete detail.
- C. Mark drawings and specifications to indicate approved substitutions; Change Orders, and actual equipment and materials used. All Change Orders, RFI responses, Clarifications and other supplemental instructions shall be marked on the documents. Record documents that merely reference the existence of the above items are not acceptable. Should this Contractor fail to complete Record Documents as required by this contract, Contractor shall reimburse Architect/Engineer for all costs to develop record documents complying with this requirement. Reimbursement shall be made at Architect/Engineer hourly rates in effect at time of work.
- D. Record changes daily and keep the marked drawings available for Architect/Engineer examination at any normal work time.
- E. Upon completing the job, and before final payment is made, give the marked-up drawings to Architect/Engineer.
- F. Record actual routing of conduits exceeding 2 inches.

3.8 PAINTING

- A. Paint all equipment that is marred or damaged prior to the Owner's acceptance. Paint and color shall match original equipment paint and shall be obtained from the equipment supplier if available. All equipment shall have a finished coat of paint applied unless specifically allowed to be provided with a prime coat only.
- B. Equipment in finished areas that will be painted to match the room decor will be painted by others. Should this Contractor install equipment in a finished area after the area has been painted, the Contractor shall have the equipment and all its supports, hangers, etc., painted to match the room decor. Painting shall be performed as described in project specifications.
- C. Equipment cabinets, casings, covers, metal jackets, etc., located in equipment rooms or concealed spaces, shall be furnished in standard finish, free from scratches, abrasions, chippings, etc.
- D. Equipment in occupied spaces, or if standard to the unit, shall have a baked primer with baked enamel finish coat free from scratches, abrasions, chipping, etc. If color option is specified or is standard to the unit, verify with the Architect the color preference before ordering.
- E. Paint all equipment in unfinished areas such as boiler room, mechanical spaces, and storage rooms. Equipment furnished with a suitable factory finish need not be painted; provided the factory applied finish is not marred or spattered. If so, equipment shall be refinished with the same paint as was factory applied.
- F. Do NOT paint electric conduits in crawl spaces, tunnels, or spaces above suspended ceilings except that where conduit is in a damp location give exposed threads at joints two coats of sealer after joint is made up.
- G. After surfaces have been thoroughly cleaned and are free of oil, dirt or other foreign matter, paint all raceway and equipment with the following:
 - 1. Bare Metal Surfaces - Apply one coat of metal primer suitable for the metal being painted. Finish with two coats of Alkyd base enamel paint.
 - 2. Plastic Surfaces - Paint plastic surfaces with two coats of semi-gloss acrylic latex paint.
- H. In accordance with LEED EQc4.2: Low-Emitting Materials - Paints and Coatings, all paints and coatings used on the interior of the building must comply with the following criteria:
 - 1. Architectural paints and coatings applied to interior walls and ceilings must not exceed the volatile organic compound (VOC) content limits established in Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993.
 - 2. Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates must not exceed the VOC content limit of 250 g/L (2 lb./gal) established in Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997.

3.9 ADJUST AND CLEAN

- A. Thoroughly clean all equipment and systems prior to Owner final acceptance of the project.
- B. Clean all foreign paint, grease, oil, dirt, labels, stickers, etc. from all equipment.
- C. Remove all rubbish, debris, etc., accumulated during construction from the premises.

3.10 SPECIAL REQUIREMENTS

- A. Coordinate the installation of all equipment, controls, devices, etc., with other trades to maintain

clear access area for servicing.

- B. Install all equipment to maximize access to parts needing service or maintenance. Review the final location, placement, and orientation of equipment with the Owner's representative prior to setting equipment.
- C. Installation of equipment or devices without regard to coordination of access requirements and confirmation with the Owner's representative will result in removal and reinstallation of the equipment at the Contractor's expense.
- D. Raceway and Cable Routing Restrictions: Raceways and cable are restricted from being routed in the following locations, unless serving the space or permitted by authority having jurisdiction.
 - 1. Elevator machine rooms and hoistways.
 - 2. Exit enclosures.
 - 3. Other areas restricted by code.
 - 4. Technology, data, server rooms.
 - 5. Fire pump and sprinkler rooms.
 - 6. Normal power in emergency power equipment rooms: Limited to feeders and branch circuits serving the emergency power equipment located in the room.
 - 7. Emergency power in normal power equipment rooms: Limited to feeders and branch circuits serving the normal power equipment located in the room.

3.11 INDOOR AIR QUALITY (IAQ) MAINTENANCE FOR OCCUPIED FACILITIES UNDER CONSTRUCTION

- A. Within the Limits of Construction:
 - 1. The Electrical Contractor shall coordinate all work with the contractor responsible for IAQ.
 - 2. The means, methods and materials used by the Electrical Contractor shall be coordinated with the contractor responsible for IAQ and shall comply with the IAQ requirements set forth in Division 1 and Division 21/22/23 of these specifications.
- B. Outside the Limits of Construction:
 - 1. IAQ shall be the responsibility of the electrical contractor for work that is required outside the limits of construction.
 - 2. The Electrical Contractor is responsible for the IAQ set forth in Division 1 and Division 21/22/23 of these specifications.
 - 3. The Electrical Contractor shall review and coordinate all IAQ plans and procedures with the owner's IAQ representative.
- C. Contractors shall make all reasonable efforts to prevent construction activities from affecting the air quality of the occupied areas of the building or outdoor areas near the building. These measures shall include, but not be limited to:
 - 1. General Contractor shall erect and maintain dust barriers throughout the construction work. These barriers shall be reasonably airtight and shall prevent entry into the construction zone by unauthorized persons. Reasonably airtight means construction equivalent to full-height temporary or permanent walls with joints taped or sealed, and shafts and other penetrations sealed as well as possible. Fire resistant polyethylene is acceptable; if flame spread/smoke developed ratings are demonstrated to conform to the applicable building codes and licensing acts.
 - 2. The Contractor shall continuously maintain the construction zone under a negative pressure of at least 0.01" w.g. minimum relative to all adjacent areas of the building.
 - a. Exhaust fans used for this purpose shall filter air and discharge it outdoors or to the least populated area adjacent to the construction work using negative air machines

designed specifically for this purpose. All filtration for air recirculated back into the building shall be HEPA (99.97% DOP efficiency) for work adjacent to healthcare or elderly facilities. If no work is adjacent to these areas, 95% filtration is acceptable. Filtering air discharged to outdoors shall be accomplished with 30% filters.

- b. If air is discharged outdoors, maintain all required distances to doors, windows, air intakes, etc.
 - c. If high levels of Volatile Organic Compounds (VOC's) or odors are released, activated carbon or equivalent filtration shall also be employed. Exhaust shall not discharge near doors, air intakes, pedestrians, gathering areas, or operable windows.
 - d. Adjusting existing air handling equipment to assist in pressure control is acceptable, if approved by the Owner and the authority having jurisdiction.
 - e. Seal return, exhaust, and supply air openings in or near the construction zone that serve existing air handling systems, and rebalance the systems for proper operation. If this is impractical, add filters at the intakes of sufficient cross sectional area to minimize the pressure drop and avoid the need for rebalancing.
 - f. Maintain pressure control one hour before and after all construction periods, and 24 hours per day in healthcare or elderly facilities.
3. All contractors shall endeavor to minimize the amount of contaminants generated during construction. Methods to be employed shall include, but not be limited to:
- a. Minimizing the amount of dust generated.
 - b. Reducing solvent fumes and VOC emissions.
 - c. Maintain good housekeeping practices, including sweeping and periodic dust and debris removal. There should be no visible haze in the air.
4. Request that the Owner designate an IAQ representative.
5. Review and receive approval from the Owner's IAQ representative for all IAQ-related construction activities and negative pressure containment plans.
6. Inform the IAQ representative of all conditions that could adversely impact IAQ, including operations that will produce higher than normal dust production or odors.
7. Schedule activities that may cause IAQ conditions that are not acceptable to the Owner's IAQ representative during unoccupied periods.
8. Request copies of and follow all Owner's IAQ and infection control policies.
9. Unless no other access is possible, the entrance to construction site shall not be through the existing facility.
10. To minimize growth of infectious organisms, do not permit damp areas in or near the construction area to remain for over 24 hours.
11. In addition to the criteria above, provide measures as recommended in the SMACNA "IAQ Guidelines for Occupied Buildings under Construction".

3.12 SYSTEM STARTING AND ADJUSTING

- A. The electrical systems shall be complete and operating. System startup, testing, adjusting, and balancing to obtain satisfactory system performance is the responsibility of the Contractor. This includes all calibration and adjustment of electrical controls, balancing of loads, troubleshooting and verification of software, and final adjustments that may be needed.
- B. Complete all manufacturer-recommended startup procedures and checklists to verify proper equipment operation and does not pose a danger to personnel or property.
- C. All operating conditions and control sequences shall be tested during the start-up period. Testing all interlocks, safety shut-downs, controls, and alarms.
- D. The Contractor, subcontractors, and equipment suppliers shall have skilled technicians to ensure that all systems perform properly. If the Architect/Engineer is requested to visit the job site for trouble shooting, assisting in start-up, obtaining satisfactory equipment operation,

resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period, through no fault of the design; the Contractor shall reimburse the Owner on a time and materials basis for services rendered at the Architect/Engineer's standard hourly rates in effect when the services are requested. The Contractor shall pay the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

3.13 FIELD QUALITY CONTROL

- A. General:
 - 1. Supply necessary instruments, meters, etc., for the tests as required. Supply competent technicians with training in the proper testing techniques.
 - 2. Any wiring device, electrical apparatus or luminaire, if grounded or shorted on any integral "live" part, shall have all defective parts or materials replaced.
 - 3. Test cable insulation of service conductors for proper insulation values. Tests shall include the cable, all splices, and all terminations. Each conductor shall be tested and shall test free of short circuits and grounds and have an insulation value not less than Electrical Code Standards. Take readings between conductors, and between conductors and ground.
 - 4. If the results obtained in the tests are not satisfactory, make adjustments, replacements, and changes as needed. Then repeat the tests, and make additional tests, as the Architect/Engineer or authority having jurisdiction deems necessary.

- B. Arc Energy Reduction Equipment Performance Testing:
 - 1. Test: Perform arc energy protection performance testing when system is installed. The test process shall use primary current injection or approved method per manufacturer instructions and procedures. Perform test for the following:
 - a. All arc energy reduction systems installed.
 - 2. Report: Provide copy of test result report with Operation and Maintenance manuals. Provide report to Authority Having Jurisdiction when requested.

- C. Other Equipment:
 - 1. Give other equipment furnished and installed by the Contractor all standard tests normally made to assure that the equipment is electrically sound, all connections properly made, phase rotation correct, fuses and thermal elements suitable for protection against overloads, voltage complies with equipment nameplate rating, and full load amperes are within equipment rating.

- D. If any test results are not satisfactory, make adjustments, replacements and changes as needed and repeat the tests and make additional tests as the Architect/Engineer or authority having jurisdiction deem necessary.

3.14 UTILITY REBATE

- A. Submit utility rebate forms, where offered at project location, with rebate items completed. Rebate may include lighting, lighting controls, variable speed drives, heat pumps, package terminal A/C, air conditioners, chillers, water heaters, programmable thermostats, and motors.

- B. Contractor must submit notification of any value engineering or product substitution that will affect the utility rebate amount prior to approval.

READINESS CERTIFICATION PRIOR TO FINAL JOBSITE OBSERVATION

To prevent the final job observation from occurring too early, we require that the Contractor review the completion status of the project and, by copy of this document, certify that the job is indeed ready for the final job observation. The following is a typical list of items that represent the degree of job completeness expected prior to your requesting a final job observation.

1. Penetrations of fire-rated construction fire sealed in accordance with specifications.
2. Electrical panels have typed circuit identification.
3. Smoke and fire/smoke dampers are wired and have been tested.
4. Per Section 26 05 00, cable insulation test results have been submitted.
5. Per Section 26 05 00, medium voltage testing report has been submitted.
7. Operation and Maintenance manuals have been submitted as per Section 26 05 00.
8. Bound copies of approved shop drawings have been submitted as per Section 26 05 00.
9. Report of instruction of Owner's representative has been submitted as per Section 26 05 00.
10. Fire alarm inspection and testing report has been submitted as per Sections 26 05 00 and 28 31 00.
11. Start-up reports from factory representative have been submitted as per Section 26 05 00.

Accepted by:

Prime Contractor _____

By _____ Date _____

Upon Contractor certification that the project is complete and ready for a final job observation, we require the Contractor to sign this agreement and return it to the Architect/Engineer so that the final observation can be scheduled.

It is understood that if the Architect/Engineer finds the job not ready for the final observation and that additional trips and observations are required to bring the project to completion, the costs incurred by the Architect/Engineers for additional time and expenses will be deducted from the Contractor's contract retainage prior to final payment at the completion of the job.

END OF SECTION

SECTION 26 05 03 - THROUGH PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Through-Penetration Firestopping.

1.2 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products specified in this Section.
- B. Installer: Individuals performing work shall be certified by the manufacturer of the system selected for installation.

1.3 REFERENCES

- A. UL 263 - Fire Tests of Building Construction and Materials
- B. UL 723 - Surface Burning Characteristics of Building Materials
- C. ANSI/UL 1479 - Fire Tests of Through Penetration Firestops
- D. UL 2079 - Tests for Fire Resistance of Building Joint Systems
- E. UL Fire Resistance Directory Through Penetration Firestop Systems (XHEZ)
- F. Intertek / Warnock Hersey - Directory of Listed Products
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- H. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Firestops
- I. The Building Officials and Code Administrators National Building Code
- J. 2018 International Building Code
- K. NFPA 5000 - Building Construction Safety Code

1.4 SUBMITTALS

- A. Submit under provisions of Section 26 05 00.
- B. Submit Firestopping Installers Certification for all installers on the project.
- C. Shop Drawings: Submit for each condition requiring firestopping. Include descriptions of the specific penetrating item, actual wall/floor construction, manufacturer's installation instructions, and UL or Interek / Warnock Hersey Assembly number.
- D. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
 - 1. Types of penetrating items.
 - 2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
 - 3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

4. F ratings for each firestop system.
- E. Maintain a notebook on the job site at all times that contains copies of approved submittals for all through penetration firestopping to be installed. Notebook shall be made available to the Authority Having Jurisdiction at their request and turned over to the Owner at the end of construction as part of the O&M Manuals.
- F. Submit VOC rating of firestopping material in g/L (less water) with documentation that it meets the limits set forth in SCAQMD Rule 1168.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store, protect and handle products on site. Accept material on site in factory containers and packing. Inspect for damage. Protect from deterioration or damage due to moisture, temperature changes, contaminants, or other causes. Follow manufacturer instructions for storage.
- B. Install material prior to expiration of product shelf life.

1.6 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
 1. Fire-resistance-rated walls including fire partitions, fire barriers, and smoke barriers.
 2. Fire-resistance-rated horizontal assemblies including floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per UL 1479:
 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 2. L-Rated Systems: Provide through-penetration firestop systems with L-ratings of not more than 5.0 cfm/sq.ft. at both ambient temperature and 400°F.
- C. For through-penetration firestop systems exposed to light, traffic, moisture, or physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. For through-penetration firestop systems in air plenums, provide products with flame-spread and smoke-developed indexes of less than 25 and 50, respectively, as determined per ASTM E 84.

1.7 MEETINGS

- A. Pre-installation meeting: A pre-installation meeting shall be scheduled and shall include the Construction Manager, General Contractor, all Subcontractors associated with the installation of systems penetrating fire barriers, Firestopping Manufacturer Representative, and Owner.
 1. Review foreseeable methods related to firestopping work.
 2. Tour representative areas where firestopping is to be installed; inspect and discuss each type of condition and each type of substrate that will be encountered, and preparation to

be performed by other trades.

1.8 WARRANTY

- A. Provide one year warranty on parts and labor.
- B. Warranty shall cover repair or replacement of firestop systems which fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, general durability, or appear to deteriorate in any manner not clearly specified by the manufacturer as an inherent quality of the material.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application that are produced by one of the following manufacturers. All firestopping systems installed shall be provided by a single manufacturer.
 - 1. 3M; Fire Protection Products Division
 - 2. Hilti, Inc.
 - 3. RectorSeal Corporation, Metacaulk
 - 4. Tremco; Sealant/Weatherproofing Division
 - 5. Johns-Manville
 - 6. Specified Technologies Inc. (S.T.I.)
 - 7. Spec Seal Firestop Products
 - 8. AD Firebarrier Protection Systems
 - 9. Wiremold/Legrand: FlameStopper
 - 10. Dow Corning Corp
 - 11. Fire Trak Corp
 - 12. International Protective Coating Corp

2.2 THROUGH PENETRATION FIRESTOP SYSTEMS

- A. Provide materials and systems classified by or listed by Intertek / Warnock Hersey to provide firestopping equal to time rating of construction being penetrated.
- B. All firestopping materials shall be free of asbestos, lead, PCB's, and other materials that would require hazardous waste removal.
- C. Firestopping shall be flexible to allow for normal penetrating item movement due to expansion and contraction.
- D. Provide firestopping systems capable of supporting floor loads where systems are exposed to possible floor loading or traffic.
- E. Provide firestopping systems allowing continuous insulation for all insulated pipes.
- F. Provide firestopping systems classified by UL or listed by Intertek / Warnock Hersey for penetrations through all fire rated construction. Firestopping systems shall be selected from the UL or listed by Intertek / Warnock Hersey Fire Resistance Directory Category XHEZ based on substrate construction and penetrating item size and material and shall fall within the range of numbers listed:
 - 1. Combustible Framed Floors and Chase Walls - 1 or 2 Hour Rated:
 - a. F Rating = Floor/Wall Rating

- b. L Rating = Penetrations in Smoke Barriers

Penetrating Item	UL System No.
No Penetrating Item	FC 0000-0999*
Metallic Pipe or Conduit	FC 1000-1999
Non-Metallic Pipe or Conduit	FC 2000-2999
Electrical Cables	FC 3000-3999
Cable Trays	FC 4000-4999
Insulated Pipes	FC 5000-5999
Bus Duct and Misc. Electrical	FC 6000-6999
Duct without Damper and Misc. Mechanical	FC 7000-7999
Multiple Penetrations	FC 8000-8999

*Alternate method of firestopping is patching opening to match original rated construction.

2. Non-Combustible Framed Walls - 1 or 2 Hour Rated:

- a. F Rating = Wall Rating
 b. L Rating = Penetrations in Smoke Barriers

Penetrating Item	UL System No.
No Penetrating Item	WL 0000-0999*
Metallic Pipe or Conduit	WL 1000-1999
Non-Metallic Pipe or Conduit	WL 2000-2999
Electrical Cables	WL 3000-3999
Cable Trays	WL 4000-4999
Insulated Pipes	WL 5000-5999
Bus Duct and Misc. Electrical	WL 6000-6999
Duct without Damper and Misc. Mechanical	WL 7000-7999
Multiple Penetrations	WL 8000-8999

*Alternate method of firestopping is patching opening to match original rated construction.

3. Concrete or Masonry Floors and Walls - 1 or 2 Hour Rated:

- a. F Rating = Wall/Floor Rating
 b. L Rating = Penetrations in Smoke Barriers

Penetrating Item	UL System No.
No Penetrating Item	CAJ 0000-0999*
Metallic Pipe or Conduit	CAJ 1000-1999
Non-Metallic Pipe or Conduit	CAJ 2000-2999
Electrical Cables	CAJ 3000-3999
Cable Trays	CAJ 4000-4999
Insulated Pipes	CAJ 5000-5999
Bus Duct and Misc. Electrical	CAJ 6000-6999
Duct without Damper and Misc. Mechanical	CAJ 7000-7999
Multiple Penetrations	CAJ 8000-8999

*Alternate method of firestopping is patching opening to match original rated construction.

G. Any opening in walls or floors not covered by the listed series of numbers shall be coordinated with the firestopping manufacturer.

H. Any openings in floors or walls not described in the UL or listed by Intertek / Warnock Hersey Fire Resistance Directory, or outlined in manufacturer's information shall be sealed in a manner agreed upon by the Firestopping Manufacturer, Owner, and the Authority Having Jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Ensure all surfaces that contact seal materials are free of dirt, dust, grease, oil, rust, or loose materials. Clean and repair surfaces as required. Remove laitance and form-release agents from concrete.
- B. Ensure substrate and penetrating items have been permanently installed prior to installing firestopping systems. Ensure penetrating items have been properly spaced and have proper clearance prior to installing firestopping systems.
- C. Surfaces to which sealing materials are to be installed must meet the selected UL or Intertek / Warnock Hersey system substrate criteria.
- D. Prime substrates where recommended in writing by through-penetration firestop system manufacturer. Confine primer to area of bond.

3.2 INSTALLATION

- A. In existing construction, provide firestopping of openings prior to and after installation of penetrating items. Remove any existing coatings on surfaces prior to firestopping installation. Temporary firestopping shall consist of packing openings with fire resistant mineral wool for the full thickness of substrate, or an alternate method approved by the Authority Having Jurisdiction. All openings shall be temporarily firestopped immediately upon their installation and shall remain so until the permanent UL or listed by Intertek / Warnock Hersey listed firestopping system is installed.
- B. Install penetration seal materials in accordance with printed instructions of the UL or Intertek / Warnock Hersey Fire Resistance Directory and with manufacturer printed application instructions.
- C. Install dams as required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating. Remove combustible damming after appropriate curing.

3.3 CLEANING AND PROTECTING

- A. Clean excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not cause damage.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.4 IDENTIFICATION

- A. Provide and install labels adjacent to each firestopping location. Label shall be provided by the firestop system supplier and contain the following information in a contrasting color:
 - 1. The words "Warning - Through Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Firestop System Supplier; UL or listed by Intertek / Warnock Hersey system number; date installed; contractor name and phone number; manufacturer's representative name, address, and phone number.

3.5 INSPECTION

- A. All penetrations shall be inspected by manufacturer representative to ensure proper installation.
- B. Access to firestop systems shall be maintained for examination by the Authority Having Jurisdiction at their request.
- C. Proceed with enclosing through-penetration firestop system with other construction only after inspection reports are issued and firestop installations comply with requirements.
- D. Contractor shall allow for visual destructive review of 5% of installed firestop systems (minimum of one) to prove compliance with specifications and manufacturer's instructions and details. Destructive system removal shall be performed by the contractor and witnessed by Architect/Engineer and manufacturer's factory representative. Architect/Engineer shall have sole discretion of which firestop system installations will be reviewed. The contractor is responsible for all costs associated with this requirement including labor and material for removing and replacing the installed firestop system. If any firestop system is found to not be installed per manufacturer's specific instructions and details, all firestop systems are subject to destructive review and replacement at Architect/Engineer discretion and Contractor expense.

END OF SECTION

SECTION 26 05 05 - ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Electrical demolition

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials & equipment for patching & extending work shall be as specified in individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. DRAWINGS ARE INTENDED TO INDICATE SCOPE OF WORK REQUIRED AND DO NOT INDICATE EVERY BOX, CONDUIT, OR WIRE THAT MUST BE REMOVED. CONTRACTOR SHALL VISIT SITE PRIOR TO SUBMITTING A BID AND VERIFY EXISTING CONDITIONS.
- B. Lincoln Hall - The electrical scope for demolition is to make the existing building safe for other contractors to demolish. Items that require disconnection and removal for use in new building are part of electrical contractors scope of work. Demolition of building and its systems is by the general contractor.
- C. Graham Hall - Where ceilings, walls, structures, etc., are temporarily removed and replaced by others, this Contractor shall be responsible for the removal, storage, and replacement of equipment, devices, fixtures, raceways, wiring, systems, etc.
- D. Graham Hall - Where ceilings, walls, structures, etc., are permanently removed and replaced by others, this Contractor shall be responsible for the removal, storage, and replacement of equipment, devices, fixtures, raceways, wiring, systems, etc.
- E. Where mechanical or technology equipment is indicated as being removed on electrical, mechanical, or technology drawings, the Contractor shall be responsible for disconnecting the equipment and removing all starters, VFD, controllers, electrical equipment, raceways, wiring, etc. associated with the device.
- F. Verify that abandoned wiring and equipment serve only abandoned equipment or facilities. Extend conduit and wire to facilities and equipment that will remain in operation following demolition. Extension of conduit and wire to equipment shall be compatible with the surrounding area. Extended conduit and conductors to match existing size and material.
- G. Coordinate scope of work with all other Contractors and the Owner at the project site. Schedule removal of equipment and electrical service to avoid conflicts.
- H. Bid submittal shall mean the Contractor has visited the project site and has verified existing conditions and scope of work.

3.2 PREPARATION

- A. The Contractor shall obtain approval from the Owner before turning off power to circuits, feeders, panels, etc. Coordinate all outages with Owner.

- B. Coordinate utility service outages with Utility Company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations. Assume all equipment and systems must remain operational unless specifically noted otherwise on drawings.
- D. Disconnect electrical systems in walls, floors, structures, and ceilings scheduled for removal.
- E. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 48 hours before partially or completely disabling system. Minimize outage duration.
- F. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Obtain permission from Owner at least 48 hours before partially or completely disabling system. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area. Provide a watchman to make required premise observations during all outages, requirements as dictated by codes and Owner's insurance carrier.
- G. Refer to the drawings and specifications for fire alarm separation. Graham Hall to be separated from Lincoln Hall.
- H. Existing Telephone System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 48 hours before partially or completely disabling system. Minimize outage duration.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work under provisions of Division 1 of Specifications and this Section.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. Remove abandoned wiring and raceway to source of supply. Existing conduit in good condition may be reused in place by including an equipment ground conductor in reused conduit. Reused conduit and boxes shall have supports revised to meet current codes. Relocating conduit shall not be allowed.
- D. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces. Remove all associated clamps, hangers, supports, etc. associated with raceway removal.
- E. Disconnect and remove outlets and devices that are to be demolished. Remove outlet or devices' associated back box, supports, and conduit and conductors back to source. Patch opening created from removal of device to match surrounding finishes.
- F. Disconnect and remove abandoned panelboards and distribution equipment.
- G. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories. Ballasts in light fixtures installed prior to 1980 shall be incinerated in EPA approved incinerator or disposed of in EPA certified containers and deposited in an EPA landfill certified for PCB disposal or recycled by permitted ballast recycler. Punctured or leaking

ballasts must be disposed of according to Federal Regulations under the Toxic Substance Control Act. Provide Owner and Architect/Engineer with a Certificate of Destruction to verify proper disposal.

- I. Repair adjacent construction and finishes damaged during demolition and extension work. Patch openings to match existing surrounding finishes.
- J. Maintain access to existing electrical installations that remain active. Modify installation or provide junction boxes and access panel as appropriate.
- K. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified. Extended conduit and conductors to match existing size and material.
- L. Disconnect and remove fire alarm devices in Briscoe Hall for owner stock. Coordinate with owner for packaging and location devices are to be stored.
- M. HID and fluorescent lamps, determined by the Toxicity Characteristic Leachate procedure (TCLP), to be hazardous waste shall be disposed of in an EPA-permitted hazardous waste disposal facility or by a permitted lamp recycler.
- N. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- O. Floor slabs may contain conduit systems. This Contractor is responsible for taking any measures required to ensure no conduits or other services are damaged. This includes X-ray or similar non-destructive means. Where conduit is in concrete slab, cut conduit flush with floor, pull out conductors, and plug conduit ends.
- P. This Contractor is responsible for all costs incurred in repair, relocations, or replacement of any cables, conduits, or other services if damaged without proper investigation.

3.4 EXISTING ENCLOSURES - NEW EQUIPMENT

- A. Existing enclosures may be reused to house new equipment including branch panels, industrial controls, and similar systems pending documented verification of the following provided with the applicable new equipment submittals.
 - 1. New equipment or panelboard is listed for the existing enclosure or application.
 - 2. Existing enclosure and new equipment is field evaluated by the manufacturer or nationally recognized testing laboratory for the available fault current, condition, and application.
 - 3. Authority Having Jurisdiction (AHJ) approval.

3.5 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment that remain or are to be reused.
- B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.
- C. ELECTRICAL ITEMS (E.G., LIGHTING FIXTURES, RECEPTACLES, SWITCHES, CONDUIT, WIRE, ETC.) REMOVED AND NOT RELOCATED REMAIN THE PROPERTY OF THE OWNER. CONTRACTOR SHALL PLACE ITEMS RETAINED BY THE OWNER IN A LOCATION COORDINATED WITH THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF MATERIAL THE OWNER DOES NOT WANT.

3.6 INSTALLATION

- A. Install relocated materials and equipment under the provisions of Division 1 of Specifications.

END OF SECTION

SECTION 26 05 13 - WIRE AND CABLE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Building wire
- B. Cabling for remote control, signal, and power limited circuits
- C. Metal-clad cable (MC)

1.2 RELATED WORK

- A. Section 26 05 53 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 REFERENCES

- A. NEMA WC 70 - Power Cables Rated 2,000V or Less for the Distribution of Electrical Energy
- B. NFPA 70 - National Electrical Code (NEC)
- C. UL 44 - Thermoset-Insulated Wires and Cables
- D. UL 83 - Thermoplastic-Insulated Wires and Cables
- E. UL 854 - Service-Entrance Cables
- F. UL 1581 - Standard for Electrical Wires, Cables, and Flexible Cords
- G. UL 2196 - Fire Resistive, Fire Resistant and Circuit Integrity Cables

PART 2 - PRODUCTS

2.1 BUILDING WIRE

- A. All Feeders and Branch Circuits 8 AWG and larger: Copper, stranded conductor, 600-volt insulation, THHN/THWN or XHHW-2.
- B. Feeders and Branch Circuits 10 AWG and Smaller: Copper, solid or stranded conductor, 600-volt insulation, THHN/THWN, unless otherwise noted on the drawings.
- C. Motor Feeder from Variable Frequency Drives: Copper conductor, 600-volt XHHW-2 insulation, stranded conductor, unless otherwise noted on the drawings. Three conductor stranded copper, 600-volt XHHW-2 insulation, with copper ground and overall helical copper tape shield. Shield shall be terminated at both ends of cable with an approved termination.
- D. Control Circuits: Copper, stranded conductor 600-volt insulation, THHN/THWN.
- E. Each 120 and 277-volt branch circuit shall have a dedicated neutral conductor. Neutral conductors shall be considered current-carrying conductors for wire derating.

2.2 CABLING FOR REMOTE CONTROL, SIGNAL, AND POWER LIMITED CIRCUITS

- A. Wire for the following specialized systems shall be as designated on the drawings, or

elsewhere in these specifications. If not designated on the drawings or specifications, the system manufacturer's recommendations shall be followed.

1. Fire alarm
 2. Low voltage switching and lighting control
 3. Electronic control
 4. Other specialized cabling, signal, and power limited cabling. Refer to the appropriate Division 23, 27, or 28 requirements; including, but not limited, to the following:
 - a. Building Automation Systems and Controls, Division 23.
 - b. Distributed Antenna System (First Responder), Division 28.
 - c. Electronic Access Control, Intrusion Detection Systems, Video Surveillance, Division 28.
 - d. [Rescue Assistance Communication System, Division 28.]
- B. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600-volt insulation, rated 60°C, individual conductors twisted together, shielded, and covered with a PVC jacket.
- C. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300-volt insulation, rated 60°C, individual conductors twisted together, shielded, and covered with a PVC jacket; UL listed.
- D. Plenum Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300-volt insulation, rated 60°C, individual conductors twisted together, shielded, and covered with a nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums.

2.3 METAL-CLAD CABLE (MC)

- A. Conductors shall be copper, 600-volt insulation, THHN. Metal clad cable shall be constructed in strict accordance with Underwriters Laboratories, Inc. Standard for Metal-Clad Cables, UL 15694, exterior of metal interlocked armor.
- B. Minimum conductor size for branch circuit wiring shall be 12 AWG, with larger wires used only where specified.
- C. Metal-clad cables may be used for branch circuit wiring as defined in the Electrical Code, subject to acceptance by State and local codes.
- D. Metal-clad cable shall NOT be used for circuits serving the Essential Electrical System.

PART 3 - EXECUTION

3.1 WIRE AND CABLE INSTALLATION SCHEDULE

- A. Above Accessible Ceilings:
 1. Building wire shall be installed in raceway.
 2. Metal clad cable, Type MC, 1/2" size with minimum #12 conductors and ground, shall be allowed for flexible whips to individual luminaires on non-essential circuits. The flexible whips shall be between 18" to 72" in length per Electrical Code.
- B. All Other Locations: Building wire in raceway.
- C. Above Grade: All conductors installed above grade shall be type "THHN".

- D. Underground or In Slab: All conductors shall be type "THWN".
- E. Low Voltage Cable (less than 100 volts): Low voltage cables in ducts, plenums, and other air handling spaces shall be plenum listed. Low voltage cables in non-accessible areas shall be installed in conduit. Low voltage cable may be installed without conduit in accessible areas using the following types of cable supports. Cable support types/systems shall comply with the warranty requirements of the low voltage cable manufacturer.
 - 1. J-hooks
 - 2. Bridle rings with saddle supports
- F. Low Voltage Cable (less than 100 volts): Low voltage cable shall be installed in raceway.
- G. Fire-Rated 2-Hour Feeders and Circuit Requiring Continuous Operation (CI): Refer to Part 2 of this section for acceptable products and assemblies. Installation shall meet UL 2196.

3.2 CONTRACTOR CHANGES

- A. The basis of design is copper conductors installed in raceway based on ambient temperature of 30°C, NEC Table 310.16 (2011 - 2017 edition 310.15(B)(16)). Service entrance conductors are based on copper conductor installed in underground electrical ducts, NEC Table B.2(7) (2011 - 2017 edition Table B310.15(B)(2)(7); 2008 or later edition B.301.7) or calculated in accordance with Annex B Application Information for Ampacity Calculation..
- B. The Contractor shall be responsible for derating and sizing conductors and conduits to equal or exceed the ampacity of the basis of design circuits, if he/she chooses to use methods or materials other than the basis of design.
- C. Underground electrical duct ampacity rating shall be in accordance with NEC Table 310.16 (2011 - 2017 edition 310.15(B)(16)) or calculated in accordance with Annex B Application Information for Ampacity Calculation. The calculations and a sketch of the proposed installation shall be submitted prior to any conduit being installed.
- D. Conductor length(s) listed on plans and schedules. The drawings are diagrammatic with intent to convey the components of the electrical distribution system. Conductor length(s) when listed on plans and schedules are for engineering calculation purposes. Conductor length(s) shall NOT be used for bidding purposes.
- E. Record drawing shall include the calculations and sketches.

3.3 GENERAL WIRING METHODS

- A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.
- B. Use no wire smaller than 18 AWG for low voltage control wiring below 100 volts.
- C. Use 10 AWG conductor for 20 ampere, 120-volt branch circuit home runs longer than 75 feet, and for 20 ampere, 277-volt branch circuit home runs longer than 200 feet or as sized by the NEC for voltage drop.
- D. Use no wire smaller than 8 AWG for outdoor lighting circuit or as sized by the NEC.
- E. The ampacity of multiple conductors in one conduit shall be derated per the Electrical Code. In no case shall more than 4 conductors be installed in one conduit to such loads as motors larger than 1/4 HP, panelboards, motor control centers, etc.
- F. Where installing parallel feeders, place an equal number of conductors for each phase of a

circuit in same raceway or cable.

- G. Splice only in junction or outlet boxes.
- H. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- I. Make conductor lengths for parallel circuits equal.
- J. All conductors shall be continuous in conduit from last outlet to their termination.
- K. Terminate all spare conductors on terminal blocks, and label the spare conductors.
- L. Cables or wires shall not be laid out on the ground before pulling.
- M. Cables or wires shall not be dragged over earth or paving.
- N. Care shall be taken so as not to subject the cable or wire to high mechanical stresses that would cause damage to the wire and cable.
- O. At least six (6)-inch loops or ends shall be left at each outlet for installation connection of luminaires or other devices.
- P. All wires in outlet boxes not connected to fixtures or other devices shall be rolled up, spliced if continuity of circuit is required, and insulated.

3.4 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- C. Pulling shall be continuous without unnecessary stops and starts with wire or cable only partially through raceway.
- D. Where reels of cable or wire are used, they shall be set up on jacks close to the point where the wire or cable enters the conduit or duct so that the cable or wire may be unreeled and run into the conduit or duct with a minimum of change in the direction of the bend.
- E. Conductors shall not be pulled through conduits until plastering or masonry work is completed and conduits are free from moisture. Care shall be taken so that long pulls of wire or pulls around several bends are not made where the wire may be permanently stretched and the insulation damaged.
- F. Only nylon rope shall be permitted to pull cables into conduit and ducts.
- G. Completely and thoroughly swab raceway system before installing conductors.
- H. Conductor Supports in Vertical Raceways:
 - 1. Support conductors in vertical raceways in accordance with the Electrical Code Spacing of Conductors Supports.
 - 2. Supports shall be of insulated wedge type (OZ Gedney Type S, or equal) and installed in a tapered insulated bushing fitting or a metal woven mesh with a support ring that fits inside conduit fitting installed in an accessible junction box (Hubbell Kellems support grip or equal).

3.5 CABLE INSTALLATION

- A. Provide protection for exposed cables where subject to damage.
- B. Use suitable cable fittings and connectors.
- C. Run all open cable parallel or perpendicular to walls, ceilings, and exposed structural members. Follow the routing as illustrated on the drawings as closely as possible. Cable routing on drawings scaled 1/4"=1'-0" or less shall be considered diagrammatical, unless noted otherwise. The correct routing, when shown diagrammatically, shall be chosen by the Contractor based on information in the contract documents; in accordance with the manufacturer's written instructions, applicable codes, the NECA's "Standard of Installation", recognized industry standards; and coordinated with other contractors.
- D. Open cable shall be supported by the appropriate size J-hooks or other means if called for on the drawings. Wire and cable from different systems shall not be installed in the same J-hook. J-hooks shall be sized with 20% spare capacity. J-hooks shall provide proper bend radius support for data cable and fiber cables.
- E. Open cable installed above suspended ceilings shall not rest on the suspended ceiling construction, nor utilize the ceiling support system for wire and cable support.
- F. J-hook support spans shall be based on the smaller of the manufacturer's load ratings and code requirements. In no case shall horizontal spans exceed 5 feet and vertical spans exceed 4 feet. All J-hooks shall be installed where completely accessible and not blocked by piping, ductwork, inaccessible ceilings, etc. J-hooks shall be independently rigidly attached to a structural element. J-hooks shall be installed to provide 2" horizontal separation and 6" vertical separation between systems.
- G. Open cable shall only be installed where specifically shown on the drawings, or permitted in these specifications.

3.6 FIRE-RATED CABLE AND ASSEMBLY INSTRUCTIONS

- A. Terminations of the fire-rated cable must be outside of the fire zone.
- B. Fire-rated cable shall be installed according to the manufacturer's instructions, recommendations, and UL listing.
- C. Route fire-rated cable and assemblies separate from other feeders and distribution. Install cable and assemblies in locations protected from physical damage.
- D. Refer to Electrical Identification Section 26 05 53 for specific identification requirements.

3.7 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice and tap only in accessible junction boxes.
- B. Use solderless, tin-plated copper, compression terminals (lugs) applied with circumferential crimp for conductor terminations, 8 AWG and larger.
- C. Use solderless, tin-plated, compression terminals (lugs) applied with indenter crimp for copper conductor terminations, 10 AWG and smaller.
- D. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.

- E. Use compression connectors applied with circumferential crimp for conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor. Cold shrink connector insulator with 1kV rating shall be used in damp and wet locations.
- F. Thoroughly clean wires before installing lugs and connectors.
- G. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
- H. Phase Sequence: All apparatus shall be connected to operate in the phase sequence A-B-C representing the time sequence in which the phase conductors so identified reach positive maximum voltage.
- I. As a general rule, applicable to switches, circuit breakers, starters, panelboards, switchgear and the like, the connections to phase conductors are intended thus:
 - 1. Facing the front and operating side of the equipment, the phase identification shall be:
 - a. Left to Right - A-B-C
 - b. Top to Bottom - A-B-C
- J. Connection revisions as required to achieve correct rotation of motors shall be made at the load terminals of the starters or disconnect switches.
- K. Use antioxidant joint compound on all aluminum conductor terminations. Apply antioxidant joint compound per manufacturer's recommendations.

3.8 MC CABLE INSTALLATION

- A. AC/MC shall NOT be used for circuits serving the Essential Electrical System.
- B. Cable shall be supported by an approved means every 4.5' and within 12" of outlet boxes, junction boxes, cabinets, or fittings.
- C. Cable may be unsupported in the following conditions:
 - 1. Cable is no longer than 2' in length at terminals where flexibility is necessary.
 - 2. Cable is not more than 4.5' from the last point of support for connections within an accessible ceiling to light fixtures or equipment.
- D. Conductor ampacity shall be derated as required by the Electrical Code where more than three current carrying conductors are used.
- E. Each 120 and 277-volt circuit shall have a dedicated neutral conductor. Neutral conductors shall be considered current-carrying conductors for cable derating.
- F. Cables shall be cut using a rotary cutter as recommended by the manufacturer to eliminate nicking and cutting of the conductors.
- G. Bending radius shall comply with the requirements listed in the Electrical Code for the type and size of cable being installed, but shall not be less than 5-times the diameter of the cable in any case.
- H. At cable terminations, a fitting shall be provided to protect wires from abrasion, unless the design of the outlet boxes or fittings is such as to afford equivalent protection, and, in addition, an insulating bushing or its equivalent protection shall be provided between the conductors and the armor.

- I. All wiring devices supplied by nonmetallic-sheathed cables shall be mounted in an outlet box.

3.9 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 1.
- B. Building Wire and Power Cable Testing: Perform an insulation-resistance test on each conductor with respect to ground and adjacent conductors. Test shall be made by means of a low-resistance ohmmeter, such as a "Megger". The applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. The test duration shall be one minute. Insulation resistance must be greater than 100 mega-ohm for 600 volt and 25 mega-ohm for 300 volt rated cables per NETA Acceptance Testing Standard. Verify uniform resistance of parallel conductors.
- C. MI cable shall have the insulation resistance of each cable tested with a 500-volt dc megohmmeter prior to energizing the cables. Tabulate resistance values and submit to Architect/Engineer for acceptance.
- D. Inspect wire and cable for physical damage and proper connection.
- E. Torque test conductor connections and terminations to manufacturer's recommended values.
- F. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.
- G. Provide documentation of the manufacturer's recommended lug torque value for copper and aluminum conductors, the date the lugs were torqued, and installed torque readings. Documentation indicating that the torque wrench has been calibrated not more than 30 days prior to tightening of lugs shall be provided.
- H. Protection of wire and cable from foreign materials:
 - 1. It is the Contractor's responsibility to provide adequate physical protection to prevent foreign material application or contact with any wire or cable type. Foreign material is defined as any material that would negatively impact the validity of the manufacturer's performance warranty. This includes, but is not limited to, overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid, or compound that could come in contact with the cable, cable jacket, or cable termination components.
- I. Overspray of paint on any wire or cable will not be accepted. It shall be the Contractor's responsibility to replace any component containing overspray, in its entirety, at no additional cost to the project. Cleaning of the cables with harsh chemicals is not allowed.

END OF SECTION

SECTION 26 05 17 - ELECTRIC HEAT TRACE FOR ROOF AND GUTTER

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Self Regulating Heat tracing cables for Gutter deicing
- B. Deicing controller
- C. Heat Cable installation accessories.

1.2 REFERENCES

- A. NFPA 70 - National Electrical Code (NEC)
- B. ASTM 2633 - Standard Test Method for Thermoplastic Insulations
- C. ASTM B193 - Standard Test Method for Resistivity of Electrical Conductor Materials
- D. UL 746B - Polymeric Materials - Long Term Property Evaluations
- E. Division 07 - Roof Installation
- F. National Electric Code (NEC): Article 426 Fixed Outdoor Electric Deicing & Snow Melting Equipment
- G. IEEE 515.1-2012: Standard for testing, design, installation and maintenance of electrical resistance trace heating for commercial applications.

1.3 SUBMITTALS

- A. Submit shop drawings under provisions of Section 26 05 00. Product Data: For Roof & Gutter Deicing System Components including the following:
 - 1. Manufacturer Data Sheet
 - 2. Installation Instructions
 - 3. Electrical Requirements
 - 4. Factory Shop Drawings indicating the location of the heating cable in gutters and downspouts , sensors & controls.
 - 5. Wiring Diagrams for controller & sensors
- B. For each type of product indicated.
 - 1. Field Test Reports: Submit written test reports to include test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

- C. Submit manufacturer instructions under provisions of Section 26 05 00.
- D. Factory drawings that show wiring, terminations, and appurtenances.

1.4 COORDINATION

- A. Coordinate layout and installation of electrical heating cables and system components with General Contractor and heat trace vendor

1.5 WARRANTY

- A. Provide a ten (10) year warranty under provisions of Section 26 05 00.

1.6 QUALITY ASSURANCE

- A. Manufacturers Qualifications
 - 1. Minimum of 20 years of experience in design, engineering, manufacturer and support of roof & gutter system and components.
 - 2. Manufacturer shall be ISO-9001:2008 Registered
- B. Installer Qualifications
 - 1. System installer shall have a complete understanding of product from manufacturer prior to installation of roof & gutter deicing system.
 - 2. Electrical Connections shall be performed by a licensed electrician.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Store products in manufacturer unopened packaging and dry location with a temperature range of 0°F (-18°C) to 100°F (38°C) until ready for installation.
- B. Protect Heating Cable from exposure to moisture, water & mechanical damage until ready for installation.

1.8 WARRANTY

- A. Provide manufacturer standard warranty form which manufacturer agrees to repair or replace products that fail in material or workmanship within the following periods following the date of substantial completion:
 - 1. Heating Cable & Components: One Year
 - 2. Controls & Sensors: One Year

PART 2 - PRODUCTS

2.1 HEAT-TRACING CABLE

- A. Basis of Design Manufacturer: Subject to compliance with requirements, provide a self-regulating, roof & gutter deicing system by Chromalox, Pittsburgh, PA, 800-443-2640, www.chromalox.com.
 - 1. Submit comparable products of one of the following for approval by Engineer:
 - a. Raychem
- B. Self-Regulating Heating Cable:
 - 1. Chromalox CPR Self-Regulating, Heating Cable
 - 2. Cable shall be capable of crossing over itself without overheating.
 - 3. 208V operating system.
 - 4. Provide power end seals and splices as required.
 - 5. Materials:
 - a. Self-regulating, heating cable shall consist of two (2) 16 AWG nickel-copper bus wires embedded in radiation cross-linked, continuous, self-regulating polymer core.

- b. Self-regulating, heating cable shall have modified polyolefin dielectric jacket cover.
 - c. The self-regulating, heating cable shall have a tinned-copper braid.
 - d. The self-regulating, heating cable shall have a fluoropolymer over jacket.
 - e. The self-regulating, heating cable shall be suited for use on wood, plastic, sheet metal, tile and asphalt building materials.
 - f. The self-regulating, heating cable have a power output of 5 watts per foot @ 32°F in snow and ice.
 - g. The heating cable shall be part of a UL Listed and CSA Certified System.
6. Chromalox Connection Kits
- a. Manufacturer to provide connection kits for power, splice, tee and end seal shall be:
 - b. Chromalox RG Series crimp & heat shrink style connection system
 - c. Power Connection Kits shall be rated NEMA 4X to prevent water ingress and corrosion.
 - d. Connection Kits shall be UV stabilized
 - e. Connections kits shall be UL Listed and CSA Certified.
7. Chromalox Heating Cable Installation Accessories
- a. Roof clips RCK-1 shall be capable of being installed with mechanical fastening or adhesive.
 - b. Downspout Hangers RDK-1 to support heating cable in the gutter downspout.
 - c. Self-Regulating Heating Cable:SPECIFIER: Modify wattage in paragraphs below to suit conditions. Refer to Ray-Chem XL-Trace design guide. Coordinate with mechanical for pipe type, insulation, and number of runs required. Larger pipes may require multiple runs, show pipe run on plans.

2.2 CONTROLS

- A. Snow Melt Distribution and Control Panel:
- 1. Branch circuit and control panel. NEMA 3R/4 enclosure. 208 volt 3 phase-amp main lug circuit breaker panel with Insert 2 pole 30mA ground fault protection branch breakers. Snow melt control panel with adjustable hold-on timer, automatic/off/manual switch.
 - 2. Manufacturers:
 - a. Chromalox #515127 Chroma FP-BN-BacNet Communication Capable Controller.
- B. Ambient Thermostat:
- 1. Remote bulb unit with adjustable temperature range from 15°F to 150°F snap action, open-on-rise, single-pole double throw switch with 22A 125/250/480VAC ratings. Provide one pipe thermostat for each circuit of heat trace.
 - 2. Manufacturer:
 - a. Chomolox

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surface and substrates to receive heating cables for compliance with requirements for installation, tolerances, and other conditions affecting performance.
- 1. Ensure surfaces and pipes in contact with electrical heating cables are free of burrs and sharp protrusions.

2. Ensure surfaces and substrates are level and plumb.
3. Installer to verify that all roofing & gutter surfaces have been properly prepared for heating cable installation. Notify architect of unsatisfactory conditions exist prior to installing Roof & Gutter Deicing System.

- B. Test cables for electrical continuity before installing.
- C. Test cables for insulation resistance before installing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.
- E. Installer to field verify all dimensions as shown on Roof & Gutter Deicing System shop drawings

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. The heating cable shall be protected from where it leaves the pavement to the junction box by installing the cable in rigid metal conduit. Use one conduit for each heating cable.
- C. Avoid crossing expansion, construction, or control joints with heating cables. Provide sufficient slack conductor in expansion loop.
- D. The installer shall comply with the Roof & Gutter Deicing installation, operation & maintenance instructions – Chromalox document – PJ485-2.
- E. The installer shall layout heating cable per approved shop drawings.
- F. Grounding of the roof & Gutter Deicing System shall be in accordance with section 26 05 26 “Grounding & Bonding for Electrical Systems”

3.3 CONNECTIONS

- A. Cable splices and repairs shall be made using a splice kit provided by the manufacturer and specifically designed for that purpose.
- B. Power connection and end seal junction box shall be mounted above grade. The junction box shall be installed in such a way so that water cannot enter it.

3.4 FIELD QUALITY CONTROL

- A. Start-Up and testing of the Roof & Gutter Deicing System shall be performed by factory technician or factory representative per the owner's requirements.
- B. Field Testing & Inspections
 1. The system shall be commissioned in accordance to the Chromalox Installation, Operation & Maintenance manual for Roof & Gutter Deicing Systems – PJ-485.
 2. The heating cable circuit integrity shall be tested using a 2500 Vdc megohmmeter at the following intervals below. Minimum acceptable insulation resistance shall be 1000 megohms or greater.
 - a. Before installing the heating cable
 - b. After heating cable has been installed onto the roof or gutter
 - c. After installing connection kits
 - d. Prior to initial start-up (commissioning)
 - e. As part of the regular system maintenance

3. The technician shall verify that the controller parameters are set properly for the roof & gutter deicing application requirements.
4. The technician shall verify that the temperature & moisture sensors are corrected connected to the controller.
5. The installer shall submit test results to owner after commissioning.

END OF SECTION

SECTION 26 05 33 - CONDUIT AND BOXES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Rigid metallic conduit and fittings (RMC)
- B. Intermediate metallic conduit and fittings (IMC)
- C. Electrical metallic tubing and fittings (EMT)
- D. Flexible metallic conduit and fittings (FMC)
- E. Liquidtight flexible metallic conduit and fittings (LFMC)
- F. Rigid polyvinyl chloride conduit and fittings (PVC)
- G. High density polyethylene conduit and fittings (HDPE)
- H. Wall and ceiling outlet boxes
- I. Electrical connection
- J. Pull and junction boxes
- K. Rough-ins
- L. Handholes
- M. Accessories

1.2 RELATED WORK

- A. Section 26 05 53 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated
 - 2. ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated and Fittings
 - 3. ANSI C80.4 - Fittings for Rigid Metal Conduit and Electrical Metallic Tubing
 - 4. ANSI C80.6 - Intermediate Metal Conduit, Zinc Coated
 - 5. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports
 - 6. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports
- B. Federal Specifications (FS):
 - 1. A-A-50553A - Fittings for Conduit, Metal, Rigid, (Thick-Wall and Thin-Wall (EMT) Type
 - 2. A-A-55810 - Specification for Flexible Metal Conduit
- C. NECA "Standards of Installation"
- D. National Electrical Manufacturers Association (NEMA):

1. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing and Cable
 2. RN 1 - Polyvinyl chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit, Rigid Aluminum Conduit, and Intermediate Metal Conduit
 3. TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit
 4. TC 9 - Fittings for PVC Plastic Utilities Duct for Underground Installation
- E. NFPA 70 - National Electrical Code (NEC)
- F. Underwriters Laboratories (UL): Applicable Listings
1. UL 1 - Flexible Metal Conduit
 2. UL 6 - Rigid Metal Conduit
 3. UL 360 - Liquid Tight Flexible Steel Conduit
 4. UL514-B - Conduit Tubing and Cable Fittings
 5. UL651-A - Type EB and a PVC Conduit and HDPE Conduit
 6. UL651-B - Continuous Length HDPE Conduit
 7. UL746A - Standard for Polymeric Materials - Short Term Property Evaluations
 8. UL797 - Electrical Metal Tubing
 9. UL1242 - Intermediate Metal Conduit
- G. American Standard of Testing and Materials (ASTM):
1. ASTM D 570 - Standard Test Method for Water Absorption of Plastics
 2. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics
 3. ASTM D 648 - Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edge Wise Position
 4. ASTM D 2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
 5. ASTM D 2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter
 6. ASTM D 3350 - Standard Specification for Polyethylene Plastic Pipe and Fittings Material
- H. Definitions:
1. Fittings: Conduit connection or coupling.
 2. Body: Enlarged fittings with opening allowing access to the conductors for pulling purposes only.
 3. Mechanical Spaces: Enclosed areas, usually kept separated from the general public, where the primary use is to house service equipment and to route services. These spaces generally have exposed structures, bare concrete and non-architecturally emphasized finishes.
 4. Finished Spaces: Enclosed areas where the primary use is to house personnel and the general public. These spaces generally have architecturally emphasized finishes, ceilings and/or floors.
 5. Concealed: Not visible by the general public. Often indicates a location either above ceiling, in the walls, in or beneath the floor slab, in column coverings, or in the ceiling construction.
 6. Above Grade: Not directly in contact with the earth. For example, an interior wall located at an elevation below the finished grade shall be considered above grade but a wall retaining earth shall be considered below grade.
 7. Slab: Horizontal pour of concrete used for a floor or sub-floor.

PART 2 - PRODUCTS

2.1 RIGID METALLIC CONDUIT (RMC) AND FITTINGS

- A. Manufacturers:

1. Allied
2. LTV
3. Steelduct
4. Calbond Calpipe
5. Wheatland Tube Co
6. O-Z Gedney
7. or approved equal.

B. Manufacturers of RMC Conduit Fittings:

1. Appleton Electric
2. O-Z/Gedney Co.
3. Electroline
4. Raco
5. Bridgeport
6. Midwest
7. Regal
8. Thomas & Betts
9. Crouse-Hinds
10. Killark
11. Orbit Industries
12. or approved equal.

C. Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted.

D. Fittings and Conduit Bodies:

1. End Bell Fittings: Malleable iron, hot dip galvanized, threaded flare type with provisions for mounting to form.
2. Expansion Joints: Malleable iron and hot dip galvanized providing a minimum of 4 inches of movement. Fitting shall be watertight with an insulating bushing and a bonding jumper.
3. Expansion Joint for Concrete Encased Conduit: Neoprene sleeve with bronze end coupling, stainless steel bands and tinned copper braid bonding jumper. Fittings shall be watertight and concrete-tight.
4. Conduit End Bushings: Malleable iron type with molded-on high impact phenolic thermosetting insulation. Where required elsewhere in the contract documents, bushing shall be complete with ground conductor saddle and clamp. High impact phenolic threaded type bushings are not acceptable.
5. All other fittings and conduit bodies shall be of malleable iron construction and hot dip galvanized.

E. PVC Externally Coated Conduit: Compliant with UL 6, ANSI C80.1 and NEMA RN 1; rigid galvanized steel conduit with external 40 mil PVC coating and internal 2 mil urethane coating surface. All fittings and conduit bodies shall be complete with coating. Threads shall be hot galvanized and coated with a clear coat of urethane. The PVC coated system shall include necessary PVC coated fittings, boxes and covers to form a complete encapsulated system.

1. Acceptable Manufacturers:
 - a. Calbond Calpipe
 - b. Robroy
 - c. T&B Ocal
 - d. or approved equal.

2.2 STAINLESS STEEL CONDUIT (316SS) AND FITTINGS

A. Manufacturers:

1. Gibson Stainless & Specialty
 2. Calbond Calpipe
 3. Calbrite
 4. Eaton/Crouse-Hinds
 5. Thomas & Betts
 6. or approved equal.
- B. All material shall be Type 316 stainless steel, meet ASTM A-321 and SA-312 standards, and be UL 6A approved.
- C. All conduit shall be heavy wall Schedule 40 with standard NPT threads.
- D. Minimum Size Stainless Steel: 3/4 inch, unless otherwise noted.
- E. Fittings, conduit bodies, couplings, nipples, bushings, connectors, supports, clamps, and all accessory hardware shall be made of Type 316 stainless steel.

2.3 INTERMEDIATE METALLIC CONDUIT (IMC) AND FITTINGS

- A. Minimum Size Galvanized Steel: 1/2 inch unless otherwise noted.
- B. Manufacturers:
1. Allied
 2. LTV
 3. Steelduct
 4. Wheatland Tube Co
 5. O-Z Gedney
 6. or approved equal.
- C. Fittings and Conduit Bodies:
1. End Bell Fittings: Malleable iron, hot dip galvanized, threaded flare type with provisions for mounting to form.
 2. Expansion Joints: Malleable iron and hot dip galvanized providing a minimum of 4 inches of movement. Fitting shall be watertight with an insulating bushing and a bonding jumper.
 3. Expansion Joint for Concrete Encased Conduit: Neoprene sleeve with bronze end coupling, stainless steel bands and tinned copper braid bonding jumper. Fittings shall be watertight and concrete-tight.
 4. Conduit End Bushings: Malleable iron type with molded-on high impact phenolic thermosetting insulation. Where required elsewhere in the contract documents, bushing shall be complete with ground conductor saddle and clamp. High impact phenolic threaded type bushings are not acceptable.
 5. All other fittings and conduit bodies shall be of malleable iron construction and hot dip galvanized.

2.4 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

- A. Minimum Size Electrical Metallic Tubing: 3/4 inch, unless otherwise noted.
- B. Manufacturers of EMT Conduit:
1. Allied
 2. Calbond Calpipe
 3. LTV
 4. Steelduct
 5. Wheatland Tube Co
 6. or approved equal.

C. Fittings and Conduit Bodies:

1. 2" Diameter or Smaller: Compression type of steel designed for their specific application.
2. 1/2" and 3/4" Conduit: Push-on connectors and couplers with locking ring and washer of zinc plated steel, listed for use in dry locations.
3. Larger than 2": Compression or steel set screw type of steel designed for their specific application.
4. Manufacturers of EMT Conduit Fittings:
 - a. Appleton Electric
 - b. O-Z/Gedney Co.
 - c. Electroline
 - d. Raco
 - e. Bridgeport
 - f. Midwest
 - g. Regal
 - h. Thomas & Betts
 - i. Orbit Industries
 - j. or approved equal.

2.5 FLEXIBLE METALLIC CONDUIT (FMC) AND FITTINGS

- A. Minimum Size Galvanized Steel: 1/2 inch, unless otherwise noted. Lighting branch circuit wiring to an individual luminaire may be a manufactured, UL listed 3/8" flexible metal conduit and fittings with #14 AWG THHN conductors and an insulated ground wire. Maximum length of 3/8" FMC shall be six (6) feet.
- B. Manufacturers:
1. American Flex
 2. Alflex
 3. Electri-Flex Co
 4. or approved equal.
- C. Construction: Flexible steel, approved for conduit ground, zinc coated, threadless type formed from a continuous length of spirally wound, interlocked zinc coated strip steel. Provide a separate equipment grounding conductor when used for equipment where flexibility is required.
- D. Fittings and Conduit Bodies:
1. Threadless hinged clamp type, galvanized zinc coated cadmium plated malleable cast iron or screw-in type, die-cast zinc.
 2. Fittings and conduit bodies shall include plastic or cast metal inserts supplied by the manufacturer to protect conductors from sharp edges.
 3. Manufacturers:
 - a. O-Z/Gedney Co.
 - b. Thomas & Betts
 - c. Appleton Electric
 - d. Electroline
 - e. Bridgeport
 - f. Midwest
 - g. Regal
 - h. Orbit Industries
 - i. or approved equal.

2.6 LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC) AND FITTINGS

- A. Manufacturers:
 - 1. Anaconda Type UA
 - 2. Electri-Flex Type LA
 - 3. Alflex
 - 4. Carlon (Lamson & Sessions)
 - 5. or approved equal.
- B. Construction: Flexible steel, approved for conduit ground, zinc coated, threadless type formed from a continuous length of spirally wound, interlocked zinc coated strip steel and an extruded PVC cover.
- C. Fittings and Conduit Bodies:
 - 1. Watertight, compression type, galvanized zinc coated cadmium plated malleable cast iron, UL listed.
 - 2. Fittings and conduit bodies shall include plastic or cast metal inserts supplied by the manufacturer to protect conductors from sharp edges.
 - 3. Manufacturers:
 - a. Appleton Electric
 - b. O-Z/Gedney Co.
 - c. Electroline
 - d. Bridgeport
 - e. Thomas & Betts
 - f. Midwest
 - g. Regal
 - h. Carlon (Lamson & Sessions)
 - i. Orbit Industries
 - j. or approved equal.

2.7 RIGID NON-METALLIC CONDUIT (PVC) AND FITTINGS

- A. Minimum Size Rigid Smooth-Wall Nonmetallic Conduit: 1/2 inch, unless otherwise noted.
- B. Acceptable Manufacturers:
 - 1. Carlon (Lamson & Sessions) Type 40
 - 2. Cantex, J.M. Mfg.
 - 3. or approved equal.
- C. Construction: Schedule 40 and Schedule 80 rigid polyvinyl chloride (PVC), UL labeled for 90°C.
- D. Fittings and Conduit Bodies: NEMA TC 3; sleeve type suitable for and manufactured especially for use with the conduit by the conduit manufacturer.
- E. Plastic cement for joining conduit and fittings shall be provided as recommended by the manufacturer.

2.8 HIGH DENSITY POLYETHYLENE (HDPE)

- A. Minimum Size: 2 inch, unless noted otherwise.
- B. Acceptable Manufacturers:
 - 1. Carlon

2. Chevron Phillips Chemical Company
3. or approved equal.

- C. Materials used for the manufacture of polyethylene pipe and fittings shall be extra high molecular weight, high-density polyethylene resin. The material shall be listed by PPI (Plastic Pipe Institute) and shall meet the following resin properties:

ASTM Test	Description	Values HDPE
D-1505	Density g/CM 3	less than 0.941
D-1238	Melt Index, g/10 min Condition E	greater than 0.55 grams/10 min.
D-638	Tensile Strength at yield (psi)	3000 min.
D-1693	Environmental Stress Crack Resistance Condition B, F 20	96 hrs.
D-790	Flexural Modulus, MPa (psi)	less than 80,000
D-746	Brittleness Temperature	-75°C Max

- D. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same raw material, including both the base resin and coextruded resin. The pipe shall be homogeneous throughout and free of visible cracks, holes, voids, foreign inclusions, or other defects that may affect the wall integrity.

- E. Fitting and Conduit Bodies:

1. Directional Bore and Plow Type Installation: Electrofusion or Universal Aluminum threaded couplings. Tensile strength of coupled pipe must be greater than 2,000 lbs.
2. For all other type of installation: Coupler must provide a water tight connection. The tensile strength of coupled pipe must be greater than 1,000 lbs.
3. E-loc type couplings are not acceptable in any situations.
4. Acceptable Manufacturers:
 - a. ARCON
 - b. Carlon
 - c. or approved equal.

2.9 REINFORCED THERMOSETTING RESIN CONDUIT (RTRC) AND FITTINGS

- A. Minimum Size: 1 inch.

- B. Acceptable Manufacturers:

1. Champion Fiberglass
2. Atkore - FRE Composites
3. or approved equal.

- C. Conduit shall be fiberglass reinforced epoxy using a filament winding process. Conduit, elbows and fittings shall be manufactured from the same resin/hardener/glass system and the same filament wound system. Resin systems shall be epoxy with no fillers. Glass used shall be E-type.

- D. Fitting and Conduit Bodies:

1. Expansion fittings for RTRC shall be provided in accordance with Electrical Code.
2. Joints in wet locations and underground locations shall be watertight.

2.10 PHENOLIC REINFORCED THERMOSETTING RESIN CONDUIT & FITTINGS (PHENOLIC RTRC)

- A. Minimum Size: 1 inch.

- B. Manufacturers:

1. Champion Fiberglass Flameshield XW
2. Atkore - FRE Composites BreathSaver
3. or approved equal.

C. Conduit shall be low smoke, no flame, low toxicity. Conduit shall be fiberglass reinforced phenolic using a filament winding process. Conduit, elbows, conduit bodies, and fittings shall be manufactured from the same resin/hardener/glass system and the same filament wound system. Resin systems shall be phenol with no fillers. Fiberglass used shall be E-type.

D. Fitting and Conduit Bodies:

1. Expansion fittings shall be provided in accordance with Electrical Code.
2. Joints in wet locations and underground locations shall be watertight.

2.11 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1; galvanized steel, 16 gauge (approximately 0.0625 inches), with 1/2-inch male fixture studs where required.
- B. Nonmetallic Outlet Boxes: ANSI/NEMA OS 2.
- C. Cast Boxes: Nema FB1, Type FD, Aluminum, cast fer alloy, or stainless steel deep type, gasketed cover, threaded hubs.
- D. Outlet boxes for luminaires to be not less than 1-1/2" deep, deeper if required by the number of wires or construction. The box shall be coordinated with surface luminaires to conceal the box from view or provide a finished trim plate.
- E. Switch outlet boxes for local light control switches, dimmers and occupancy sensors shall be 4 inches square by 2-1/8 inches deep, with raised cover to fit flush with finish wall line. Multiple gang switch outlets shall consist of the required number of gang boxes appropriate to the quantity of switches comprising the gang. Where walls are plastered, provide a plaster raised cover. Where switch outlet boxes occur in exposed concrete block walls, boxes shall be installed in the block cavity with a raised square edge tile cover of sufficient depth to extend out to face of block or masonry boxes.
- F. Outlet boxes for telephone substations in walls and columns shall be 4 inches square and 2-1/8 inches deep with single gang raised cover to fit flush with finished wall line equipped with flush telephone plate.
- G. Wall or column receptacle outlet boxes shall be 4 inches square with raised cover to fit flush with finished wall line. Boxes in concrete block walls shall be installed the same as for switch boxes in block walls.

2.12 ECONN; ELECTRICAL CONNECTION

- A. Electrical connection to equipment and motors, sized per Electrical Code. Coordinate requirements with contractor furnishing equipment or motor. Refer to specifications and general installation notes for terminations to motors.

2.13 JB; PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel.
- B. Sheet metal boxes larger than 12 inches in any dimension that contain terminations or components: Continuous hinged enclosure with 1/4 turn latch and white back panel for mounting terminal blocks and electrical components.

- C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
- D. Cast Metal Boxes for Underground Installations: NEMA 250; Type 4, inside flanged, recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screws.
- E. Flanged type boxes shall be used where installed flush in wall.

2.14 ROUGH-IN

- A. Provide with one (1) flush mount double gang box with single gang plaster ring and appropriate cover plate,
- B. Conduit stubbed to above the lay-in ceiling.
- C. RI-TECH; Technology Rough-in:
 - 1. Rough-in shall have one (1) 1" conduit.
- D. RI-TECH-W; Technology Rough-in - Wall Phone:
 - 1. Mount on wall +54" or as noted in plans. Rough-in shall have one (1) 1" conduit.
- E. RI-TECH-C; Technology Rough-in - Ceiling Flush Mounted:
 - 1. Mount flush in finished ceiling or as noted in plans. Rough-in shall have one (1) 1" conduit.
- F. RI-TV; Television Antenna Outlet Box Rough-in:
 - 1. Rough-in shall have one (1) 3/4" conduit.

2.15 HANDHOLES

- A. HH-#; Handhole, composite polymer concrete body and cover. Stainless steel hardware. Bolted non-skid cover rated for 10,000 pounds. Design load occasional non-deliberate vehicular traffic. Stack units to achieve depth shown on plans. Units in landscaped areas shall be green in color. 11"W, 18"L, 18"D or dimensions as shown on plans.
 - 1. Manufacturers:
 - a. Hubbell/Quazite PG#####BB18, PG#####HA00
 - b. Carson Industries H Series
 - c. Armorcast
 - d. Highline Products
 - e. Synertech
- B. HH-<#>; Handhole, cast iron, hot dipped galvanized with checkered cover sidewalk weatherproof box, flat neoprene cover gasket. Stainless steel screw hardware. Mounted flush in concrete. [12"W, 18"L, 12"D or dimensions as shown on plans.]
 - 1. Manufacturers:
 - a. Appleton Electric WYT Series, WYT 181212
 - b. OZ Gedney YT Series
 - c. Crouse Hinds WJBF Series

- C. HH-<#>; Handhole, concrete traffic box and galvanized steel checkered cover. Stainless steel hardware. Bolted cover and box rated for H/20 vehicular traffic. Reinforced concrete slab for bottom. [11"W, 18"L, 24"D or dimensions as shown on plans.]

- 1. Manufacturer:
 - a. Oldcastle Precast B1017 Box

2.16 ACCESSORIES

- A. Fire Rated Moldable Pads: UL #9700, moldable sheet putty at required thickness on all five sides of back boxes. Kinetics Noise Control - IsoBacker Pad, SpecSeal - SSP Putty and Pads, 3M #MPP-4S or equal.
- B. Sound Barrier Insulation Pads: Mastic, non-hardening, sheet material, minimum 1/8" thickness applied to all five sides of back boxes. Kinetics Noise Control - SealTight Backer Pad, L.H. DOTTIE Co., #68 or equal.

PART 3 - EXECUTION

3.1 INSTALLATION TRAINING

- A. PVC coated rigid metal conduit, phenolic reinforced thermosetting resin conduit (phenolic RTRC), and reinforced thermosetting resin conduit (RTRC) manufacturers shall provide Contractor installation training for field cutting, joint preparation, joint assembly, field bending, and field cut sealing.

3.2 CONDUIT INSTALLATION SCHEDULE AND SIZING

- A. In the event the location of conduit installation represents conflicting installation requirements as specified in the following schedule, a clarification shall be obtained from the Architect/Engineer. If this Contractor is unable to obtain a clarification as outlined above, concealed rigid galvanized steel conduit installed per these specifications and the Electrical Code shall be required.
- B. Installation Schedule: Refer to drawings.
- C. Fire Rated Assemblies:
 - 1. Listed Fire Rated Assemblies: Phenolic RTRC
- D. Size conduit as shown on the drawings and specifications. Where not indicated in the contract documents, conduit size shall be according to the Electrical Code. Conduit and conductor sizing shall be coordinated to limit conductor fill to less than 40%, maintain conductor ampere capacity as required by the Electrical Code (to include enlarged conductors due to temperature and quantity derating values) and to prevent excessive voltage drop and pulling tension due to long conduit/conductor lengths.
- E. Minimum Conduit Size (Unless Noted Otherwise):
 - 1. Above Grade: 3/4 inch. (The use of 1/2 inch would be allowed for installation conduit to individual light switches, individual receptacles and individual fixture whips from junction box.)
 - 2. Below Grade 5' or less from Building Foundation: 1 inch.
 - 3. Below Grade More than 5' from Building Foundation: 1 inch.
 - 4. Telecommunication Conduit: 1 inch.
 - 5. Controls Conduit: 1/2 inch.

- F. Conduit sizes shall change only at the entrance or exit to a junction box, unless specifically noted on the drawings.

3.3 CONDUIT ARRANGEMENT

- A. In general, conduit shall be installed concealed in walls, in finished spaces and where possible or practical, or as noted otherwise. Conduit shall be installed parallel or perpendicular to walls, ceilings, and exposed structural members. In unfinished spaces, mechanical and utility areas, conduit may run either concealed or exposed as conditions dictate and as practical unless noted otherwise on drawings. Installation shall maintain headroom in exposed vicinities of pedestrian or vehicular traffic.
- B. Exposed conduit on exterior walls or above roof will not be allowed without prior written approval of Architect/Engineer. A drawing of the proposed routing and a photo of the location shall be submitted 14 days prior to start of conduit rough-in. Routing shall be shown on coordination drawings.
- C. Conduit arrangement in elevated slabs (restricted to applications specifically noted or shown on drawings):
 - 1. Conduit size shall not exceed one-third of the structural slab thickness. Place conduit between the top and bottom reinforcing with a minimum of 3" concrete cover.
 - 2. Parallel conduits shall be spaced at least 8 inches apart. Exception: Within 18 inches of commonly served floor boxes, junction boxes, or similar floor devices. Arrange conduits parallel or perpendicular to building lines and walls.
- D. Conduit shall not share the same cell as structural reinforcement in masonry walls.
- E. Conduit runs shall be routed as shown on large scale drawings. Conduit routing on drawings scaled 1/4"=1'-0" or less shall be considered diagrammatic, unless noted otherwise. The correct routing, when shown diagrammatically shall be chosen by the Contractor based on information in the contract documents, in accordance with manufacturer's written instructions, applicable codes, the NECA's "Standard of Installation", in accordance with recognized industry standards, and coordinated with other contractors.
- F. Contractor shall adapt Contractor's work to the job conditions and make such changes as required and permitted by the Architect/Engineer, such as moving to clear beams and joists, adjusting at columns, avoiding interference with windows, etc., to permit the proper installation of other mechanical and/or electrical equipment.
- G. Contractor shall cooperate with all contractors on the project. Contractor shall obtain details of other contractor's work to ensure fit and avoid conflict. Any expense due to the failure of This Contractor to do so shall be paid for in full by Contractor. The other trades involved as directed by the Architect/Engineer shall perform the repair of work damaged as a result of neglect or error by This Contractor. The resultant costs shall be borne by This Contractor.

3.4 CONDUIT SUPPORT

- A. Conduit runs installed above a suspended ceiling shall be properly supported. In no case shall conduit rest on the suspended ceiling construction, nor utilize ceiling support system for conduit support.
 - 1. Support wire used to independently support raceway and wiring systems above suspending ceilings shall be supported on both ends, minimum 12 gauge suspended ceiling support wire, and distinguishable from ceiling support systems by color (field paint), tagging, or equivalent means.
- B. Conduit shall not be supported from ductwork, water, sprinkler piping, or other non-structural

members, unless approved by the Architect/Engineer. All supports shall be from structural slabs, walls, structural members, and bar joists, and coordinated with all other applicable contractors, unless noted otherwise.

- C. Conduit shall be held in place by the correct size of galvanized one-hole conduit clamps, two-hole conduit straps, patented support devices, clamp back conduit hangers, or by other means if called for on the drawings.
- D. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- E. Spring-steel conduit clips specifically designed for supporting single conduits or tubing may be used in lieu of malleable-iron hangers for 1" and smaller raceways serving lighting and receptacle branch circuits above accessible ceilings and for securing raceways to slotted channel and angle supports.
- F. Group conduits in parallel runs where practical and use conduit racks or trapeze hangers constructed of steel channel, suspended with threaded solid rods or wall mounted from metal channels with conduit straps or clamps. Provide space in each rack or trapeze for 25% additional conduits.
- G. Do not exceed 25 lbs. per hanger and a minimum spacing of 2'-0" on center when attaching to metal roof decking (excludes concrete on metal deck). This 25 lbs. load and 2'-0" spacing include adjacent electrical and mechanical items hanging from deck. If the hanger restrictions cannot be achieved, supplemental framing off steel framing will need to be added.
- H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- I. Supports for metallic conduit shall be no greater than 10 feet. A smaller interval may be used if necessitated by building construction, but in no event shall support spans exceed the Electrical Code requirements. Conduit shall be securely fastened within 3 feet of each outlet box, junction box, device box, cabinet, or fitting.
- J. Supports of flexible conduit shall be within 12 inches of each outlet box, junction box, device box, cabinet, or fitting and at intervals not to exceed 4.5 feet.
- K. Supports for non-metallic conduit shall be at sufficiently close intervals to eliminate any sag in the conduit. The manufacturer's recommendations shall be followed, but in no event shall support spans exceed the Electrical Code requirements.
- L. Where conduit is to be installed in poured concrete floors or walls, provide concrete-tight conduit inserts securely fastened to forms to prevent conduit misplacement.
- M. Finish:
 - 1. Prime coat exposed steel hangers and supports. Hangers and supports in crawl spaces, pipe shafts, and above suspended ceiling spaces are not considered exposed.
 - 2. Trim all ends of exposed field fabricated steel hangers, slotted channel and threaded rod to within 1" of support or fastener to eliminate potential injury to personnel unless shown otherwise on the drawings. Smooth ends and install elastomeric insulation with two coats of latex paint if exposed steel is within 6'-6" of finish floor and presents potential injury to personnel.

3.5 CONDUIT INSTALLATION

- A. Conduit Connections:
 - 1. Shorter than standard conduit lengths shall be cut square using industry standards. The

- ends of all conduits cut shall be reamed or otherwise finished to remove all rough edges.
2. Metallic conduit connections in slab on grade installation shall be sealed and one coat of rust inhibitor primer applied after the connection is made.
 3. Where conduits with tapered threads cannot be coupled with standard couplings, then approved split or Erickson couplings shall be used. Running threads will not be permitted.
 4. Install expansion/deflection joints where conduit crosses structure expansion/seismic joints.
- B. Conduit terminations for all low voltage wiring shall have nylon bushings installed on each end of every conduit run.
- C. Conduit Bends:
1. Use a hydraulic one-shot conduit bender or factory elbows for bends in conduit 2" in size or larger. All steel conduit bending shall be done cold; no heating of steel conduit shall be permitted.
 2. All bends of rigid polyvinyl chloride conduit (PVC) shall be made with the manufacturer's approved bending equipment. The use of spot heating devices will not be permitted (i.e. blow torches).
 3. A run of conduit shall not contain more than the equivalent of four (4) quarter bends (360°), including those bends located immediately at the outlet or body.
 4. Telecommunications conduits shall have no more than two (2) 90-degree bends between pull points and contain no continuous sections longer than 100 feet. Insert pull points or pull boxes for conduits exceeding 100 feet in length.
 - a. A third bend is acceptable if:
 - 1) The total run is not longer than (33) feet.
 - 2) The conduit size is increased to the next trade size.
 5. Telecommunications pull boxes shall not be used in lieu of a bend. Align conduits that enter the pull box from opposite ends with each other. Pull box size shall be twelve (12) times the diameter of the largest conduit. Slip sleeves or gutters can be used in place of a pull box.
 6. Telecommunications Conduit(s): Maintain appropriate conduit bend radius at all times. For conduits with an internal diameter of less than 2", maintain a bend radius of at least 6 times the internal diameter. For conduits with an internal diameter 2" or greater, maintain a bend radius of at least 10 times the internal diameter.
 7. Rigid polyvinyl chloride conduit (PVC) runs longer than 100 feet or runs which have more than two 90° equivalent bends (regardless of length) shall use rigid metal or RTRC factory elbows for bends.
 8. Use conduit bodies to make sharp changes in direction (i.e. around beams).
- D. Conduit Placement:
1. Conduit shall be mechanically continuous from source of current to all outlets. Conduit shall be electrically continuous from source of current to all outlets, unless a properly sized grounding conductor is routed within the conduit. All metallic conduits shall be bonded per the Electrical Code.
 2. Route exposed conduit and conduit above suspended ceilings (accessible or not) parallel/perpendicular to the building structural lines, and as close to building structure as possible. Wherever possible, route horizontal conduit runs above water and steam piping.
 3. Route conduit through roof openings provided for piping and ductwork where possible. If not provided or routing through provided openings is not possible, route through roof jack with pitch pocket. Coordinate roof penetrations with other trades.
 4. Conduits, raceway, and boxes shall not be installed in concealed locations in metal deck roofing or less than 1.5" below bottom of roof decking.
 5. Avoid moisture traps where possible. Where unavoidable, provide a junction box with

- drain fitting at conduit low point.
6. All conduits through walls shall be grouted or sealed into openings. Where conduit penetrates firewalls and floors, seal with a UL listed sealant. ; refer to Section 26 05 03 for through penetration firestopping requirements.
 7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OPENINGS REQUIRED IN MASONRY OR EXTERIOR WALLS UNDER THIS DIVISION. A QUALIFIED MASON AT THE EXPENSE OF THIS CONTRACTOR SHALL REPAIR ALL OPENINGS TO MATCH EXISTING CONDITIONS.
 8. Seal interior of conduit at exterior entries, air handling units, coolers/freezers, etc., and where the temperature differential can potentially be greater than 20°F, to prevent moisture penetration. Seal shall be placed where conduit enters warm space. Conduit seal fitting shall be a drain/seal, with sealing compound, identified for use with cable and raceway system, equal to O-Z/Gedney type EYD.
 9. Horizontal conduit routing through slabs above grade
 - a. Conduits, if run in concrete structure, shall be in middle one-third of slab thickness, and leave at least 3" min. concrete cover. Conduits shall run parallel to each other and spaced at least 8" apart centerline to centerline. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement. Maximum conduit outside diameter 1".
 - b. No conduits are allowed in concrete on metal deck unless expressly approved in writing by the Structural Engineer.
 - c. No conduits are allowed to be routed horizontally through slabs above grade.
 10. Do not route conduits across each other in slabs on grade.
 11. Rigid polyvinyl chloride conduit (PVC) shall be installed when material surface temperatures and ambient temperature are greater than 40°F.
 12. Where rigid polyvinyl chloride conduit (PVC) is used below grade, in a slab, below a slab, etc., a transition to rigid galvanized steel or PVC-coated steel conduit shall be installed before conduit exits earth. The metallic conduit shall extend a minimum of 6" into the surface concealing the non-metallic conduit.
 13. Contractor shall provide suitable mechanical protection around all conduits stubbed out from floors, walls or ceilings during construction to prevent bending or damaging of stubs due to carelessness with construction equipment.
 14. Contractor shall provide a polypropylene pull cord with 2000 lbs. tensile strength in each empty conduit (indoor and outdoor), except in sleeves and nipples.
 15. Telecommunications conduits that protrude through the structural floor shall be installed 1 to 3" above finished floor (AFF).
 16. Telecommunications conduits that enter into Telecommunications rooms below the finished ceiling shall terminate a minimum of 4" below ceiling and as close to the wall as possible.
 17. Telecommunications conduits that are below grade and enter into a building shall terminate a minimum of 4" above finished floor (AFF) and as close to the wall as possible.

3.6 CONDUIT TERMINATIONS

- A. Where conduit bonding is indicated or required in the contract documents, the bushings shall be a grounding type sized for the conduit and ground bonding conductor as manufactured by O-Z/Gedney, Appleton, Thomas & Betts, Burndy, Regal, Orbit Industries or approved equal.
- B. Conduits with termination fittings shall be threaded for one (1) lock nut on the outside and one (1) lock nut and bushing on the inside of each box.
- C. Where conduits terminate in boxes with knockouts, they shall be secured to the boxes with lock nuts and provided with approved screw type tinned iron bushings or fittings with plastic inserts.
- D. Where conduits terminate in boxes, fittings, or bodies with threaded openings, they shall be tightly screwed against the shoulder portion of the threaded openings.

- E. Conduit terminations to all motors shall be made with flexible metallic conduit (FMC), unless noted otherwise. Final connections to roof exhaust fans, or other exterior motors and motors in damp or wet locations shall be made with liquidtight flexible metallic conduit (LFMC). Motors in hazardous areas, as defined in the Electrical Code, shall be connected using flexible conduit rated for the environment. Flexible conduit shall not exceed 6' in length. Route equipment ground conductors from circuit ground to motor ground terminal through flexible conduit.
- F. Rigid polyvinyl chloride conduit (PVC) shall be terminated using fittings and bodies produced by manufacturer of conduit, unless noted otherwise. Prepare conduit as per manufacturer recommendations before joining. All joints shall be solvent welded by applying full even coat of plastic cement to entire areas that will be joined. Turn conduit at least a quarter to one half turn in the fitting and let the joint cure for 1-hour minimum or as per manufacturer recommendations.
- G. All conduit ends shall be sealed with plastic immediately after installation to prevent the entrance of any foreign matter during construction. The seals shall be removed and the conduits blown clear of all foreign matter prior to any wires or pull cords being installed.

3.7 RIGID POLYVINYL CHLORIDE CONDUIT (PVC) OVERHEAD CONDUIT INSTALLATION

- A. Conduit shall be installed away from high temperature piping and equipment.
- B. Conduit shall be installed to prevent exposure to ultraviolet radiation.
- C. Proper allowances shall be made for expansion and/or contraction of conduit during installation.
- D. Expansion fittings shall be installed in any 100' continuous run of conduit & at each 100' thereafter.
- E. Supports shall be made from non-corroding materials and spacing shall not be greater than the listing in the Electrical Code, but also shall not exceed the manufacturer's recommendations depending on the expected surface temperature.

3.8 UNDERGROUND CONDUIT INSTALLATION

- A. Conduit Connections:
 - 1. Conduit joints in a multiple conduit run shall be staggered at least one foot apart.
- B. Conduit Bends (Lateral):
 - 1. Conduits shall have long sweep radius elbows instead of standard elbows wherever special bends are indicated and noted on the drawings, or as required by the manufacturer of the equipment or system being served.
 - 2. Telecommunications conduit bend radius shall be six times the diameter for conduits under 2" and ten times the diameter for conduits over 2". Where long cable runs are involved, sidewall pressures may require larger radius bends. Coordinate with Architect/Engineer prior to conduit installation to determine bend radius.
- C. Conduit Elbows (vertical):
 - 1. Minimum metal or RTRC elbow radiuses shall be 30 inches for primary conduits (greater than 600V) and 18 inches for secondary conduits (less than 600V). Increase radius, as required, based on pulling tension calculation requirements.
- D. Expansion Fittings at Finished Grade: Provide underground raceways with an expansion fitting after emerging from finished grade and exterior equipment pads. Field locate the expansion fitting above and within 24 inches of finished grade. Raceways extending less than 12 inches above finished grade, transitioning to LFMC within 12 inches of finished grade, and interior concrete building slabs do not require an expansion fitting unless required by code.

E. Conduit Placement:

1. Conduit runs shall be pitched a minimum of 4" per 100 feet to drain toward the terminations. Duct runs shall be installed deeper than the minimum wherever required to avoid any conflicts with existing or new piping, tunnels, etc.
2. For parallel runs, use suitable separators and chairs installed not greater than 4' on centers. Band conduit together with suitable banding devices. Securely anchor conduit to prevent movement during concrete placement or backfilling.
3. Where concrete is required, the materials for concreting shall be thoroughly mixed to a minimum $f'c = 2500$ and immediately placed in the trench around the conduits. No concrete that has been allowed to partially set shall be used.
4. Before the Contractor pulls any cables into the conduit, Contractor shall have a mandrel 1/4" smaller than the conduit inside diameter pulled through each conduit and if any concrete or obstructions are found, the Contractor shall remove them and clear the conduit. Spare conduit shall also be cleared of all obstructions.
5. Conduit terminations in manholes, masonry pull boxes, or masonry walls shall be with malleable iron end bell fittings.
6. All spare conduits not terminated in a covered enclosure shall have its terminations plugged as described above.
7. Ductbanks and conduit shall be installed a minimum of 24" below finished grade, unless otherwise noted on the drawings or elsewhere in these specifications.
8. All non-metallic conduit installed underground outside of a slab shall be rigid.

F. Horizontal Directional Drilling:

1. Entire drill path shall be accurately surveyed, with entry and exit stakes placed and coordinated with other contractors. If using a magnetic guidance system, entire drill path shall be surveyed for any surface geo-magnetic variations or anomalies.
2. Any utility locates within 20 feet of the bore path shall have the exact location physically verified by hand digging or vacuum excavation. Restore inspection holes to original condition after verification.

G. Raceway Seal:

1. Where a raceway enters a building or structure, it shall be sealed with a sealing bushing or duct seal to prevent the entry of liquids or gases. Seal must be compatible with conductors and raceway system. Spare or unused raceway shall also be sealed.
2. All telecommunications conduits and innerducts, including those containing cables, shall be plugged at the building and vault with "JackMoon" or equivalent duct seal, capable of withstanding a 10-foot head of water (5 PSI).
3. Duct Seal Alternative Option: Inflatable duct seal system. Capable of withstanding a 10-foot head of water (5 PSEI).
 - a. Manufacturers:
 - 1) Raychem Rayflate Duct Sealing Systems RDSS
 - 2) Approved equal

3.9 BOX INSTALLATION SCHEDULE

A. Galvanized steel boxes may be used in:

1. Concealed interior locations above ceilings and in hollow studded partitions.
2. Exposed interior locations in mechanical rooms and in rooms without ceilings; higher than 8' above the highest platform level.
3. Direct contact with concrete except slab on grade.
4. Recessed in stud wall of kitchens and laundries.

- B. Cast boxes shall be used in:
 - 1. Exterior locations.
 - 2. Hazardous locations.
 - 3. Exposed interior locations within 8' of the highest platform level.
 - 4. Direct contact with earth.
 - 5. Direct contact with concrete in slab on grade.
 - 6. Wet locations.
 - 7. Kitchens and laundries when exposed on wall surface.

3.10 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on the drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on the Contract Drawings are approximate, unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough-in.
- C. Locate and install boxes to allow access. Avoid interferences with ductwork, piping, structure, equipment, etc. Recessed luminaires shall not be used as access to outlet, pull, and junction boxes. Where installation is inaccessible, provide access doors. Coordinate locations and sizes of required access doors with the Architect/Engineer and General Contractor.
- D. Locate and install to maintain headroom and to present a neat appearance.
- E. Coordinate locations with Heating Contractor to avoid baseboard radiation cabinets.

3.11 OUTLET BOX INSTALLATION

- A. Do not install boxes back-to-back in walls.
 - 1. Provide a minimum horizontal separation of 6 inches between boxes installed on opposite sides of non-rated stud walls. When the minimum separation cannot be maintained, install sound insulation pads on all five sides of the back box in accordance with the manufacturer's instructions.
 - 2. Provide a minimum horizontal separation of 24 inches between boxes installed on opposite sides of fire-rated walls. When the minimum separation cannot be maintained, the box is greater than 16 square inches or the total box area (all trades) per 100 square feet is greater than or equal to 100 square inches, install fire-rated moldable pads to all five sides of the back box to maintain the fire rating of the wall. Install moldable pads in accordance with UL listing for specific product. Sound insulation pads are not acceptable for use in fire-rated wall applications unless the product carries the necessary fire rating.
- B. Install sound insulation pads on all five sides of the back of all boxes in sound-rated wall assemblies. Sound-rated wall assemblies are defined as partition types carrying a Sound Transmission Class (STC) rating.
- C. Contractor shall anchor switch and outlet box to wall construction so that it is flush with the finished masonry, paneling, drywall, plaster, etc. Contractor shall check the boxes as finish wall surface is being installed to assure that the box is flush. (Provide plaster rings as necessary.)
- D. Mount at heights shown or noted on drawings or as generally accepted if not specifically noted.
- E. Locate boxes in masonry walls to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat openings for boxes.
- F. Provide knockout closures for unused openings.

- G. Support boxes independently of conduit.
- H. Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- I. Install boxes in walls without damaging wall insulation.
- J. Coordinate mounting heights and locations of outlets mounted above counters, benches, backsplashes, and below baseboard radiation.
- K. Position outlets to locate luminaires as shown on reflected ceiling drawings.
- L. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioned to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
- M. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
- N. Provide cast outlet boxes in exterior locations and wet locations, and where exposed rigid or intermediate conduit is used.

3.12 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
- B. Support pull and junction boxes independent of conduit.
- C. Do not install boxes back-to-back in walls.
 1. Provide a minimum horizontal separation of 6 inches between boxes installed on opposite sides of non-rated stud walls. When the minimum separation cannot be maintained, install sound insulation pads on all five sides of the back box in accordance with manufacturer instructions.
 2. Provide a minimum horizontal separation of 24 inches between boxes installed on opposite sides of fire-rated walls. When the minimum separation cannot be maintained, the box is greater than 16 square inches or the total box area (all trades) per 100 square feet is greater than or equal to 100 square inches, install fire-rated moldable pads to all five sides of the back box to maintain fire rating of wall. Install moldable pads in accordance with UL listing for specific product. Sound insulation pads are not acceptable for use in fire-rated wall applications unless product carries necessary fire rating.
- D. Install sound insulation pads on all five sides of the back of all boxes in sound-rated wall assemblies. Sound-rated wall assemblies are defined as partition types carrying a Sound Transmission Class (STC) rating.

3.13 EXPOSED BOX INSTALLATION

- A. Boxes shall be secured to the building structure with proper size screws, bolts, hanger rods, or structural steel elements.
- B. On brick, block and concrete walls or ceilings, exposed boxes shall be supported with no less than two (2) Ackerman-Johnson, Paine, Phillips, or approved equal screw anchors or expansion shields and round head machine screws. Cast boxes shall not be drilled.
- C. On steel structures, exposed boxes shall be supported to the steel member by drilling and tapping the member and fastening the boxes by means of round head machine screws.

- D. Boxes may be supported on steel members by APPROVED beam clamps if conduit is supported by beam clamps.
- E. Boxes shall be fastened to wood structures by means of a minimum of two (2) wood screws adequately large and long to properly support. (Quantity depends on size of box.)
- F. Wood, plastic, or fiber plugs shall not be used for fastenings.
- G. Explosive devices shall not be used unless specifically allowed.

END OF SECTION

SECTION 26 05 53 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Adhesive Markings and Field Labels
- B. Nameplates and Signs
- C. Product Colors

1.2 REFERENCES

- A. NFPA 70E - National Electrical Safety Code
- B. NFPA 70 - National Electrical Code (NEC)
- C. ANSI A13.1 - Standard for Pipe Identification
- D. ANSI Z535.4 - Standard for Product Safety Signs and Labels

1.3 QUALITY ASSURANCE

- A. Electrical identification products shall be suitable for the environment installed. Identification labels damaged by the environment due to ultraviolet light fading, damp or wet conditions, physical damage, corrosion, or other conditions shall be replaced with labels suitable for the environment.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Division 1 Specification Sections and under provisions of Section 26 05 00.
 - 1. Product Data for each type of product specified.
 - 2. Schedule of nomenclature to be used for identification signs and labels for each piece of equipment including, but not limited to, the following equipment types as specified in Division 26.
 - 3. Samples of each color, lettering style and other graphic representation required for identification materials including samples of labels and signs.
 - 4. Identification required in this section shall apply to equipment furnished in Division 26 and any other applicable Divisions including Division 21/22/23.

PART 2 - PRODUCTS

2.1 ADHESIVE MARKINGS AND FIELD LABELS

- A. Adhesive Marking Labels for Raceway: Pre-printed, flexible, self-adhesive vinyl labels with legend indicating voltage and service (Emergency, Lighting, Power, HVAC, Communications, Control, Fire). Where building standard has been established for labeling, this contractor shall adhere to the established campus standard.
 - 1. Label Size as follows:
 - a. Raceways: Kroy or Brother labels 1-inch high by 12-inches long (minimum).

2. Color: As specified for various systems.
- B. Colored Adhesive Marking Tape for banding Raceways, Wires, and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.
 - C. Pretensioned Flexible Wraparound Colored Plastic Sleeves for Cable Identification: flexible acrylic bands sized to suit the cable diameter and arranged to stay in place by pre-tensioned gripping action when coiled around the cable.
 - D. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letter.
 - E. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a temperature range from -40°F to 185°F (-40°C to 85°C), type 2/2S or type 21/21S based on application. Provide ties in specified colors when used for color coding. Cable ties shall be listed and identified for the application, securement, and support.
 - F. Underground Plastic Markers: Bright colored continuously printed plastic ribbon tape of not less than 6 inches wide by 4 mil thick, printed legend indicating type of underground line, manufactured for direct burial service. Tape shall contain a continuous metallic wire to allow location with a metal detector.
 - G. Aluminum, Wraparound Marker Bands: 1-inch width, 0.014 (5mm) inch thick aluminum bands with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.
 - H. Brass or Aluminum Tags: 2" (50mm) by 2" (50mm) by .05-inch metal tags with stamped legend, punched for fastener.
 - I. Indoor/Outdoor Number and Letters: Outdoor grade vinyl label with acrylic adhesive designed for permanent application in severe indoor and outdoor environments.
 - J. Text Sizes:
 1. The following information shall be used for text heights, fonts, and size, unless otherwise noted.
 - a. Font: Normal 721 Swiss Bold
 - b. Adhesive Labels: 3/16 inch minimum text height
 - c. Vinyl / Plastic Laminate Labels: 3/4" inch minimum text height

2.2 NAMEPLATES AND SIGNS

- A. Where building standard has been established for labeling, this contractor shall adhere to the established campus standard.
- B. Engraved, Plastic-Laminated Labels, Signs and Instruction Plates: Engraving stock melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 square inches, or 8 inches in length; 1/8 inch thick for larger sizes. Labels shall be punched for mechanical fasteners.
- C. Text Sizes:
 1. The following information shall be used for text heights, fonts, and size, unless otherwise noted.
 - a. Text Height: 3/8 inch minimum

- D. Baked-Enamel Signs for interior Use: Preprinted aluminum signs, punched, or drilled for fasteners, with colors, legend, and size required for application. Mounting ¼" grommets in corners.
- E. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396 inch galvanized-steel backing: and with colors, legend, and size required for application. Mounting 1/4" grommets in corners.
- F. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.
- G. Fasteners for Plastic-Laminated Signs; Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

2.3 PRODUCT COLORS

- A. Where building standard has been established for labeling, this contractor shall adhere to the established campus standard.
- B. Adhesive Markings and Field Labels:
 - 1. All Labels: Black letters on white face
 - 2. Normal Power and General Labels: Black letters on white face
 - 3. Control Labels: Refer to division 27
 - 4. Medium Voltage (greater than 1,000 volts): Match existing on campus.
 - 5. Fire Alarm: Red letters on white face
- C. Nameplates and Signs:
 - 1. NORMAL POWER: Black letters on white face
 - 2. Control Labels: Black letters on white face
 - 3. EMERGENCY: White letters on red face
 - 4. GROUNDING: White letters on green face.
 - 5. CAUTION or UPS: Black letters on yellow face
- D. Box Covers:
 - 1. Box covers shall be painted to correspond with system type as follows:
 - a. Normal Power and General: Silver
 - b. Fire Alarm System: Red
 - c. Temperature Controls: Refer to mechanical cover sheet for color
 - 2. Box cover colors shall match conduit colors listed above.
- E. Conductor Color Identification: Refer to Part 3 for additional information.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.
- B. Exposed Ceilings and Finished Spaces: The project includes exposed ceilings in finished spaces. The installation of colored raceways and labeling may not be aesthetically desirable in

finished spaces. The contractor shall coordinate identification requirements in exposed ceilings of finished spaces with the A/E prior to installation and ordering of materials.

- C. Electrical System Color Chart: This Contractor shall furnish and install framed 8" x 12" charts of the color-coded identification scheme used for the electrical system in all electrical rooms and next to the main fire alarm panel.
- D. Install identification devices in accordance with manufacturer's written instruction and requirements of Electrical Code.
- E. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work. All mounting surfaces shall be cleaned and degreased prior to identification installation.
- F. Circuit Identification: Tag or label conductors as follows:
 - 1. Multiple Power or Lighting Circuits in Same Enclosure: Where multiple branch circuits are terminated or spliced in a box or enclosure, label each conductor with source and circuit number.
 - 2. Multiple Control Wiring and Communication/Signal Circuits in Same Enclosure: For control and communications/signal wiring, use wire/cable marking tape at terminations in wiring boxes, troughs, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tape.
 - 3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.
- G. Apply Danger, Warning, Caution and instruction signs as follows:
 - 1. Install Danger, Warning, Caution or instruction signs where required by Electrical Code, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
 - 2. 'Danger' indicates a hazardous situation which, if not avoided, will result in death or serious injury. ANSI standard red background, white letters.
 - 3. 'Warning' indicates a hazardous situation which, if not avoided, could result in death or serious injury. ANSI standard orange background, black letters.
 - 4. 'Caution' indicates a hazardous situation which, if not avoided, may result in minor or moderate injury. ANSI standard yellow background, black letters.
 - 5. Emergency Operating Signs: Install, where required by Electrical Code, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect, engraved laminate signs with white legend on red background with minimum 3/8-inch high lettering for emergency instructions on power transfer, load shedding, or other emergency operations.
- H. Apply circuit/control/item designation labels of engraved plastic laminate for pushbuttons, pilot lights, alarm/signal components, and similar items, except where labeling is specified elsewhere.
- I. Install labels parallel to equipment lines at locations as required and at locations for best convenience of viewing without interference with operation and maintenance of equipment.
- J. Install ARC FLASH WARNING signs on all power distribution equipment per Section 26 05 73.
- K. Install ARC FLASH WARNING signs on all switchboards, switchgear, distribution panels,

branch panelboards, industrial control panels, and motor control centers.

1. Sample Label:
! WARNING
ARC FLASH AND SHOCK HAZARD
APPROPRIATE PPE REQUIRED
FAILURE TO COMPLY CAN RESULT IN DEATH OR INJURY
REFER TO NFPA 70E
- L. Circuits with more than 600V: Identify raceway and cable with "DANGER-HIGH VOLTAGE" in black letters 2 (50mm) inches high on orange background at 10'-0 foot intervals.
 1. Entire floor area directly above conduits running beneath and within 12 inches of a basement or ground floor that is in contact with earth or is framed above unexcavated space.
 2. Wall surfaces directly external to conduits concealed within wall.
 3. All accessible surfaces of concrete envelope around conduits in vertical shafts, exposed in building, or concealed above suspended ceilings.
- M. Selective Coordination Label: Install caution signs on all switchboards, distribution panels, panelboards, disconnects, and other equipment with selectively coordinated overcurrent protection devices. Sign at a minimum shall contain:
 1. CAUTION: OVERCURRENT DEVICES IN THIS ENCLOSURE ARE SELECTIVELY COORDINATED. EQUIVALENT REPLACEMENTS AND TRIP SETTINGS ARE REQUIRED.
- N. Underground Electrical Lines: For exterior underground power, control, signal, and communication lines, install continuous underground plastic line marker located directly above line at 6 (150mm) to 8 (205mm) inches below grade. A single plastic line marker is permitted when the width of the common trench does not exceed 16 inches; provide a second plastic line marker to mark each edge of the trench when 16 inches of width is exceeded. Install line marker for underground wiring, both direct-buried cables and cables in raceway.

3.2 FEEDER AND BRANCH CIRCUIT DIRECTORIES

- A. Product:
 1. Adhesive labels and field markings
 2. Nameplates and signs
- B. Feeder Directories Branch: Provide each feeder, branch circuit, feeder modification, and branch circuit modification with a typed circuit directory label. Refer to technical equipment specification sections for additional requirements. Include the following with each label:
 1. Load Description: Lighting, receptacles, specific equipment, spare, space, or similar description.
 2. Location: Room name, number, location.
- C. Provide a factory or custom clear plastic sleeve for each branch panel directory and secure to inside panel cover.

3.3 LIGHTING CONTROL AND RECEPTACLE COVER PLATES

- A. Product:
 1. Adhesive labels and field markings
 2. Nameplates and signs

- B. Identification material to be a clear, 3/8-inch Kroy tape or Brother self-laminating vinyl label with black letters. Embossed Dymo-Tape labels are not acceptable. Permanently affix identification label to cover plates, centered above the receptacle openings.
- C. Identification material to be engraved plastic-laminated labels, 1/16-inch minimum thickness with white letters on a red face. Letter and number size to 1/8-inch high.
- D. Provide identification on all switch and receptacle cover plates. Identification shall indicate source and circuit number serving the device (e.g. "C1A #24"). Identification for switch cover plates shall be installed on the inside cover.

3.4 BOX LABELING

- A. Products:
 - 1. Marker.
- B. Identify Junction, Pull and Connection Boxes: Labeling shall be by Sharpie. In rooms that are painted out, provide labeling on inside of cover.
- C. All junction, pull, and connection boxes shall be identified as follows:
 - 1. For power and lighting circuits, indicate system voltage and identity of contained circuits ("120V, 1LA1-3,5,7").
 - 2. Essential Electrical System EES: When applicable the label shall include "Essential Electrical System EES". Maximum interval between label intervals shall be 25 feet or as required by code.
 - 3. For other wiring, indicate system type and description of wiring ("FIRE ALARM NAC #1").

3.5 CONDUCTOR COLOR CODING

- A. Products:
 - 1. All wire and cables shall be color coded by the manufacturer.
 - 2. All wires and cables, 6 AWG or larger, used in motor circuits, main feeders, sub-main feeders, and branch circuits shall be coded by the application of plastic tape. The tape shall be 3-M, Plymouth or Permacel in colors specified below. The tape shall be applied at each conductor termination with two 1-inch tape bands at 6-inch centers. Contractor option to use colored cabling in lieu of the tape at each end for conductor 6 AWG to 500 KCM. Wire and cables smaller than 6 AWG shall be color coded by the manufacturer.
- B. Color coding shall be applied at all panels, switches, junction boxes, pull boxes, vaults, manholes etc., where the wires and cables are visible and terminations are made. The same color coding shall be used throughout the entire electrical system, therefore maintaining proper phasing throughout the entire project.
- C. Colored cable ties shall be applied in groups of three ties of specified color to each conductor at each terminal or splice point starting 3 inches from the termination and spaced at 3- inches centers. Tighten to a snug fit, and cut off excess length.
- D. Where more than one nominal voltage system exists in a building or facility, each ungrounded conductor of a multi-wire branch circuit, where accessible, shall be identified by phase and system.
- E. Conductors shall be color coded as follows:
 - 1. 208Y/120 Volt, 4-Wire:

- a. A-Phase - Black
 - b. B-Phase - Red
 - c. C-Phase - Blue
 - d. Neutral - White
 - e. Ground Bond - Green
2. 480Y/277 Volt, 4-Wire:
- a. A-Phase - Brown
 - b. B-Phase - Orange
 - c. C-Phase - Yellow
 - d. Neutral - Gray
 - e. Ground Bond - Green
3. Grounding Conductors:
- a. Equipment grounding conductors, main/system/supply-side bonding jumpers: Green.
 - b. Isolated Equipment Ground Conductors: Green with colored distinctive yellow stripe along the entire length of the conductor. Isolated ground for feeders, use colored tape with alternating bands of green and yellow to provide a minimum of three bands of green and two bands of yellow.
4. Cabling for Remote Control, Signal, and Power Limited Circuits:
- a. Fire Alarm: Red.
 - b. Low Voltage Switching: Per manufacturer recommendations and code requirements.
 - c. Building Automation Systems and Control: Refer to the Temperature Control Contactor notes located on the mechanical cover sheet.
 - d. Nurse Call: Refer to Division 27.
 - e. Electronic Control: Per manufacturer recommendations and code requirements.
 - f. Audio/Visual Systems: Refer to Division 27.
 - g. Structured Cabling: Refer to Division 27.

3.6 CONTROL EQUIPMENT IDENTIFICATION

- A. Products:
 - 1. Nameplates and signs
- B. Provide identification on the front of all control equipment such as combination starters, starters, VFDs, contactors, motor control centers, etc.
- C. Identification shall be provided for all connections to equipment furnished by this Contractor, other contractors, or the Owner.
- D. Labeling shall include:
 - 1. Equipment type and contract documents designation of equipment being served.
 - 2. Location of equipment being served if it is not located within sight.
 - 3. Voltage and phase of circuit(s).
 - 4. Panel and circuit number(s) serving the equipment.
 - 5. Method of automatic control, if included ("AUTO CONTROL BY FMCS").
 - 6. Available fault current; refer to one-line diagram or panel schedule of panel serving equipment.
 - 7. Date of fault current study, refer to one-line diagram
 - 8. Sample Label:
EXHAUST FAN EF-1 ("LOCATED ON ROOF")

480V, 3-PHASE
FED FROM "1HA1-1"
AUTO CONTROL BY FMCS
22,000 AMPS AVAILABLE FAULT CURRENT
DATE OF STUDY: 1 JAN 2017

3.7 EQUIPMENT CONNECTION IDENTIFICATION

- A. Products:
1. Nameplates and signs
- B. Provide identification for hard wired electrical connections to equipment such as disconnects switches, starters, etc. Plug and cord type connections do not require this specific label.
- C. Labeling shall include:
1. Equipment type and contract documents designation of equipment being served
 2. Location of equipment being served if it is not located within sight.
 3. Voltage and rating of the equipment.
 4. Panel and circuit numbers(s) serving the equipment
 5. Available fault current; refer to one-line diagram or panel schedule of panel serving equipment.
 6. Date of fault current study; refer to one-line diagram
 7. Sample Label:
UNIT HEATER UH-1 ("LOCATED IN STORAGE ROOM 200")
480V: 3-PHASE
FED FROM "1HA1-1"
22,000 AMPS AVAILABLE FAULT CURRENT
DATE OF STUDY: 1 JAN 2017

3.8 POWER DISTRIBUTION EQUIPMENT IDENTIFICATION

- A. Products:
1. Nameplates and signs
- B. Provide identification on the front of all power distribution equipment such as panelboards, switchboards, switchgear, motor control centers, generators, UPS, storage battery disconnects, transfer switches, etc. Labels shall be visible on the exterior of the gear, correspond to the one-line diagram nomenclature, and identify each cubicle of multi-section gear.
1. Interior Equipment: The identification material shall be engraved plastic-laminated labels.
 2. Exterior Equipment: The identification material shall be engraved vinyl labels.
 3. Labeling shall include:
 - a. Essential Electrical System EES: When applicable the label shall include "Essential Electrical System EES". Applicable equipment includes components of the life safety and critical branch for healthcare facilities (generators, transfer switches, switchboards, distribution panels, panelboards, etc.).
 - b. Equipment type and contract documents designation of equipment.
 - c. Voltage of the equipment.
 - d. Name of the upstream equipment and location of the upstream equipment if it is not located within sight.
 - e. Rating and type of the overcurrent protection device serving the equipment if it is not located within sight ("FED BY 400A/3P BREAKER").
 - f. Sample Label:

DISTRIBUTION PANEL DP-H1
480Y/277V
FED FROM SWITCHBOARD "SB-1" (LOCATED IN MAIN ELEC ROOM)

4. Provide the following on a separate label, installed below the label above:
 - a. Available fault current; refer to one-line diagram or panel schedules
 - b. Date of fault current study; refer to one-line diagram
 - c. Sample Label:
22,000 AMPS AVAILABLE FAULT CURRENT
DATE OF STUDY: 1 JAN 2017

- C. Service Equipment Label: A separate nameplate for the service entrance equipment and include:
 1. Nominal system voltage, service wire size, quantity, material, distance
 2. Maximum available fault current; refer to one-line diagram for values
 3. Clearing time of overcurrent protection devices based on available fault current. Refer to calculations and report from Section 26 05 73 for value.
 4. Date of fault current study; refer to one-line diagram
 5. Date of label
 6. Sample Label:
480Y/277V, 6 SETS 4#750KCM CU, 75FT
39,800 AMPS AVAILABLE FAULT CURRENT
0.07 SECOND CLEARING TIME
DATE OF STUDY: 1 JAN 2017
DATE OF LABEL: 4 JUL 2017

- D. Arc Energy Reduction Label:
 1. Provide a separate engraved plastic laminate label centered at the top of each vertical section of the electrical gear indicating the following when applicable.
 - a. Label: "This equipment is designed with a [system listed below]".
 - b. Applicable Systems:
 - 1) Zone-selective interlocking system for selective coordination and arc energy reduction
 - 2) Differential relaying system for selective coordination and arc energy reduction
 - 3) Arc energy reducing maintenance switch
 - 4) Energy reducing active arc flash mitigation system

- E. Adjustable-Trip Over Current Protection Label:
 1. Provide a separate engraved plastic laminate label adjacent to each overcurrent projection device with adjustable trip settings. Provide label separate from load identification label.
 - a. Label:
 - 1) Long-time delay:
 - 2) Long-time pickup:
 - 3) Short-time delay:
 - 4) Short-time pickup:
 - 5) Instantaneous:
 - 6) Ground fault delay:
 - 7) Ground fault:

- b. Sample Label:
 - Long-time delay: 10.0
 - Long-time pickup: 1.0
 - Short-time delay: 0.15
 - Short-time pickup: 5.0
 - Instantaneous: 2.0
 - Ground fault delay: 0.25
 - Ground fault: 50.0

F. Nominal System Voltage Label:

- 1. Where more than one nominal voltage system exists in a building or facility, the identification of color coding used in the panelboard or equipment shall be permanently posted on the interior of the door or cover.

G. Distribution panelboards and switchboards shall have each overcurrent protection device identified with name and location of the load being served ("AHU-1 LOCATED IN PENTHOUSE 1"). Provide a separate engraved plastic laminate label adjacent to each overcurrent protection device with feeder wire size, feeder wire quantity, conductor material and distance in feet. Provide label separate from load identification label and adjustable trip settings label.

- 1. Sample Labels for Feeders:
 - 4#3/0 CU & 1#6 CU GND, 125FT
 - 4#250KCM AL & 1#6 GND CU, 125FT
 - 2 SETS 4#400KCM CU & 1#1 GND CU, 125FT

H. Branch panelboards shall be provided with typed panel schedules upon completion of the project. Existing panelboards shall have their existing panel schedules typed, with all circuit changes, additions or deletions also typed on the panel schedules. A copy of all panel schedules for project shall be turned over as part of O&M Manuals. Refer to Section 26 05 00 for other requirements.

3.9 TRANSFORMER EQUIPMENT IDENTIFICATION

A. Products:

- 1. Nameplates and signs

B. Provide identification on the front of all transformers. The identification nameplate shall be an engraved plastic-laminated label.

C. Labeling shall include:

- 1. Equipment type and contract documents designation of equipment
- 2. Name of the upstream equipment.
- 3. Voltage and rating of the equipment.
- 4. Location of the upstream equipment if it is not located within sight.
- 5. Sample Label:
 - TRANSFORMER TR-15
 - 480V: 208Y/120V 15KVA
 - FED FROM SWITCHBOARD "SB-1" (LOCATED IN ELEC 123)

3.10 POLE IDENTIFICATION

A. Product:

- 1. Adhesive labels and field markings

2. Nameplates and signs

- B. Lighting poles, bollards and overhead distribution poles shall be individually identified with a unique number, for maintenance purposes. Apply the vinyl label number above the hand hole cover or 24" (610mm) above grade. Bollards may be identified with a number applied inside the luminaire that is visible from the exterior.

END OF SECTION

SECTION 26 09 33 - LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Line and low voltage standalone lighting controls
- B. Automatic load control relay (ALCR20)
- C. Distributed lighting control

1.2 RELATED SECTIONS

- A. The lighting system design includes a combination of luminaire sources, lighting control components, programming sequences, and supplementary components for building and energy code compliance. The design uses performance-based specifications for portions of the lighting system to account for the limitation of comparable product solutions available by competitive manufacturers. The Contractor shall reference related specification sections, plans, schedules, and details prior to submitting pricing, submittals, and installation. The Contractor shall coordinate system component compatibility among various manufacturers and suppliers for a turnkey lighting system. Referenced sections include, but are not limited to, the following:
 - 1. 26 51 19 LED Lighting
 - 2. 26 52 15 Emergency Lighting Inverter
 - 3. Electrical Drawings: Plans, luminaire schedules, lighting control sequence of operations, diagrams, and details.

1.3 RELATED WORK

- A. Section 01 91 00 - Commissioning
- B. Section 23 09 00 - Facility Management Control System (FMCS)
- C. Section 26 51 00 - Lighting
- D. Section Insert - Motorized Shades
- E. Section 27 41 00 - Audio/Visual System

1.4 QUALITY ASSURANCE

- A. Manufacturers shall be regularly engaged in the manufacture of lighting control equipment and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for not less than five (5) years.
- B. All components and assemblies are to be factory pre-tested prior to delivery and installation.
- C. Comply with Electrical Code as applicable to electrical wiring work.
- D. Comply with applicable portions of NEMA standards pertaining to types of electrical equipment and enclosures.
- E. Panels and accessory devices are to be UL listed under UL 916 Energy Management Equipment. Panels and accessories used for control of life safety and critical branch circuits shall be listed under UL 924 Emergency Lighting and Power Equipment.

- F. All assemblies are to be in compliance with FCC emissions standards specified in Part 15 Subpart J for Class A applications.

1.5 REFERENCES

- A. FCC Rules and Regulations, Part 15, Subpart J - Radio Frequency Interference
- B. FS W S 896 Switch, Toggle
- C. NEMA WD 1 - General Color Requirements for Wiring Devices
- D. NEMA WD 7 - Occupancy Motion Sensors
- E. NFPA 70 - National Electrical Code (NEC)
- F. UL Standard 916 Energy Management Equipment
- G. UL 924 - Emergency Lighting and Power Equipment
- H. UL 1472 - Solid-State Dimming Controls

1.6 SUBMITTALS

- A. Submit product data under provisions of Section 26 05 00.
- B. Submit a comprehensive package including devices, hardware, software, product specification, finishes, dimensions, installation instructions, warranty, system software requirements, and roles and responsibilities of all persons and groups involved in installation, execution, and commissioning.
- C. Provide floor plan showing location, orientation, and coverage area of each control device, sensor, and controller/interface. For areas requiring multiple sensor devices for appropriate coverage, submit specific manufacturer-approved sensor layout as an overlay directly on the project drawings, either in print or approved electronic form.
- D. Submit a list of devices and equipment that will be installed for each sequence of operation.
- E. Submit project specific control wiring diagrams showing all equipment, line voltage, and control wiring requirements for all components including, but not limited to, dimmers, relays, low voltage switches, occupancy sensors, control stations, dimmer panels, relay panels, and communication interfaces and programming instructions for each sequence of operation. Include network cable specification and end-of-line termination details, if required.
- F. Project specific network riser diagram including floor and building level details. Illustrate points of connection to integrated systems. Coordinate integration with mechanical &/or other trades.
- G. Verify acceptance of communications connection to building automation system. Submit BACnet IP parameters.

1.7 EXTRA STOCK

- A. Provide extra stock under provisions of Section 26 05 00.

1.8 PROJECT RECORD DOCUMENTS

- A. Submit project record documents under provisions of Section 26 05 00.

- B. Accurately record location of all controls and devices. Include description of switching sequences and circuiting arrangements.

1.9 OPERATION AND MAINTENANCE DATA

- A. Submit emergency, operation, and maintenance data under provisions of Section 26 05 00. Data shall also include the following:
 - 1. Schedule for routine maintenance, inspection, and calibration of all lighting control devices and system components. Recommended schedule for inspection and recalibration of sensors.
 - 2. Complete narrative describing intended operation and sequence for each control scenario and system component, updated to reflect all changes resulting from commissioning of systems. Narrative shall indicate recommended settings for devices where applicable.
 - 3. Replacement part numbers for all system components.
- B. Identify installed location and labeling for each luminaire controlled by automated lighting controls.
- C. Submit software operating and maintenance manuals, program software backup on compact disc or compatible media with data files, device address list, and a printout of software application and graphic screens, where applicable.

1.10 SYSTEM DESCRIPTION

- A. Performance Statement: This specification section and the accompanying lighting design documents describe the minimum material quality, required features, and operational requirements of the lighting control system (LCS). These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the performance required of the system, as presented in these documents, the Contractor and system manufacturer/vendor are solely responsible for determining all equipment, wiring, and programming required for a complete and operational system.
- B. Provide an integrated lighting controls system consisting of panels, power supplies, controllers, sensors, relays, switches, devices, wiring, etc. necessary to perform the Lighting Control Sequence of Operation as defined on the plans and specifications. Contractor is responsible for confirming that all components and luminaires interoperate as a single system.
 - 1. Sequence of Operation: Describes the required operation and performance for lighting control in each space. Sequences of operation are indicated on the drawings.
 - 2. Drawings: The drawings include sequences of operation, locations of control interface devices, sensors, and control zones. Wiring and additional equipment to make a complete and functioning system has not been shown, but shall be submitted with the shop drawings.
- C. The following control types and features are acceptable. Acceptable control locations are shown on the drawings.
 - 1. Line Voltage Control: Control equipment consists of traditional line voltage wiring devices and equipment such as switches, dimmers and combination occupancy/vacancy sensor switches, etc.
 - 2. Distributed Control: Control equipment is in the space/zone being controlled; not reliant on centralized controllers.
 - a. All locations shall have the ability to be networked for remote control and monitoring, but network connections are not required.
 - b. SPECIFIER: Paragraph below is not typical for all projects. Edit to suit project.

1.11 COMMISSIONING

- A. Commissioning of a system or systems specified in this section is part of the construction process. Documentation and testing of these systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Owner's Representative and the Commissioning Agent. Project closeout is dependent on successful completion of all commissioning procedures, documentation, and issue closure. Refer to Division 1 for detailed commissioning requirements.
- B. The commissioning shall include, but not be limited to, a commissioning plan, preliminary commissioning report, construction documents, manuals, final commissioning report, and lighting system functional testing.
- C. This project will have selected building systems commissioned. The Contractor is responsible to execute commissioning. The commissioning process, equipment, and systems to be commissioned are defined in Division 1. A third-party Commissioning Agent will direct the commissioning process.
- D. Contractor shall notify the Commissioning Agent, Architect/Engineer and Owner Representative ten (10) working days prior to scheduled commissioning date.
- E. Commissioning process requires meeting attendance. Refer to Division 1 for meeting requirements.
- F. System shall be functionally tested by a factory-authorized engineer and comply with Sequence of Operation. All loads shall be tested live for continuity and freedom from defects, and all control wiring shall be tested for continuity and connections prior to energizing the system.

1.12 WARRANTY

- A. Manufacturer shall warrant products under normal use and service to be free from defects in materials and workmanship for a period of two (1) years from date of commissioning.
- B. Occupancy, vacancy, daylight sensors and controls shall have a five (5) year warranty from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LIGHTING CONTROLS

- A. All items of material having a similar function (e.g., switches, dimmers, sensors, contactors, relays, etc.) shall be of the same manufacturer, unless specifically stated otherwise on drawings or elsewhere in the specifications. Lighting control switches, systems, and components shall be listed.
- B. Color of lighting controls and sensors shall match the receptacle wiring devices specified in space.
- C. The functions described in the lighting sequence of operation shall dictate the actual lighting control device required to accomplish the functions described for the space.

2.2 LIGHTING CONTROL STATION

- A. The lighting control station shall contain the controls required by the lighting sequence of operation in a common coverplate. The controls may consist of switches, dimmers, occupancy sensors, pushbuttons, etc.

1. In spaces where the wall control station is shown in multiple locations, the sequence of operation shall be the same at all locations, unless noted otherwise.
2. Controls supplier shall prepare control station shop drawings showing arrangement of controls, dimensioned elevations, wiring diagram, and recommended backboxes. The shop drawing submittal should be identified with the lighting sequence that the station provides. Submit data sheets on the switches, dimmers, sensors, buttons, etc. contained in the control station.

2.3 DEVICE COLOR

- A. All switch, lighting controls, and coverplate colors shall be the same as wiring devices, unless indicated otherwise.

2.4 COVERPLATES

- A. All switches and lighting controls shall be complete with coverplates that match material and color of the wiring device coverplates in the space.
- B. Where several devices are ganged together, the coverplate shall be of the ganged style for the number of devices used.
- C. Install nameplate identification as indicated in Section 26 05 53.
- D. Plate-securing screws shall be metal with head color matching the wall plate finish.

2.5 WALL SWITCHES

- A. SW-1P; Single Pole Switch:
 1. Single throw, 120/277-volt, 20-amp maintained contact. Toggle handle, side and back wired.

2.6 WALL DIMMERS

- A. UL listed with integral air-gap switch for on/off control.
- B. Integral EMI/RFI suppression.
- C. Non-viewable heat sink.
- D. Dimmer compatibility and wiring with the load being controlled shall be verified by Contractor prior to purchase and installation.
- E. Dimmer to match device color.
- F. SW-OD; Wall 0-10V Dimmer / Occupancy sensor:
 1. Wall switch with manual on/auto off. 120VAC load rating of 0-800 W for electronic ballast, LED. 277VAC load rating of 0-1,800 W for electronic ballast, LED. adjustable OFF delay. 0-10V dimming with up to 30ma sink. Automatic ON/OFF, manual ON/automatic OFF, or occupancy on to predetermined dimming level go to last dimming setting upon occupancy.

2.7 LOCAL DAYLIGHTING CONTROLS

- A. Standalone Interior Photo Sensors:
 1. SW-LS; Daylight Level Sensor - On/Off Control - One Zone:

- a. On/Off control. Range of 10-200 FC. Adjustable deadband prevents cycling. Adjustable time delay.
2. SW-LS-3Z; Daylight Level Sensor and Controller - On/Off Control - Three Zones:
 - a. On/off control of up to three 10-amp zones. Range of 10 to 200 FC. Adjustable deadband prevents cycling. Adjustable time delay.
3. SW-LS-D; Daylight Level Sensor and Controller - 0-10V Dimming - One Zone:
 - a. Dimming control of one 0-10V zone. Range of 10 to 200 FC. Adjustable deadband prevents cycling. Adjustable time delay. Coordinated with dimming ballast prior to submittal.
4. SW-LS-D-3Z; Daylight Level Sensor and Controller - Dimming - Three Zones:
 - a. Dimming control of up to three zones of 0-10V. Range of 10 to 200 FC. Adjustable deadband prevents cycling. Adjustable time delay. Coordinate with dimming ballasts prior to submittal.
5. SW-LS-M; Daylight Level Sensor & Controller - Multilevel/Bi-level On/Off Control - Dual Zones:
 - a. Multilevel/bi-level on/off control of up to two 10-amp zones. Range of 10 to 200 FC. Adjustable deadband prevents cycling. Adjustable time delay. [120/277 volt].
6. Sensor shall detect changes in ambient light level and provide triggering of lighting groups in area based on sequence of operation.
7. Sensor shall be configurable via DIP switches at device or via handheld wireless remote programming unit. Settings shall include:
 - a. Ambient sensitivity range between 1 and 1,000 foot-candles.
 - b. Time delay of 5 to 300 seconds.
 - c. Trigger setpoints with deadband adjustment.
8. Sensor shall provide on/off setpoints in quantity as specified on drawings and as shown in the sequence of operation.
9. Sensor shall be ceiling- or wall-mounted for range and viewing angle meeting application requirements as outlined in the sequence of operation.
10. Output signal from sensor shall be linear with light level.

B. SW-LS-PC; Standalone Exterior Photo Sensors:

1. Sensor shall be within a weatherproof enclosure, with design operation in temperatures of -30°F to +130°F. Sensor shall have threaded stem for box mounting, with knuckle to permit aiming of receptor after installation. Sensor shall be mounted facing north.
2. Sensor shall contain an integral switching contactor rated for 277-volt operation, with loads of up to 1,800 VA. Contacts shall be configured for zero-crossing closure to provide 100,000 cycle minimum operation.
3. Sensor shall detect changes in daylight levels to provide triggering of exterior lighting equipment based on the sequence of operation.
4. Sensor shall be field configurable at the device or via handheld wireless remote controller. Configurable settings shall include:
 - a. Ambient sensitivity range of 5 to 1,500 foot-candles.
 - b. Adjustable setpoint.
 - c. Deadband adjustment by percentage of setpoint.
 - d. Time delay of up to five minutes.

5. Sensor shall be equipped with a lens cover that can be applied for system testing during daylight conditions.
6. Manufacturers:
 - a. Paragon
 - b. Tork
 - c. Intermatic

2.8 INDOOR OCCUPANCY AND VACANCY SENSORS

- A. General Description: Wall- or ceiling-mounting, solid-state units with a separate power supply/relay unit.
 1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied, with a time delay for turning lights off, adjustable over a minimum range of 1 to 30 minutes. Vacancy sensors require a manual switch operation to turn lights on and off, with a time delay for turning lights off when unoccupied.
 2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 3. Relay Unit: Dry contacts rated for 20 A ballast load at 120 and 277 VAC, for 13-amp tungsten at 120 VAC, and for 1 hp at 120 VAC. Power supply to sensor shall be 24 V dc, 150-mA, Class 2 power source as defined by Electrical Code.
 4. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard outlet box.
 - b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure. Mount relay above accessible ceiling near entry door to room or area.
 - c. Time Delay and Sensitivity Adjustments: Recessed and concealed.
 5. Indicator: LED to show when motion is being detected during testing and normal operation of the sensor.
 6. Bypass Switch: Override the on function in case of sensor failure.
 7. Power Supply and Child Packs: Provide as required for sensor quantity and switching scheme. Mount to standard 1/2" knockout on electrical box above accessible ceiling near entry door to room or area. Sensor power shall be from emergency circuit if emergency lighting is in the area.
 8. Detection Coverage (Room): Detect occupancy anywhere in an area based on hand motion.
 9. Detection Coverage (Corridor): Detect occupancy based on a half-step motion.
 10. Warranty: Five (5) year warranty.
- B. Dual-Technology Type: Detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on and off functions shall be selectable in the field by operating controls on unit.
 1. SW-VS-D or SW-OC-D; 360 Degree Coverage Pattern:
 - a. Frequency greater than 40 KHz. Dual sensing verifications (requires both technologies to activate), either technology maintains on status. Integrated ambient light level sensor (2 to 200 FC range), adjustable sensitivity and time delay. Sensor shall control all circuits in area, unless noted otherwise. Initial settings: ambient sensor 40 FC.
 2. SW-VS-D-W or SW-OC-D-W; Wall Mounted on Adjustable Swivel Mount:
 - a. Wall or ceiling sensor with adjustable settings to allow manual on/auto off or auto on/auto off. Integrated ambient light level sensor (2 to 100 FC range).
 3. SW-O; Wall Switch:

- a. Wall switch with manual on/auto off. 120/277 VAC load rating of 0-800 W for ballast, LED or tungsten. 5-, 15-, 30-minute adjustable OFF delay. Coverage of minor motion in 12' x 15' pattern.
- 4. SW-O2; Wall Switch:
 - a. Multi-relay wall switch with manual on/auto off for two separate loads. 120/277 VAC load relay rating of 0-800 W for ballast, LED or tungsten. 5-, 15-, 30-minute adjustable OFF delay. Coverage of minor motion in 12' x 15' pattern.
- 5. Sensitivity Adjustment: Separate for each sensing technology.
- 6. Detection Coverage:
 - a. Task Areas: Detect occupancy anywhere in an area based on hand motion.
 - b. Circulation Areas: Detect occupancy anywhere in an area based upon half-step walking motion.
- C. Mask sensors where necessary to prevent nuisance switching from adjacent areas.
- D. Ultrasonic Type: Ceiling mounting. Detect occupancy by sensing a change in pattern of reflected ultrasonic energy in area of coverage.
 - 1. SW-OC-U; 360 Degree 20' x 20' Hand Motion Coverage Pattern:
 - a. Frequency greater than 32 KHz solid state, adjustable sensitivity and time delay, [integral isolated 1-amp relay contact], temperature and humidity resistant receivers. Sensor shall control all circuits in area, unless noted otherwise.
 - b. Manufacturers:
 - 1) Watt Stopper WT-1100 series
 - 2) Hubbell OMNI-US or ATU series
 - 3) Leviton OSC series
 - 4) Greengate ODC-U series
 - 2. SW-OC-U2; 35' x 30' Hand Motion Coverage Pattern:
 - a. Frequency greater than 32 KHz solid state, adjustable sensitivity and time delay, [integral isolated relay contact], temperature and humidity resistant receivers. Sensor shall control all circuits in area, unless noted otherwise.
 - b. Manufacturers:
 - 1) Watt Stopper WT-2200 series
 - 2) Hubbell OMNI-US or ATU series
 - 3) Leviton OSC series
 - 4) Greengate ODC-U series
 - 3. SW-OC-U-A; 360 Degree Two-Sided Corridor Coverage Pattern:
 - a. Frequency greater than 32 KHz solid state, adjustable sensitivity and time delay, [integral isolated relay contact], temperature and humidity resistant receivers. Sensor shall control all circuits in area, unless noted otherwise.
 - b. Manufacturers:
 - 1) Watt Stopper WT-2250 Series
 - 2) Hubbell OMNI-US or ATU series
 - 3) Greengate ODC-U Series
 - 4. SW-OC-U-W; Wall Mounted:

- a. Wall switch with adjustable settings to allow manual on/auto off or auto on/auto off.
 - b. Manufacturers:
 - 1) Watt Stopper UW-100 Series
 - 2) Hubbell AU12771,
5. Crystal controlled with circuitry causing no detection interference between adjacent sensors.

2.9 AUTOMATIC LOAD CONTROL RELAY (ALCR)

- A. ALCR20; Automatic Load Control Relay ALCR, 120/277 volt, dry/damp listed, 32°F to 113°F (0°C to 45°C) operating temperature, plenum NEMA 1 rated, test button with visual indicator, remote test and fire alarm control, UL924 listed latest edition, Electrical Code Article 700 compliant.

- 1. Rating:
 - a. 20 amp (16 A permitted) LED driver and ballast.
 - b. 10 A (1,200 watt) incandescent.
- 2. Lighting Control Coordination: Provide ALCR device compatible with designated lighting zone controls. Example: switched, 0-10 volt dimming, DALI control, 2 wire dimming, or DMX.
- 3. Operation:
 - a. ALCR device shall allow the same local lighting control devices to control both the normal lights and emergency designated lighting. Devices that require separate local lighting controls for the normal and designated emergency lighting are NOT allowed.
 - b. ALCR device shall monitor the normal power circuit and shunt/bypass the local lighting controls upon loss of power, remote test switch, or fire alarm override to provide full lumen output for designated emergency lighting.
 - c. ALCR device shall return designated emergency lighting to local lighting control after a 15-minute delay upon return of normal power or remote test/fire alarm override release.
 - d. Equivalent Facilitation and Performance: A limitation of equivalent comparable products may require some of the required functions of the ALCR device to be provided by an alternative component of the lighting control system. The following functions may be performed by alternative components of the lighting control system when the device is listed for the required function and compatible with the lighting control system:
 - 1) Remote test switch / fire alarm override interface.
 - 2) The 15-minute time delay upon return of normal power or remote test/fire alarm override release.
 - e. Accessory - Remote Test Switch: Provide a remote button test switch. The test switch shall be a single gang type switch compatible with the ALCR device and allow the remote fire alarm override to function.
 - 1) Test Switch Mounting:
 - a) Finished Spaces (ceiling height 10 feet or less): Flush mount device in finished ceiling adjacent to one of the emergency lights.
 - b) Finished Spaces (ceiling height greater than 10 feet): Flush mounted in wall. Refer to Architect/Engineer for location.
 - c) Unfinished Spaces: Adjacent and aligned with local wall-mounted lighting controls.
 - d) Option: ALCR device(s) with a test button, visual indicator, and flush mounting plate may be installed in the location of the remote test

switch in lieu of providing a separate remote test switch.

4. Manufacturers:
 - a. LVS Controls EPC-2 (switched)
 - b. EPC-2-D Series (0-10V dimming)
 - c. EPC-DMX (DMX) EPC Series (alternative lighting control)
 - d. Iota ETS-20 (switched)
 - e. ETC-20-DR (0-10V dimming)
 - f. ETC Series (alternative lighting control)
 - g. Myers Emergency Power Systems RLY-SW-2 (switched)
 - h. RLY-DIM-2D (0-10V dimming)
 - i. RLY Series (alternative lighting control)
 - j. Nine24 Inc ELCR-R (switched)
 - k. ELCR-Z10 (0-10V dimming)
 - l. ELCR Series (alternative lighting control)
 - m. Lighting control manufacturer

2.10 DISTRIBUTED LIGHTING CONTROL

- A. Manufacturers: as listed below meet the qualifications as outlined in this specification. Contractor is responsible for verifying that selected manufacturer is capable of furnishing the complete system as specified herein.
 1. Acuity Controls nLight Series
 2. Legrand Watt Stopper DLM Series
 3. Eaton Greengate RC3 Series (room-based system)
 4. Lutron
- B. System Description: The lighting control system shall be a network of remote modules System includes all associated wiring, relay modules, photocells, switches, dimmers, time clock, occupancy sensors. System shall utilize distributed relays modules, allowing these relay modules to be located above accessible ceilings in or adjacent to rooms they are controlling.
- C. Control Devices: All occupancy sensors (ultrasonic, IR and dual technology type), photocells, switches, and timers shall be provided with system and designed to operate on system network. Supplemental power packs shall be provided as required for multiple control devices. This equipment shall be identified in shop drawing submission.
- D. Relay Modules: Mounted in NEMA enclosure with physically separate 120/277-volt wiring compartment from low voltage control wiring. Provide low voltage digital communication to control devices as shown on drawings and schedules. Supplemental power packs shall be provided as required for multiple control devices. This equipment shall be identified in shop drawing submission. Dimmable relay modules shall be provided where indicated. Relay modules shall contain up to four (4) relays. Relay modules shall be labeled with room number that relays control lighting within.
- E. Single-Pole Relays: Mechanically held unless otherwise indicated; split-coil, momentary-pulsed type, rated 20 A, 125-volt AC for tungsten filaments and 20 A, 277-volt AC for electronic ballasts, 50,000 cycles at rated capacity.
- F. System shall include server / central station with operating software, data network, and BACnet IP communication with other systems as described. System communication protocol shall be compatible with the building automation system.
- G. System server / central station shall provide programmable operation of lights connected via system relays and controlled with system devices. System software shall provide control of relays and control devices, time and sequence scheduling, timed out and blink light operation,

and monitoring and reporting of system events and components. Initial programming shall be as shown on plans and schedules.

- H. Server / Central Control Station: Lighting control system manufacturer shall be responsible to assure coordination between relay modules, network hubs, and control system server/ central station such that system performs as described. Server shall be provided with monitor, keyboard, and mouse, and plugged into a receptacle connected to an equipment emergency circuit as a minimum.
- I. Network Hub: Network Hub shall contain processor and astronomic time clock for control and monitoring of lighting. Network hub shall be fed from an equipment emergency circuit at a minimum.

2.11 CONDUCTORS AND CABLES

- A. Control Wiring:
 - 1. Where installed with the line-voltage wiring, control wiring shall be copper conductors not smaller than No. 16 AWG with insulation voltage rating and temperature rating equal to that of the line-voltage wiring, complying with Division 26 Section 26 05 13 "Wire and Cable."
 - 2. Tap conductors to switches or relays: Stranded copper conductors of 16 AWG or solid 16 or 18 AWG with insulation rating equal to that of the line-voltage wiring.
 - 3. Tap conductors to dimming ballasts: Solid copper conductors of 18 AWG with insulation voltage rating equal to that of the line-voltage wiring and insulation temperature rating not less than 90°C.
 - 4. Network cabling as required by manufacturer.
- B. Splices and Taps:
 - 1. Tapping or wire trap connectors shall be used to splice all Class 1 and Class 2 control wiring. Twist-on, wire-nut type connectors are not allowed.

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION MEETING

- A. Schedule a pre-construction meeting with the controls representative, installing contractor, Architect/Engineer, and Owner to explain the proposed lighting control and distributed systems.

3.2 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Verify field dimensions and coordinate physical size of all equipment with the architectural requirements of the spaces into which they are to be installed. Allow space for adequate ventilation and circulation of air.
- C. Verify that required utilities are available, in proper location, and ready for use.
- D. Beginning of installation means installer accepts existing conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved shop drawings.
- B. **Class II low voltage control wiring may be open wiring and shall maintain 150 mm (6 inch)**

spacing from electronic ballast and other RFI/EMI sources.

- C. All branch load circuits shall be live tested before connecting the loads to lighting control panel.

3.4 SUPPORT SERVICES

A. System Startup:

- 1. Manufacturer shall provide factory authorized technician to confirm proper installation and operation of all system components.

B. Testing:

- 1. System shall be completely functional tested by a factory-authorized technician. All loads shall be tested live for continuity and freedom from defects, and all control wiring shall be tested for continuity and connections prior to energizing the system components.
- 2. Programming of initial zones, schedules, lighting levels, control station groups, and sensor settings shall be performed by a factory-authorized technician. Lighting Control Sequence of Operation shall serve as a basis for programming, However, all final decisions regarding groups and schedules shall be at the direction of the Owner. The following procedures shall be performed at a minimum:
 - a. Confirm occupancy sensor placement, sensitivity, and time delay settings to meet specified performance criteria.
 - b. Confirm daylight sensor placement, sensitivity, deadband, and delay settings to meet specified performance criteria.
 - c. Confirm that schedules and time controls are configured to meet specified performance criteria and Owner's operating requirements.
- 3. Verify occupancy/vacancy and daylight sensor operation is correct after furniture and equipment is installed in each area. Make adjustments to sensor settings and time delays to allow proper operation.
- 4. Verify occupancy/vacancy sensors are located to provide complete coverage for the area served with no nuisance switching.
 - a. Relocate sensors or provide additional sensors as necessary to provide adequate coverage.
 - b. Mask occupancy sensors where necessary to prevent nuisance switching from adjacent areas.

C. Training:

- 1. Manufacturer shall provide competent factory-authorized technician to train Owner personnel in the operation, maintenance and programming of the lighting control system. Submit training plan with notification seven (7) days prior to proposed training dates.
- 2. Training duration shall be no less than two(2) days, with one (1) day being scheduled at least two (2) weeks after initial training.

D. Documentation:

- 1. Manufacturer shall provide system documentation including:
 - a. System one-line showing all panels, number and type of control stations and sensors, communication line, and network or BMS/BAS interface unit.
 - b. Drawings for each panel showing hardware configuration and numbering.
 - c. Panel wiring schedules.
 - d. Typical diagrams for each component.

3.5 SYSTEM COMMISSIONING

- A. Contractors' tests shall be scheduled and documented in accordance with the commissioning requirements. Refer to Section 01 09 00, General Commissioning, for further details.
- B. System verification testing is part of the commissioning process. Verification testing shall be performed by the Contractor and witnessed and documented by the Commissioning Agent. Refer to Section 01 09 00, General Commissioning, for system verification tests and commissioning requirements.
- C. Training of the Owner's operation and maintenance personnel is required in cooperation with the Owner's Representative. The instruction shall be scheduled in coordination with the Owner's Representative after submission and approval of formal training plans. Refer to Section 01 09 00, General Commissioning, for Contractor training requirements.

PART 4 - NLIGHT CONTROLS SYSTEM

4.1 SUMMARY

- A. Section includes a networked lighting control system comprised of the following components.
- B. System software interfaces.
 - 1. Management Interface
- C. System Backbone and Integration Equipment
 - 1. System Controller
- D. Wired Network Devices
 - 1. Wall Stations
 - 2. {nLAiod}Auxillary Input/Output Devices
 - 3. Occupancy and Photocell Sensors
 - 4. Wall Switch Sensors
 - 5. Power Packs and Secondary Packs
 - 6. {nLCb} Communication Bridge
- E. Wireless Networked Devices
 - 1. Wireless Networked Outdoor Occupancy and Photosensors
 - 2. Wireless Networked Indoor Embedded Sensors
 - 3. Wireless Networked Luminaires
- F. The networked lighting control system shall meet all the characteristics and performance requirements specified herein.
- G. The contractor shall provide, install and verify proper operation of all equipment necessary for proper operation of the system as specified herein and as shown on applicable drawings.

4.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. System shall have an architecture that is based upon three main concepts: (1) networkable intelligent lighting control devices, (2) standalone lighting control zones using distributed intelligence, (3) optional system backbone for remote, time based and global operation.
- B. Intelligent lighting control devices shall have individually addressable network communication capability and consist of one or more basic lighting control components: occupancy sensor, photocell sensor, relay, dimming output, contact closure input, analog 0-10V input, and manual wall station capable of indicating switching, dimming, and/or scene control. Combining one or

more of these components into a single device enclosure shall be permissible so as to minimize overall device count of system.

- C. System System shall have an architecture that is based upon three main concepts: (1) networkable intelligent lighting control devices, (2) standalone lighting control zones using distributed intelligence, (3) optional system backbone for remote, time based and global operation.
- D. Networked luminaires and intelligent lighting control devices shall support individual (unique) configuration of device settings and properties, with such configuration residing within the networked luminaires and intelligent control devices.
- E. Lighting control zones consisting of one or more networked luminaires and intelligent lighting control devices and shall be capable of providing automatic control from sensors (occupancy and/or photocell) and manual control from local wall stations without requiring connection to a higher-level system backbone; this capability is referred to as "distributed intelligence."
- F. Lighting control zones (wired and wireless) of at least 128 devices per zone shall be supported.
- G. Networked luminaires and intelligent lighting control devices shall have distributed intelligence programming stored in non-volatile memory, such that following any loss of power the lighting control zones shall operate according to their defined default settings and sequence of operations.
- H. Lighting control zones shall be capable of being networked with a higher-level system backbone to provide time-based control, remote control from inputs and/or systems external to the control zone, and remote configuration and monitoring through a software interface.
- I. The system may include one or more system controllers that provide time-based control. The system controller also provides a means of connecting the lighting control system to a system software interface and building management systems via BACnet/IP or BACnet MS/TP protocol.
- J. All system devices shall support firmware update, either remotely or from within the applications space, for purposes of upgrading functionality at a later date.

END OF SECTION

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Device plates and box covers
- B. Receptacles
- C. Countertop and furniture receptacle assemblies
- D. Floor boxes and floor box with service fitting
- E. Poke-through fittings

1.2 QUALITY ASSURANCE

- A. Provide similar devices from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in the Electrical Code, by a testing agency to Authorities Having Jurisdiction and marked for intended use.
- C. Comply with the Electrical Code.

1.3 REFERENCES

- A. DSCC W-C-896F - General Specification for Electrical Power Connector
- B. FS W-C-596 - Electrical Power Connector, Plug, Receptacle, and Cable Outlet
- C. NEMA WD 1 - General Color Requirements for Wiring Devices
- D. NEMA WD 6 - Wiring Devices - Dimensional Requirements
- E. NFPA 70 - National Electrical Code (NEC)
- F. UL 498 - Standard for Attachment Plugs and Receptacles
- G. UL 943 - Standard for Ground Fault Circuit Interrupters

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 26 05 00.
- B. Provide product data showing configurations, finishes, dimensions, and manufacturer instructions.
- C. Provide a non-returnable sample of each countertop and furniture-mounted receptacle assembly as part of the submittal process.

1.5 COORDINATION

- A. Receptacles for Owner Furnished Equipment: Match plug configurations.
- B. Cord and Plug Sets: Match equipment requirements.
- C. Coordinate installation of receptacle assemblies in countertops and furniture with the

Contractor providing the countertop or furniture. Contractor shall coordinate penetrations and conduit routing in countertops and furniture with drawings and other obstacles below the installation surface.

PART 2 - PRODUCTS

2.1 DEVICE COLOR

- A. All switch, receptacle, and outlet colors shall be verified with Architect, unless indicated otherwise.

2.2 COVERPLATES

- A. All switches, receptacles, and outlets shall be complete with the following:
 - 1. Unbreakable thermoplastic/thermoset plastic and match device color coverplates in finished spaces where walls are finished.
 - 2. Galvanized steel coverplates in unfinished spaces for surface mounted boxes.
- B. Where several devices are ganged together, the coverplate shall be of the ganged style for the number of devices used.
- C. Install nameplate identification as indicated in Section 26 05 53.
- D. Plate securing screws shall be metal with head color matching the wall plate finish.

2.3 RECEPTACLES

- A. REC-DUP: NEMA 5-20R Duplex Receptacle:
 - 1. Spec Grade: 125-volt, 20 amp, 3-wire grounding type with impact resistant thermoplastic face and brass back strap.
 - a. Manufacturers:
 - 1) Hubbell 5352
 - 2) Leviton 5362-S
 - 3) Pass & Seymour 5362
 - 4) Cooper 5362
- B. REC-DUP-GFI: NEMA 5-20R Ground Fault Duplex Receptacle:
 - 1. Standard Grade: 125-volt, 20 amp, 3-wire grounding type with test and reset buttons in impact resistant thermoplastic face, listed.
 - a. Device shall perform self-test of GFCI circuitry in accordance with UL 943.
 - b. Manufacturers:
 - 1) Hubbell GF20L
 - 2) Leviton GFNT2
 - 3) Pass & Seymour 2097
 - 4) Cooper SGF20
- C. REC-DUP-WP: NEMA 5-20R Weatherproof Ground Fault Duplex Receptacle:
 - 1. 125-volt, 20 amp, 3-wire grounding type with test and reset buttons in impact resistant thermoplastic face, weather resistant WR listed. Provide extra-duty NEMA 3R rated

- while-in-use cast aluminum cover.
2. Device shall perform self-test of GFCI circuitry in accordance with UL 943.
 - a. Manufacturers:
 - 1) Hubbell:
 - a) GFTWRST20 with aluminum housing WP826
 - b) GFCI type devices are not allowed. Contractor may substitute an alternative manufacturer when Hubbell is the basis of submittal for all other wiring devices.
 - 2) Leviton GFWT2 with aluminum housing M5979
 - 3) Pass & Seymour 2097TRWR with aluminum housing WIUCAST1
 - 4) Cooper WRS GF20 with aluminum housing WIUMV-1

D. REC-USB: NEMA 5-20R Receptacle with USB Charger:

1. Hospital Grade: 125-volt, 20-amp, hospital grade tamper resistant, 3-wire grounding type with impact resistant thermoplastic face. USB charging rated at 5VDC 3.0A minimum. Mounted in double gang backbox. Device shall be compatible with all major cell phone and devices manufacturers.
 - a. Manufacturers:
 - 1) Hubbell USB8300
 - 2) Pass & Seymour TR8300USB
 - 3) Leviton T5832-HG

E. Back wired devices shall be complete with eight holes that are screw activated with metal clamps for connection to #12 or #10 copper conductors.

F. Ground fault circuit interrupter (GFCI) receptacles shall be listed and comply with UL 943 requiring increased surge immunity, improved corrosion resistance, improved resistance to false tripping and diagnostic indication for miswiring if the line and load conductors are reversed during installation.

2.4 FLOOR BOXES

- A. Cover Color and Style: Verify with Architect from manufacturer standard options.
- B. Refer to Technology drawings for voice/data, Audio/Video outlet, and coordination requirements.
- C. Refer to electrical drawing schedule.

2.5 POKE-THROUGH FITTINGS

- A. Cover Color and Style: Verify with Architect from manufacturer standard options.
- B. Refer to Technology drawings for voice/data, Audio/Video outlet, and coordination requirements.
- C. Refer to electrical schedule for types.
- D. UL listed as fire-rated poke-through device for 1, 2, 42-hour rated floors: include fire stops and smoke barriers in through-floor component. UL514A listed for scrub locations and approved for use in the City of Chicago.

- E. Terminate in 4-inch square by 2-1/2-inch-deep junction box.
- F. Suitable for installation with a floor thickness of 2-1/4 to 7 inches.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install convenience receptacles at elevations indicated in the General Installation Notes on the contract drawings.
- B. Install specific-use receptacles at heights shown on the contract drawings. Install devices level, plumb, and square with building lines. Coordinate installation of adjacent devices of separate systems with common mounting heights, including lighting, power, systems, technology, and temperature control device rough-ins.
- C. Ground Fault Protection: Provide ground fault protection for all branch circuit breakers serving 120/208 receptacles and electrical outlets rated 50 amps or less single-phase and 100 amps or less three-phase in the following locations, as shown on drawings, or required by adopted code:
 - 1. Bathrooms, locker rooms, shower rooms
 - 2. Kitchens' all 120-volt through 250-volt receptacles
 - 3. Buffet, serving, food preparation areas; all 120-volt through 250-volt receptacles
 - 4. Rooftops
 - 5. Interior/Exterior locations subject to damp/wet conditions
 - 6. When located within 6 feet of sinks, bathtubs, and shower stalls
 - 7. Plug-&-cord receptacles when utilization appliance is located within 6 feet of a sink edge.
 - 8. Exterior dwelling outlets (disconnects, equipment connections, etc.) when required by code.
 - 9. Specific Appliances: Auto vacuum machines, water drink/bottle fill coolers, pressure staying machines, tire inflation machines, vending machines, sump pumps, dishwashers, electric ranges, ovens, clothes dryers, microwave ovens
 - 10. Future Provisions: Provide a conduit raceway and backbox for future addition of countertop pop-receptacle when receptacles are not installed in kitchen islands and peninsulas.
- D. Tamper Resistant Protection: Provide tamper resistant protection for all 15 / 20-amp 120/208 straight blade wiring devices in the following locations, as shown on the drawings, or required by adopted code.
 - 1. Dwelling units and accessory dwelling unit structures
 - 2. Boathouses
 - 3. Dormitory units
 - 4. Guest rooms, guest suites, and common public areas
 - 5. Childcare, preschool, elementary, middle, high school, educational facilities
 - 6. Medical Business Office: Offices, corridors, waiting rooms, common areas
 - 7. Public Buildings: Corridors, waiting rooms, common areas
 - 8. Public Spaces involving: Transportation waiting, gymnasiums, fitness centers, auditoriums, public use venue common areas
 - 9. Nursing homes, assisted living, psychiatric spaces, substance abuse, foster care facilities
 - 10. Agricultural buildings common areas accessible to the public
- E. Drill opening for poke-through fitting installation in accordance with manufacturer's instructions. This Contractor is responsible for taking any measures required to ensure no conduits or other services are damaged. This may include X-ray or similar non-destructive means.
- F. Install receptacles vertically with ground slot up or where indicated on the drawings, horizontally with ground slot to the left.

- G. Install decorative plates on switch, receptacle, and blank outlets in finished areas, using jumbo size plates for outlets installed in masonry walls.
- H. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.
- I. Install devices and wall plates flush and level.
- J. Install nameplate identification to receptacle cover plates indicated. Identification shall identify panel name and circuit number. Refer to Specification Section 26 05 53 Electrical Identification.
- K. Test receptacles and modular wiring connectors for proper polarity, ground continuity and compliance with requirements.
- L. Floor Box Installation:
 - 1. Set boxes level and flush with finish flooring material.
 - 2. Use cast iron floor boxes for installations in slab on grade. Trim shall match floor covering to be used.
 - 3. Provide a minimum horizontal offset of 24 inches between boxes.
 - 4. Provide saw-cutting and patching of existing concrete floors as necessary for floor box installations within existing floors.

END OF SECTION

SECTION 28 05 00 - BASIC ELECTRONIC SAFETY AND SECURITY SYSTEM REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Basic Safety and Security System Requirements (herein referred to Security) specifically applicable to Division 28 sections, in addition to Division 1 - General Requirements.
- B. All materials and installation methods shall conform to the applicable standards, guidelines and codes referenced herein and within each specification section.

1.2 SCOPE OF WORK

- A. This Specification and the accompanying drawings govern the work involved in furnishing, installing, testing and placing into satisfactory operation the security systems as shown on the drawings and specified herein.
- B. Each Contractor shall provide all new materials as indicated in the schedules on the drawings, and/or in these specifications, and all items required to make the portion of the security systems a finished and working system.
- C. Description of systems include but are not limited to the following:
 - 1. Electronic access control system
 - 2. Electronic intrusion detection system
 - 3. Video surveillance
 - 4. Fire detection and alarm.
 - 5. Low voltage security wiring (less than +120VAC) as specified and required for proper system control and communications.
 - 6. All associated electrical backboxes, conduit, miscellaneous cabling, and power supplies required for proper system installation and operation as defined in the "Suggested Matrix of Scope Responsibility".
 - 7. Firestopping of penetrations of fire-rated construction as described in Section 28 05 03.

1.3 DIVISION OF WORK BETWEEN ELECTRICAL AND SECURITY CONTRACTORS

- A. Division of work is the responsibility of the Prime Contractor. Any scope of work described in the contract document shall be sufficient for including said requirement in the project. The Prime Contractor shall be solely responsible for determining the appropriate subcontractor for the described scope. In no case shall the project be assessed an additional cost for scope that is described in the contract documents. The following division of responsibility is a guideline based on typical industry practice.
- B. Definitions:
 - 1. "Electrical Contractor" as referred to herein refers to the Contractors listed in Division 26 of this Specification.
 - 2. "Electrical Contractor" shall also refer to the Contractor listed in Division 28 of this specification when the "Suggested Matrix of Scope Responsibility" indicates the work shall be provided by the EC. Refer to the Contract Documents for the "Suggested Matrix of Scope Responsibility".
 - 3. "Security Contractor" as referred to herein refers to the Contractors listed in Division 28 of this Specification.
 - 4. Low Voltage Security Wiring: The wiring (less than 120VAC) associated with the Security Systems, used for analog and/or digital signals between equipment.
- C. General:

1. The purpose of these Specifications is to outline typical Electrical and Security Contractor's work responsibilities as related to security systems including back boxes, conduit, cable tray, power wiring and low voltage security wiring. The prime contractor is responsible for all divisions of work.
2. The exact wiring requirements for much of the equipment cannot be determined until the systems have been purchased and submittals are approved. Therefore, only known wiring, conduits, raceways, and electrical power as related to such items, is shown on the Security Drawings. Other wiring, conduits, raceways, junction boxes, and electrical power not shown on the Security Drawings but required for the successful operation of the systems shall be the responsibility of the Security Contractor and included in the Contractor's bid.
3. Where Electrical Contractor is required to install conduit, conduit sleeves and/or power connections in support of Security systems, the final installation shall not begin until a coordination meeting between the Electrical Contractor and the Security Contractor has convened to determine the exact location and requirements of the installation.
4. Where the Electrical Contractor is required to install cable tray that will contain Low Voltage Security Wiring, the installation shall not begin until the Security Contractor has completed a coordination review of the cable tray shop drawing.
5. Contractor shall establish Electrical and Security utility elevations prior to fabrication and installation. Security Contractor shall cooperate with Electrical Contractor and determined elevations in accordance with the guidelines below. Contractor shall coordinate utility elevations with other trades. When a conflict arises, priority shall be as follows:
 - a. Lighting Fixtures
 - b. Gravity Flow Piping, including Steam and Condensate
 - c. Sheet Metal
 - d. Electrical Busduct
 - e. Cable Trays, including 12" access space
 - f. Sprinkler Piping and other Piping
 - g. Conduit and Wireway
 - h. Open Cabling

D. Electrical Contractor Responsibility:

1. Assumes all responsibility for all required conduit and power connections when shown on the "Suggested Matrix of Scope Responsibility" to be provided by the Electrical Contractor.
2. Assumes all responsibility for providing and installing cable tray.
3. Responsible for Security Systems grounding and bonding.
4. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other Contractors to determine a viable layout.

E. Security Contractor Responsibility:

1. Assumes all responsibility for the low voltage security wiring of all systems, including cable support where open cable is specified.
2. Assumes all responsibility for all required backboxes, conduit and power connections not specifically shown as being provided by the Electrical Contractor on the "Suggested Matrix of Scope Responsibility."
3. This Contractor is responsible for coordination of utilities with all other Contractors. If any field coordination conflicts are found, the Contractor shall coordinate with other contractors to determine a viable layout.

1.4 COORDINATION DRAWINGS

A. Definitions:

1. Coordination Drawings: A compilation of the pertinent layout and system drawings that show the sizes and locations, including elevations, of system components and required access areas to ensure that no two objects will occupy the same space.
 - a. Mechanical trades shall include, but are not limited to, mechanical equipment, ductwork, fire protection systems, plumbing piping, medical gas systems, hydronic piping, steam and steam condensate piping, and any item that may impact coordination with other disciplines.
 - b. Electrical trades shall include, but are not limited to, electrical equipment, conduit 1.5" and larger, conduit racks, cable trays, pull boxes, transformers, raceway, busway, lighting, ceiling-mounted devices, and any item that may impact coordination with other disciplines.
 - c. Technology trades shall include, but are not limited to, technology equipment, racks, conduit 1.5" and larger, conduit racks, cable trays, ladder rack, pull boxes, raceway, ceiling-mounted devices, and any item that may impact coordination with other disciplines.
 - d. Maintenance clearances and code-required dedicated space shall be included.
 - e. The coordination drawings shall include all underground, underfloor, in-floor, in chase, and vertical trade items.
2. Spaces with open/cloud ceiling architecture shall indicate the overhead utilities and locate equipment as required to maintain clearance above lights. The intent for the installation is to maintain a maximum allowable vertical clearance and an organized/clean manner in the horizontal. Notify Architect/Engineer of the maximum clearance which can be maintained. Failure to comply will result in modifications with no cost to Owner.
 - a. In cloud ceiling architecture, when open cabling/wire and/or cable tray crosses gaps between ceiling clouds and/or walls, cabling is to transition to conduits to span the gaps in order to conceal cabling from below.
3. The contractors shall use the coordination process to identify the proper sequence of installation of all utilities above ceilings and in other congested areas, to ensure an orderly and coordinated end result, and to provide adequate access for service and maintenance.

B. Participation:

1. The contractors and subcontractors responsible for work defined above shall participate in the coordination drawing process.
2. One contractor shall be designated as the Coordinating Contractor for purposes of preparing a complete set of composite electronic CAD coordination drawings that include all applicable trades, and for coordinating the activities related to this process. The Coordinating Contractor for this project shall be the Mechanical Contractor.
 - a. The Coordinating Contractor shall utilize personnel familiar with requirements of this project and skilled as draftspersons/CAD operators, competent to prepare the required coordination drawings.
3. Electronic CAD drawings shall be submitted to the Coordinating Contractor for addition of work by other trades. IMEG will provide electronic file copies of applicable drawings for contractor's use if the contractor signs and returns an "Electronic File Transfer" waiver provided by IMEG. IMEG will not consider blatant reproductions of original file copies an acceptable alternative for coordination drawings.

C. Drawing Requirements:

1. The file format and file naming convention shall be coordinated with and agreed to by all contractors participating in the coordination process and the Owner.

a. Scale of drawings:

- 1) General plans: 1/4 Inch = 1'-0" (minimum).
- 2) Mechanical, electrical, communication rooms, and including the surrounding areas within 10 feet: 1/2 Inch = 1'-0" (minimum).
- 3) Shafts and risers: 1/2 Inch = 1'-0" (minimum).
- 4) Sections of shafts and mechanical and electrical equipment rooms: 1/4 Inch = 1'-0" (minimum).
- 5) Sections of congested areas: 1/2 Inch = 1'-0" (minimum).

2. Ductwork layout drawings shall be the baseline system for other components. Ductwork layout drawings shall be modified to accommodate other components as the coordination process progresses.
3. There may be more drawings required for risers, top and bottom levels of mechanical rooms, and shafts.
4. The minimum quantity of drawings will be established at the first coordination meeting and sent to the Architect/Engineer for review. Additional drawings may be required if other areas of congestion are discovered during the coordination process.

D. General:

1. Coordination drawing files shall be made available to the Architect/Engineer and Owner's Representative. The Architect/Engineer will only review identified conflicts and give an opinion, but will not perform as a coordinator.
2. A plotted set of coordination drawings shall be available at the project site.
3. Coordination drawings are not shop drawings and shall not be submitted as such.
4. The contract drawings are schematic in nature and do not show every fitting and appurtenance for each utility. Each contractor is expected to have included in the bid sufficient fittings, material, and labor to allow for adjustments in routing of utilities made necessary by the coordination process and to provide a complete and functional system.
5. The contractors will not be allowed additional costs or time extensions due to participation in the coordination process.
6. The contractors will not be allowed additional costs or time extensions for additional fittings, reroutings or changes of duct size, that are essentially equivalent sizes to those shown on the drawings and determined necessary through the coordination process.
7. The Architect/Engineer reserves the right to determine space priority of equipment in the event of spatial conflicts or interference between equipment, piping, conduit, ducts, and equipment provided by the trades.
8. Changes to the contract documents that are necessary for systems installation and coordination shall be brought to the attention of the Architect/Engineer.
9. Access panels shall preferably occur only in gypsum board walls or plaster ceilings where indicated on the drawings.
 - a. Access to mechanical, electrical, technology, and other items located above the ceiling shall be through accessible lay-in ceiling tile areas.
 - b. Potential layout changes shall be made to avoid additional access panels.
 - c. Additional access panels shall not be allowed without written approval from the Architect/Engineer at the coordination drawing stage.
 - d. Providing additional access panels shall be considered after other alternatives are reviewed and discarded by the Architect/Engineer and the Owner's Representative.
 - e. When additional access panels are required, they shall be provided without additional cost to the Owner.
10. Complete the coordination drawing process and obtain signoff of the drawings by all contractors prior to installing any of the components.
11. Conflicts that result after the coordination drawings are signed off shall be the responsibility of the contractor or subcontractor who did not properly identify their work requirements, or installed their work without proper coordination.

12. Updated coordination drawings that reflect as-built conditions may be used as record documents.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Only products of reputable manufacturers as determined by the Architect/Engineer will be acceptable.
2. Each Contractor and their subcontractors shall employ only workers who are skilled in their respective trades and fully trained. All workers involved in the installation, termination, testing, and placing into operation electronic security devices shall be individually trained by the manufacturer.
3. The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size.
4. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of electronic security devices and have personnel adequately trained in the use of such tools and equipment.
5. A resume of qualification shall be submitted with Contractor bid indicating the following:
 - a. A list of recently completed projects of similar type and size with contact names and telephone numbers for each.
6. Conform to all requirements of the City of South Dakota Codes, Laws, Ordinances and other regulations having jurisdiction.
7. Conform to all published standards of Northern State University.
8. In the event there are no local codes having jurisdiction over this job, the current issue of the National Electrical Code shall be followed.
9. If there is a discrepancy between the codes and regulations having jurisdiction over this installation, and these specifications, Architect/Engineer shall determine the method or equipment used.
10. If the Contractor notes, at the time of bidding, that any parts of the drawings or specifications do not comply with the codes or regulations, Contractor shall inform the Architect/Engineer in writing, requesting a clarification. If there is insufficient time to follow this procedure, Contractor shall submit with the proposal a separate price to make the system comply with the codes and regulations.
11. Verify the installation environment prior to purchasing or installing any cable. Cable installed in a plenum environment shall be appropriately rated. Bring all discrepancies between the contract documents and installation conditions to the attention of the Architect/Engineer prior to purchase or installation.
12. All changes to the system made after the letting of the contract, in order to comply with the applicable codes or the requirements of the Inspector, shall be made by the Contractor without cost to the Owner.

B. Permits, Fees, Taxes, Inspections:

1. Procure all applicable permits and licenses.
2. Abide by all applicable laws, regulations, ordinances, and other rules of the State or Political Subdivision wherein the work is done, or as required by any duly constituted public authority.
3. Pay all applicable charges for such permits or licenses that may be required.
4. Pay all applicable fees and taxes imposed by State, Municipal and/or other regulatory bodies.
5. Pay all charges arising out of required inspections due to codes, permits, licenses or as otherwise may be required by an authorized body.
6. Pay all charges arising out of required contract document reviews associated with the project and as initiated by the Owner or authorized independent agency/consultant.
7. All equipment, and materials shall be as approved or listed by the following: (Unless approval or listing is not applicable to an item by all acceptable manufacturers.)

- a. Factory Mutual
- b. Underwriters' Laboratories, Inc.

C. Examination of Drawings:

1. The drawings for the Security Systems work are diagrammatic, intended to convey the scope of the work and to indicate the general arrangements and locations of equipment etc., and the approximate sizes of equipment.
2. Contractor shall determine the exact locations of equipment and the exact routing of cabling to best fit the layout of the job. Scaling of the drawings will not be sufficient or accurate for determining this layout. Where a specific route is required, such route will be indicated on the drawings.
3. Where job conditions require reasonable changes in indicated arrangements and locations, such changes shall be made by Contractor at no additional cost to the Owner.
4. If an item is either shown on drawings, called for in specifications or required for proper operation of the system, it shall be considered sufficient for including same in this contract.
5. Determination of quantities of material and equipment required shall be made by Contractor from the drawings. Schedules on the drawings and in the specifications are completed as an aid to the Contractor but where discrepancies arise, the greater number shall govern.
6. Where words "provide", "install", or "furnish" are used on the drawings or in the specifications, it shall be taken to mean, to furnish, install and terminate completely ready for operation, the items mentioned.

D. Electronic Media/Files:

1. Construction drawings for this project have been prepared utilizing Revit.
2. Contractors and Subcontractors may request electronic media files of the contract drawings and/or copies of specifications. Specifications will be provided in PDF format.
3. Upon request for electronic media, the Contractor shall complete and return a signed "Electronic File Transmittal" form provided by IMEG. If the information requested includes floor plans prepared by others, the Contractor will be responsible for obtaining approval from the appropriate Design Professional for use of that part of the document.
4. Electronic contract documents can be used for preparation of shop drawings and as-built drawings only. The information may not be used in whole or in part for any other project.
5. The drawings prepared by IMEG for bidding purposes may not be used directly for ductwork layout drawings or coordination drawings.
6. Use of these CAD documents by Contractor does not relieve them from their responsibility for coordination of work with other trades and verification of space available for the installation.
7. The information is provided to expedite the project and assist the Contractor with no guarantee by IMEG as to the accuracy or correctness of the information provided. IMEG accepts no responsibility or liability for the Contractor's use of these documents.

E. Field Measurements:

1. Before ordering any materials, this Contractor shall verify all pertinent dimensions at the job site and be responsible for their accuracy.

1.6 SUBMITTALS

A. Submittals shall be required for the following items, and for additional items where required elsewhere in the specifications or on the drawings.

1. Submittals list:

Referenced Section	Submittal Item	Coordination Drawings
28 05 03	Through-Penetration Firestopping	
28 13 00	Electronic Access Control	
28 23 00	Video Surveillance	Yes

- B. General Submittal Procedures: In addition to provisions of Division 1, the following are required:
1. Transmittal: Each transmittal shall include the following:
 - a. Date
 - b. Project title and number
 - c. Contractor's name and address
 - d. Division of work (e.g., plumbing, heating, ventilating, etc.)
 - e. Description of items submitted and relevant specification number
 - f. Notations of deviations from the contract documents
 - g. Other pertinent data
 2. Submittal Cover Sheet: Each submittal shall include a cover sheet containing:
 - a. Date
 - b. Project title and number
 - c. Architect/Engineer
 - d. Contractor and subcontractors' names and addresses
 - e. Supplier and manufacturer's names and addresses
 - f. Division of work (e.g., plumbing, heating, ventilating, etc.)
 - g. Description of item submitted (using project nomenclature) and relevant specification number
 - h. Notations of deviations from the contract documents
 - i. Other pertinent data
 - j. Provide space for Contractor's review stamps
 3. Composition:
 - a. Submittals shall be submitted using specification sections and the project nomenclature for each item.
 - b. Individual submittal packages shall be prepared for items in each specification section. All items within a single specification section shall be packaged together where possible. An individual submittal may contain items from multiple specifications sections if the items are intimately linked (e.g., pumps and motors).
 - c. All sets shall contain an index of the items enclosed with a general topic description on the cover.
 4. Content: Submittals shall include all fabrication, erection, layout, and setting drawings; manufacturers' standard drawings; schedules; descriptive literature, catalogs and brochures; performance and test data; wiring and control diagrams; dimensions; shipping and operating weights; shipping splits; service clearances; and all other drawings and descriptive data of materials of construction as may be required to show that the materials, equipment or systems and the location thereof conform to the requirements of the contract documents.
 5. Contractor's Approval Stamp:
 - a. The Contractor shall thoroughly review and approve all shop drawings before submitting them to the Architect/Engineer. The Contractor shall stamp, date and sign each submittal certifying it has been reviewed.
 - b. Unstamped submittals will be rejected.
 - c. The Contractor's review shall include, but not be limited to, verification of the following:
 - 1) Only approved manufacturers are used.
 - 2) Addenda items have been incorporated.
 - 3) Catalog numbers and options match those specified.
 - 4) Performance data matches that specified.
 - 5) Electrical characteristics and loads match those specified.

- 6) Equipment connection locations, sizes, capacities, etc. have been coordinated with other affected trades.
 - 7) Dimensions and service clearances are suitable for the intended location.
 - 8) Equipment dimensions are coordinated with support steel, housekeeping pads, openings, etc.
 - 9) Constructability issues are resolved (e.g., weights and dimensions are suitable for getting the item into the building and into place, sinks fit into countertops, etc.).
- d. The Contractor shall review, stamp and approve all subcontractors' submittals as described above.
 - e. The Contractor's approval stamp is required on all submittals. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.
6. Submittal Identification and Markings:
- a. The Contractor shall clearly mark each item with the same nomenclature applied on the drawings or in the specifications.
 - b. The Contractor shall clearly indicate the size, finish, material, etc.
 - c. Where more than one model is shown on a manufacturer's sheet, the Contractor shall clearly indicate exactly which item and which data is intended.
 - d. All marks and identifications on the submittals shall be unambiguous.
- 7. Schedule submittals to expedite the project. Coordinate submission of related items.
 - 8. Identify variations from the contract documents and product or system limitations that may be detrimental to the successful performance of the completed work.
 - 9. Reproduction of contract documents alone is not acceptable for submittals.
 - 10. Incomplete submittals will be rejected without review. Partial submittals will only be reviewed with prior approval from the Architect/Engineer.
 - 11. The Architect/Engineer's responsibility shall be to review one set of shop drawing submittals for each product. If the first submittal is incomplete or does not comply with the drawings and/or specifications, the Contractor shall be responsible to bear the cost for the Architect/Engineer to recheck and handle the additional shop drawing submittals.
 - 12. Submittals shall be reviewed and approved by the Architect/Engineer before releasing any equipment for manufacture or shipment.
 - 13. Contractor's responsibility for errors, omissions or deviation from the contract documents in submittals is not relieved by the Architect/Engineer's approval.
 - 14. Schedule shall allow for adequate time to perform orderly and proper review of submittals, including time for consultants and Owner if required, and resubmittals by Contractor if necessary, and to cause no delay in Work or in activities of Owner or other contractors.
 - a. Allow at least two weeks for Architect's/Engineer's review and processing of each submittal.
 - 15. Architect/Engineer reserves the right to withhold action on a submittal which, in the Architect/Engineer's opinion, requires coordination with other submittals until related submittals are received. The Architect/Engineer will notify the Contractor, in writing, when they exercise this right.
- C. Electronic Submittal Procedures:
- 1. Distribution: Email submittals as attachments to all parties designated by the Architect/Engineer, unless a web-based submittal program is used.

2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.
 - a. Submittal file name: 28 XX XX.description.YYYYMMDD
 - b. Transmittal file name: 28 XX XX.description.YYYYMMDD
5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.

1.7 SCHEDULE OF VALUES

- A. The requirements herein are in addition to the provisions of Division 1.
- B. Format:
 1. Use AIA Document Continuation Sheets G703 or another similar form approved by the Owner and Architect/Engineer.
 2. Submit in Excel format.
 3. Support values given with substantiating data.
- C. Preparation:
 1. Itemize work required by each specification section and list all providers. All work provided by subcontractors and major suppliers shall be listed on the Schedule of Values. List each subcontractor and supplier by company name.
 2. Break down all costs into:
 - a. Material: Delivered cost of product with taxes paid.
 - b. Labor: Labor cost, excluding overhead and profit.
 3. Itemize the cost for each of the following:
 - a. Overhead and profit.
 - b. Bonds.
 - c. Insurance.
 - d. General Requirements: Itemize all requirements.
 4. For each line item having an installed cost of more than \$5,000, break down costs to list major products or operations under each item. At a minimum, provide material and labor cost line items for the following:
 - a. Security systems:
 - 1) Surveillance
 - 2) Access control
 - 3) Intrusion
 - 4) Infant abduction
- D. Update Schedule of Values when:

1. Indicated by Architect/Engineer.
2. Change of subcontractor or supplier occurs.
3. Change of product or equipment occurs.

1.8 CHANGE ORDERS

- A. A detailed material and labor takeoff shall be prepared for each change order, along with labor rates and markup percentages. Change orders shall be broken down by sheet or associated individual line item indicated in the change associated narrative, whichever provides the most detailed breakdown. Change orders with inadequate breakdown will be rejected.
- B. Itemized pricing with unit cost shall be provided from all distributors and associated subcontractors.
- C. Change order work shall not proceed until authorized.

1.9 EQUIPMENT SUPPLIERS' INSPECTION

- A. The following equipment shall not be placed in operation until a representative of the manufacturer has inspected the installation and certified that the equipment is properly installed and that the equipment is ready for operation:
 1. Firestopping, including mechanical firestop systems.

1.10 PRODUCT DELIVERY, STORAGE, HANDLING & MAINTENANCE

- A. Exercise care in transporting and handling to prevent damage to fixtures, equipment and materials.
- B. Store materials on the site to prevent damage.
- C. Keep fixtures, equipment and materials clean, dry and free from harmful conditions.

1.11 NETWORK / INTERNET CONNECTED EQUIPMENT

- A. These specifications may require certain equipment or systems to have network, Internet and/or remote access capability ("Network Capability"). Any requirement for Network Capability shall be interpreted only as a functional capability and is not to be construed as authority to connect or enable any Network Capability. Network Capability may only be connected or enabled with the express written consent of the Owner.

1.12 WARRANTY

- A. At a minimum, provide a one (1) year warranty for all equipment, materials, and workmanship. Individual specifications sections within Division 28 may require additional warranty requirements for specific equipment or systems.
- B. Warranty period for the entire installation described in this Division of the specifications shall commence on the date of substantial completion unless a whole or partial system or any separate piece of equipment or component is put into use for the benefit of any party other than the installing contractor with prior written authorization. In this instance, the warranty period shall commence on the date when such whole system, partial system or separate piece of equipment or component is placed in operation and accepted in writing by the Owner or their representative.
- C. Warranty requirements shall extend to correction, without cost to the final user, of all work and/or equipment found to be defective or nonconforming to the contract documents. The Contractor shall bear the cost of correcting all damage resulting from such defects or

nonconformance with contract documents exclusive of repairs required as a result of improper maintenance or operation, or of normal wear as determined by the Architect/Engineer.

1.13 INSURANCE

- A. Contractor shall maintain insurance coverage as set forth in Division 0 of these specifications.

1.14 MATERIAL SUBSTITUTION

- A. Where several manufacturers' names are given, the first named manufacturer constitutes the basis for job design and establishes the equipment quality required.
- B. Equivalent equipment manufactured by the other named manufacturers may be used. Contractor shall ensure that all items submitted by these other manufacturers meets all requirements of the drawings and specifications and fits in the allocated space. When using other listed manufacturers, the Contractor shall assume responsibility for any and all modifications necessary (including, but not limited to structural supports, electrical connections and rough-in, and regulatory agency approval, etc.) and coordinate such with other contractors. The Architect/Engineer shall make the final determination of whether a product is equivalent.
- C. Any material, article or equipment of other unnamed manufacturers which will adequately perform the services and duties imposed by the design and is of a quality equal to or better than the material, article or equipment identified by the drawings and specifications may be used if approval is secured in writing from the Architect/Engineer via addendum. The Contractor bears full responsibility for the unnamed manufacturers' equipment adequately meeting the intent of design. The Architect/Engineer may reject manufacturer at time of shop drawing submittal. The Contractor assumes all costs incurred by other trades on the project as a result of changes necessary to accommodate the offered material, equipment or installation method.
- D. Should Contractor be unable to secure approval from the Architect/Engineer for other unnamed manufacturers as outlined above, this Contractor may list voluntary add or deduct prices for alternate materials on the bid form. These items will not be used in determining the low bidder. Should a voluntary alternate material be accepted, This Contractor shall assume all costs that may be incurred as a result of using the offered material, article or equipment necessitating extra expense on This Contractor or on the part of other Contractors whose work is affected.

PART 2 - PRODUCTS

2.1 REFER TO INDIVIDUAL SECTIONS.

PART 3 - EXECUTION

3.1 JOBSITE SAFETY

- A. Neither the professional activities of the Architect/Engineer, nor the presence of the Architect/Engineer or the employees and subconsultants at a construction site, shall relieve the Contractor and any other entity of their obligations, duties and responsibilities including, but not limited to, construction means, methods, sequence, techniques or procedures necessary for performing, superintending or coordinating all portions of the work of construction in accordance with the contract documents and any health or safety precautions required by any regulatory agencies. The Architect/Engineer and personnel have no authority to exercise any control over any construction contractor or other entity or their employees in connection with their work or any health or safety precautions. The Contractor is solely responsible for jobsite safety. The Architect/Engineer and the Architect/Engineer's consultants shall be indemnified and shall be made additional insureds under the Contractor's general liability insurance policy.

3.2 GENERAL INSTALLATION REQUIREMENTS

- A. Installation of all conduit and cabling shall comply with Sections 26 05 33 and 26 05 13. Additional conduit requirements described within this Division shall be supplemental to the requirement described in Section 26 05 33. Should conflicts exist between the two Divisions the more stringent (more expensive material and labor) condition shall prevail until bidding addendum or construction clarification or RFI can be submitted and responded to. In no case shall the Contractor carry the least stringent condition in the pricing.
- B. It is the Contractor's responsibility to survey the site and include all necessary costs to perform the installation as specified.
- C. The Contractor shall be responsible for identifying and reporting to the Architect/Engineer any existing conditions including but not limited to damage to walls, flooring, ceiling and furnishings prior to start of work. All damage to interior spaces caused by this Contractor shall be repaired at this Contractor's expense to pre-existing conditions, including final colors and finishes.
- D. All cables and devices installed in damp or wet locations, including any underground or underslab location, shall be listed as suitable for use in such environments. Follow manufacturer's recommended installation practices for installing cables and devices in damp or wet locations. Any cable or device that fails as a result of being installed in a damp or wet location shall be replaced at the Contractor's expense.

3.3 FIELD QUALITY CONTROL

- A. General:
 - 1. Refer to specific Division 28 sections for further requirements.
 - 2. The Contractor shall conduct all tests required and applicable to the work both during and after construction of the work.
 - 3. The necessary instruments and materials required to conduct or make the tests shall be supplied by the Contractor who shall also supply competent personnel for making the tests who has been schooled in the proper testing techniques.
 - 4. In the event the results obtained in the tests are not satisfactory, This Contractor shall make such adjustments, replacements and changes as are necessary and shall then repeat the test or tests which disclose faulty or defective work or equipment, and shall make such additional tests as the Architect/Engineer or code enforcing agency deems necessary.
- B. Protection of cable from foreign materials:
 - 1. It is the Contractor's responsibility to provide adequate physical protection to prevent foreign material application or contact with any cable type. Foreign material is defined as any material that would negatively impact the validity of the manufacturer's performance warranty. This includes, but is not limited, to overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid or compound that could come in contact with the cable, cable jacket or cable termination components.
 - 2. Application of foreign materials of any kind on any cable, cable jacket or cable termination component will not be accepted. It shall be the Contractor's responsibility to replace any component containing overspray, in its entirety, at no additional cost to the project. Cleaning of the cables with harsh chemicals is not allowed. This requirement is regardless of the PASS/FAIL test results of the cable containing overspray. Should the manufacturer and warrantor of the structured cabling system desire to physically inspect the installed condition and certify the validity of the structured cabling system (via a signed and dated statement by an authorized representative of the structured cabling manufacturer), the Owner may, at their sole discretion, agree to accept said warranty in lieu of having the affected cables replaced. In the case of plenum cabling, in addition to the statement from the manufacturer, the Contractor shall also present to the Owner a

letter from the local Authority Having Jurisdiction stating that they consider the plenum rating of the cable to be intact and acceptable.

3.4 PROJECT CLOSEOUT

- A. Refer to the Division 1 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 1.
- B. Final Jobsite Observation:
 - 1. The Architect/Engineer will not perform a final jobsite observation until the project is ready. This is not dictated by schedule, but rather by completeness of the project.
 - 2. Refer to the end of Section 27 05 00 for a "STATEMENT INDICATING READINESS FOR FINAL JOBSITE OBSERVATION."
 - 3. The Contractor shall sign this form and return it to the Architect/Engineer so that the final observation can commence.
- C. Before final payment will be authorized, this Contractor must have completed the following:
 - 1. Submitted operation and maintenance manuals to the Architect/Engineer for review.
 - 2. Submitted bound copies of approved shop drawings.
 - 3. Record documents including edited drawings and specifications accurately reflecting field conditions, **inclusive** of all project revisions, change orders, and modifications.
 - 4. Submitted a report stating the instructions given to the Owner's representative complete with the number of hours spent in the instruction. The report shall bear the signature of an authorized agent of This Contractor and shall be signed by the Owner's representative as having received the instructions.
 - 5. Submitted testing reports for all systems requiring final testing as described herein.
 - 6. Submitted start-up reports on all equipment requiring a factory installation inspection and/or start.
 - 7. Provide spare parts, maintenance, and extra materials in quantities specified in individual specification sections. Deliver to project site; submit receipt to Architect/Engineer prior to final payment being approved.

3.5 OPERATION AND MAINTENANCE MANUALS

- A. General:
 - 1. Provide an electronic copy of the O&M manuals as described below for Architect/Engineer's review and approval. The electronic copy shall be corrected as required to address the Architect/Engineer's comments. Once corrected, electronic copies and paper copies shall be distributed as directed by the Architect/Engineer.
 - 2. Approved O&M manuals shall be completed and in the Owner's possession prior to Owner's acceptance and at least 10 days prior to instruction of operating personnel.
- B. Electronic Submittal Procedures:
 - 1. Distribution: Email the O&M manual as attachments to all parties designated by the Architect/Engineer.
 - 2. Transmittals: Each submittal shall include an individual electronic letter of transmittal.
 - 3. Format: Electronic submittals shall be in PDF format only. Scanned copies, in PDF format, of paper originals are acceptable. Submittals that are not legible will be rejected. Do not set any permission restrictions on files; protected, locked, or secured documents will be rejected.
 - 4. File Names: Electronic submittal file names shall include the relevant specification section number followed by a description of the item submitted, as follows. Where possible, include the transmittal as the first page of the PDF instead of using multiple electronic files.

- a. O&M file name: O&M.div28.contractor.YYYYMMDD
 - b. Transmittal file name: O&Mtransmittal.div28.contractor.YYYYMMDD
5. File Size: Files shall be transmitted via a pre-approved method. Larger files may require an alternative transfer method, which shall also be pre-approved.
 6. Provide the Owner with an approved copy of the O&M manual on compact discs (CD), digital video discs (DVD), or flash drives with a permanently affixed label, printed with the title "Operation and Maintenance Instructions", title of the project and subject matter of disc/flash drive when multiple disc/flash drives are required.
 7. All text shall be searchable.
 8. Bookmarks shall be used, dividing information first by specification section, then systems, major equipment and finally individual items. All bookmark titles shall include the nomenclature used in the construction documents and shall be an active link to the first page of the section being referenced.
- C. Operation and Maintenance Instructions shall include:
1. Title Page: Include title page with project title, Architect, Engineer, Contractor, all subcontractors, and major equipment suppliers, with addresses, telephone numbers, website addresses, email addresses and point of contacts. Website URLs and email addresses shall be active links in the electronic submittal.
 2. Table of Contents: Include a table of contents describing specification section, systems, major equipment, and individual items.
 3. Copies of all final approved shop drawings and submittals. Include Architect's/Engineer's shop drawing review comments. Insert the individual shop drawing directly after the Operation and Maintenance information for the item(s) in the review form.
 4. Copy of final approved test and balance reports.
 5. Copies of all factory inspections and/or equipment startup reports.
 6. Copies of warranties.
 7. Schematic wiring diagrams of the equipment that have been updated for field conditions. Field wiring shall have label numbers to match drawings.
 8. Dimensional drawings of equipment.
 9. Capacities and utility consumption of equipment.
 10. Detailed parts lists with lists of suppliers.
 11. Operating procedures for each system.
 12. Maintenance schedule and procedures. Include a chart listing maintenance requirements and frequency.
 13. Repair procedures for major components.
 14. List of lubricants in all equipment and recommended frequency of lubrication.
 15. Instruction books, cards, and manuals furnished with the equipment.

3.6 INSTRUCTING THE OWNER'S REPRESENTATIVE

- A. Adequately instruct the Owner's designated representative or representatives in the maintenance, care, and operation of the complete systems installed under this contract.
- B. Provide verbal and written instructions to Owner representative or representatives by FACTORY PERSONNEL in the care, maintenance, and operation of the equipment and systems.
- C. The Owner has the option to make a video recording of all instructions. Coordinate schedule of instructions to facilitate this recording.
- D. Notify Architect/Engineer of the time and place for the verbal instructions to be given to Owner representative so a representative can be present if desired.
- E. Refer to individual specification sections for minimum hours of instruction time for each system.
- F. Operating Instructions:

1. The Contractor is responsible for all instructions to the Owner and/or Owner's operating staff on the security systems.
2. If the Contractor does not have Engineers and/or Technicians on staff that can adequately provide the required instructions on system operation, performance, troubleshooting, care and maintenance, the Contractor shall include in the bid an adequate amount to reimburse the Owner for the Architect/Engineer to perform these services.

3.7 SYSTEM STARTING AND ADJUSTING

- A. The security systems included in the construction documents are to be complete and operating systems. The Architect/Engineer will make periodic job site observations during the construction period. The system start-up, testing, configuration, and satisfactory system performance is the responsibility of the Contractor. This shall include all calibration and adjustments of electrical equipment controls, equipment settings, software configuration, troubleshooting and verification of software, and final adjustments that may be required.
- B. All operating conditions & control sequences shall be simulated and tested during start-up period.
- C. Contractor, subcontractors, and equipment suppliers are expected to have skilled technicians to ensure that the system performs as designed. If the Architect/Engineer is requested to visit the job site for the purpose of trouble shooting, assisting in the satisfactory start-up, obtaining satisfactory equipment operation, resolving installation and/or workmanship problems, equipment substitution issues or unsatisfactory system performance, including call backs during the warranty period through no fault of the design; the Contractor shall reimburse the Owner on a time and material basis for services rendered at the Architect/Engineer's standard hourly rates in effect at the time the services are requested. The Contractor shall be responsible for making payment to the Owner for services required that are product, installation or workmanship related. Payment is due within 30 days after services are rendered.

3.8 RECORD DOCUMENTS

- A. Refer to the Division 1 Section: PROJECT CLOSEOUT for requirements. The following paragraphs supplement the requirements of Division 1.
- B. Mark specifications to indicate approved substitutions, change orders, and actual equipment and materials used.
- C. Contractor shall maintain at the job site, a separate and complete set of Security Drawings which shall be clearly and permanently marked and noted in complete detail any changes made to the location and arrangement of equipment or made to the Technology Systems and wiring as a result of building construction conditions or as a result of instructions from the Architect or Engineer. All Change Orders, RFI responses, Clarifications and other supplemental instructions shall be marked on the documents. Record documents that merely reference the existence of the above items are not acceptable. Should Contractor fail to complete Record Documents as required by this contract, Contractor shall reimburse Architect/Engineer for all costs to develop record documents that comply with this requirement. Reimbursement shall be made at the Architect/Engineer's hourly rates in effect at the time of work.
- D. Record actual routing of all conduits sized 2" or larger.
- E. The above record of changes shall be made available for the Architect and Engineer's examination during any regular work time.
- F. Upon completion of the job, and before final payment is made, This Contractor shall give the marked-up drawings to the Architect/Engineer.

3.9 ADJUST AND CLEAN

- A. Contractor shall thoroughly clean all equipment and systems prior to the Owner's final acceptance of the project.
- B. Contractor shall clean all foreign paint, grease, oil, dirt, labels, stickers, and other foreign material from equipment.
- C. Contractor shall remove all rubbish, debris, etc., accumulated during the Contractor's operations from the premises.

STATEMENT INDICATING READINESS FOR FINAL JOBSITE OBSERVATION

To assist the contractor in a timely close-out of the project, it is crucial that the final jobsite observation is not conducted prior to the project being ready. The contractor is required to review the completion status of the project at the time the observation is scheduled. This review, and the subsequent submittal of this form to the Architect/Engineer, shall indicate the contractor's agreement that the area of the project being requested for final observation is ready as defined below. The following list represents the degree of completeness required prior to requesting a final observation:

1. All cabling pathways (cable tray, ladder rack, conduit sleeves, etc.) are installed and all cabling has been pulled through them.
2. All mechanical firestop products are installed and all other penetrations have been sealed.
3. All CCTV cameras, mounts, cabling & all headend equipment are installed, programmed & operational.
4. All access control system equipment, including card readers, conduits, cabling, electronic locks, controllers and all headend equipment, is installed, programmed and operational.

Prime Contractor: _____ By: _____

Requested Observation Date _____ Today's Date: _____

Contractor shall sign this readiness statement and transmit to Architect/Engineer at least 10 days prior to the requested date of observation.

It is understood that if the Architect/Engineer finds that the project is not complete as defined above and that the final jobsite observation cannot be completed on the requested date, the Architect/Engineer will return to the site at a later date. All additional visits to the site for the purposes of completing the final observation will be billed T&M to the Contractor at our standard hourly rates, including travel expenses or the contractor's retainage may be deducted for the same amount.

END OF SECTION

SECTION 28 05 03 - THROUGH PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Through-Penetration Firestopping.

1.2 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products specified in this Section.
- B. Installer: Individuals performing work shall be certified by the manufacturer of the system selected for installation.

1.3 REFERENCES

- A. UL 263 - Fire Tests of Building Construction and Materials
- B. UL 723 - Surface Burning Characteristics of Building Materials
- C. ANSI/UL 1479 - Fire Tests of Through Penetration Firestops
- D. UL 2079 Tests for Fire Resistance of Building Joint Systems
- E. UL Fire Resistance Directory Through Penetration Firestop Systems (XHEZ)
- F. Intertek / Warnock Hersey - Directory of Listed Products
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- H. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Firestops
- I. The Building Officials and Code Administrators National Building Code
- J. 1997 Uniform Building Code
- K. 2018 International Building Code
- L. NFPA 5000 - Building Construction Safety Code

1.4 SUBMITTALS

- A. Submit under provisions of [Division 1][Section 28 05 00].
- B. Submit Firestopping Installers Certification for all installers on the project.
- C. Shop Drawings: Submit for each condition requiring firestopping. Include descriptions of the specific penetrating item, actual wall/floor construction, manufacturer's installation instructions, and UL or Intertek / Warnock Hersey Assembly number.
- D. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
 - 1. Types of penetrating items.
 - 2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.

3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
 4. F ratings for each firestop system.
- E. Maintain a notebook on the job site at all times that contains copies of approved submittals for all through penetration firestopping to be installed. Notebook shall be made available to the Authority Having Jurisdiction at their request and turned over to the Owner at the end of construction as part of the O&M Manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store, protect and handle products on site. Accept material on site in factory containers and packing. Inspect for damage. Protect from deterioration or damage due to moisture, temperature changes, contaminants, or other causes. Follow manufacturer instructions for storage.
- B. Install material prior to expiration of product shelf life.

1.6 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
1. Fire-resistance-rated walls including fire partitions, fire barriers, and smoke barriers.
 2. Fire-resistance-rated horizontal assemblies including floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per UL 1479:
1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
- C. For through-penetration firestop systems exposed to light, traffic, moisture, or physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. For through-penetration firestop systems in air plenums, provide products with flame-spread and smoke-developed indexes of less than 25 and 50, respectively, as determined per ASTM E 84.

1.7 MEETINGS

- A. Pre-installation meeting: A pre-installation meeting shall be scheduled and shall include the Construction Manager, General Contractor, all Subcontractors associated with the installation of systems penetrating fire barriers, Firestopping Manufacturer Representative, and Owner.
1. Review foreseeable methods related to firestopping work.
 2. Tour representative areas where firestopping is to be installed; inspect and discuss each type of condition and each type of substrate that will be encountered, and preparation to be performed by other trades.

1.8 WARRANTY

- A. Provide one year warranty on parts and labor.
- B. Warranty shall cover repair or replacement of firestop systems which fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, general durability, or appear to deteriorate in any manner not clearly specified by the manufacturer as an inherent quality of the material.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application that are produced by one of the following manufacturers. All firestopping systems installed shall be provided by a single manufacturer.
 - 1. 3M; Fire Protection Products Division
 - 2. Hilti, Inc.
 - 3. RectorSeal Corporation, Metacaulk
 - 4. Tremco; Sealant/Weatherproofing Division
 - 5. Johns-Manville
 - 6. Specified Technologies Inc. (S.T.I.)
 - 7. Spec Seal Firestop Products
 - 8. AD Firebarrier Protection Systems
 - 9. Wiremold/Legrand: FlameStopper
 - 10. Dow Corning Corp.
 - 11. Fire Trak Corp.
 - 12. International Protective Coating Corp.
 - 13. HoldRite

2.2 THROUGH PENETRATION FIRESTOP SYSTEMS

- A. Provide materials and systems classified by or listed by Intertek / Warnock Hersey to provide firestopping equal to time rating of construction being penetrated.
- B. All firestopping materials shall be free of asbestos, lead, PCBs, and other materials that would require hazardous waste removal.
- C. Firestopping shall be flexible to allow for normal penetrating item movement due to expansion and contraction.
- D. Firestopping systems for plumbing and wet pipe sprinkler piping shall be moisture resistant.
- E. Provide firestopping systems capable of supporting floor loads where systems are exposed to possible floor loading or traffic.
- F. Provide firestopping systems allowing continuous insulation for all insulated pipes.
- G. Provide firestopping systems classified by UL or listed by Intertek / Warnock Hersey for penetrations through all fire rated construction. Firestopping systems shall be selected from the UL or listed by Intertek / Warnock Hersey Fire Resistance Directory Category XHEZ based on substrate construction and penetrating item size and material and shall fall within the range of numbers listed:
 - 1. Combustible Framed Floors and Chase Walls - 1 or 2 Hour Rated:

- a. F Rating = Floor/Wall Rating
- b. L Rating = Penetrations in Smoke Barriers

Penetrating Item	UL System No.
No Penetrating Item	FC 0000-0999*
Metallic Pipe or Conduit	FC 1000-1999
Non-Metallic Pipe or Conduit	FC 2000-2999
Electrical Cables	FC 3000-3999
Cable Trays	FC 4000-4999
Insulated Pipes	FC 5000-5999
Bus Duct and Misc. Electrical	FC 6000-6999
Duct without Damper and Misc. Mechanical	FC 7000-7999
Multiple Penetrations	FC 8000-8999

*Alternate method of firestopping is patching opening to match original rated construction.

2. Non-Combustible Framed Walls - 1 or 2 Hour Rated:

- a. F Rating = Wall Rating
- b. L Rating = Penetrations in Smoke Barriers

Penetrating Item	UL System No.
No Penetrating Item	WL 0000-0999*
Metallic Pipe or Conduit	WL 1000-1999
Non-Metallic Pipe or Conduit	WL 2000-2999
Electrical Cables	WL 3000-3999
Cable Trays	WL 4000-4999
Insulated Pipes	WL 5000-5999
Bus Duct and Misc. Electrical	WL 6000-6999
Duct without Damper and Misc. Mechanical	WL 7000-7999
Multiple Penetrations	WL 8000-8999

*Alternate method of firestopping is patching opening to match original rated construction.

3. Concrete or Masonry Floors and Walls - 1 or 2 Hour Rated:

- a. F Rating = Wall/Floor Rating
- b. L Rating = Penetrations in Smoke Barriers

Penetrating Item	UL System No.
No Penetrating Item	CAJ 0000-0999*
Metallic Pipe or Conduit	CAJ 1000-1999
Non-Metallic Pipe or Conduit	CAJ 2000-2999
Electrical Cables	CAJ 3000-3999
Cable Trays	CAJ 4000-4999
Insulated Pipes	CAJ 5000-5999
Bus Duct and Misc. Electrical	CAJ 6000-6999
Duct without Damper and Misc. Mechanical	CAJ 7000-7999
Multiple Penetrations	CAJ 8000-8999

*Alternate method of firestopping is patching opening to match original rated construction.

H. Any opening in walls or floors not covered by the listed series of numbers shall be coordinated with the firestopping manufacturer.

I. Any openings in floors or walls not described in the UL or listed by Intertek / Warnock Hersey Fire Resistance Directory, or outlined in manufacturer's information shall be sealed in a manner agreed upon by the Firestopping Manufacturer, Owner, and the Authority Having Jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Ensure all surfaces that contact seal materials are free of dirt, dust, grease, oil, rust, or loose materials. Clean and repair surfaces as required. Remove laitance and form-release agents from concrete.
- B. Ensure substrate and penetrating items have been permanently installed prior to installing firestopping systems. Ensure penetrating items have been properly spaced and have proper clearance prior to installing firestopping systems.
- C. Surfaces to which sealing materials are to be installed must meet the selected UL or Intertek / Warnock Hersey system substrate criteria.
- D. Prime substrates where recommended in writing by through-penetration firestop system manufacturer. Confine primer to area of bond.

3.2 INSTALLATION

- A. In existing construction, provide firestopping of openings prior to and after installation of penetrating items. Remove any existing coatings on surfaces prior to firestopping installation. Temporary firestopping shall consist of packing openings with fire resistant mineral wool for the full thickness of substrate, or an alternate method approved by the Authority Having Jurisdiction. All openings shall be temporarily firestopped immediately upon their installation and shall remain so until the permanent UL or listed by Intertek / Warnock Hersey listed firestopping system is installed.
- B. Install penetration seal materials in accordance with printed instructions of the UL or Intertek / Warnock Hersey Fire Resistance Directory and with manufacturerd application instructions.
- C. Install dams as required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating. Remove combustible damming after appropriate curing.

3.3 CLEANING AND PROTECTING

- A. Clean excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not cause damage.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.4 IDENTIFICATION

- A. Provide and install labels adjacent to each firestopping location. Label shall be provided by the firestop system supplier and contain the following information in a contrasting color:
 - 1. The words "Warning - Through Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Firestop System Supplier; UL or listed by Intertek / Warnock Hersey system number; date installed; contractor name and phone number; manufacturer's representative name, address, and phone number.

3.5 INSPECTION

- A. All penetrations shall be inspected by manufacturer representative to ensure proper installation.
- B. Access to firestop systems shall be maintained for examination by the Authority Having Jurisdiction at their request.
- C. Proceed with enclosing through-penetration firestop system with other construction only after inspection reports are issued and firestop installations comply with requirements.
- D. The contractor shall allow for visual destructive review of 5% of installed firestop systems (minimum of one) to prove compliance with specifications and manufacturer's instructions and details. Destructive system removal shall be performed by the contractor and witnessed by the engineer and manufacturer's factory representative. The engineer shall have sole discretion of which firestop system installations will be reviewed. The contractor is responsible for all costs associated with this requirement including labor and material for removing and replacing the installed firestop system. If any firestop system is found to not be installed per manufacturer's specific instructions and details, all firestop systems are subject to destructive review and replacement at the engineer's discretion and the contractor's expense.

END OF SECTION

SECTION 28 13 00 - ELECTRONIC ACCESS CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Field Control Hardware
- B. Application Software
- C. Access Control Graphical User Interface
- D. Credentials and Badging
- E. Portal Devices

1.2 RELATED WORK

- A. Section 08 71 00 - Door Hardware
- B. Section 26 05 13 - Wire and Cable
- C. Section 26 05 33 - Conduits and Boxes
- D. Section 26 05 35 - Surface Raceways
- E. Section 27 05 26 - Communications Bonding
- F. Section 27 05 28 - Interior Communication Pathways
- G. Section 27 05 43 - Exterior Communication Pathways
- H. Section 27 05 53 - Identification and Administration
- I. Section 27 15 00 - Horizontal Cabling Requirements
- J. Section 28 05 00 - Basic Electronic Safety and Security System Requirements.
- K. Section 28 05 03 - Through Penetration Fire stopping.
- L. Section 28 23 00 - Video Surveillance
- M. Section 28 31 00 - Fire Detection and Alarm Systems.

1.3 QUALITY ASSURANCE

- A. Manufacturer: The manufacturer shall have a minimum of ten (10) years documented experience in the development and manufacture of access control software and hardware. The software developer shall be, at a minimum, a Microsoft Silver Certified Integrator and Partner for those systems that reside in a Microsoft environment.
- B. Contractor:
 - 1. Shall be a factory-authorized installation, service and support company specializing in the selected manufacturer's product, with demonstrated prior experience of a minimum of three (3) years installing, programming and supporting the selected manufacturer system.
 - 2. Shall have been in business for a minimum of three (3) years and shall have installed a

minimum of three (3) similar or larger sized systems. Contractor shall have a minimum of two (2) service technicians who are certified in the proposed manufacturer's system.

3. Shall retain the services of a minimum of one employee with the following certification(s) or education. Should more than one certification be required, one employee may maintain multiple certifications.
 - a. A certification of RCDD from BICSI or CNIDP from CNet.
 - b. A certification of MCSA: Server: Server Infrastructure from Microsoft.
 - c. A certification of CCNA or CCNP from CISCO.

C. Material:

1. All material which is Contractor furnished shall be new, unused and free from defects.
2. Where more than one of any specified item of equipment or material is used, all such items shall be the same product from the same manufacturer.

1.4 REFERENCES

- A. International Building Code
- B. NFPA 70 - National Electrical Code.
- C. The BOCA National Building Code
- D. UL 294 - Standard for Access Control Systems.
- E. UL 464 - Standard for Audible Signal Appliances.
- F. UL 1449 - Standard for Surge Protective Devices.
- G. UL 1778 - Uninterruptible Power Systems.

1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 28 05 00.
- B. Product Data Submittal: Provide manufacturer's technical product specification sheet for each individual component type. Submitted data shall show the following:
 1. Compliance with each requirement of these documents. The submittal shall acknowledge each requirement of this section, item-by-item.
 2. All component options and accessories specific to this project.
 3. Electrical power consumption rating and voltage.
 4. Heat generation for all power consuming devices.
 5. Wiring requirements.
 6. Server processor(s), workstation configurations, total and available disk space, and memory size.
 7. All network bandwidth, latency and reliability requirements.
 8. Backup/archive system size and configuration.
 9. Submit two of each type of credential to be used (access card, key fob, etc.).
- C. System Drawings: Project-specific system CAD drawings shall be provided as follows:
 1. Provide a system block diagram noting system components and interconnection between components. The interconnection of components shall clearly indicate all wiring required in the system. When multiple pieces of equipment are required in the exact same configuration (e.g., multiple identical controllers), the diagram may show one device and

refer to the others as "typical" of the device shown. The diagram shall list room numbers where each controller will be located. Block diagram shall be provided in Adobe PDF.

2. Provide a schedule of all controllers and the doors/points each controller controls. This schedule shall be provided in Adobe PDF.
 3. Provide schedules describing each system input location by an architecturally familiar reference, e.g., Door 312A. The architectural door schedule shall be used as the basis. These schedules shall be provided in Adobe PDF
- D. Submit sample format of site specific programming guides to be used for system planning/programming conference with Owner. These guides shall be provided in Adobe PDF.
- E. So that required Owner personnel are present at the planning/programming conference required in Part 3 of this section, submit meeting agenda for the conference a minimum of two weeks prior to the conference.
- F. Submit detailed description of Owner training to be conducted at project end, including specific training times. Refer to Part 3 of this section for details.
- G. IP Addresses: Contractor shall provide to Owner, in a documented transmittal and in Microsoft Excel format, the names and locations of devices which require an IP address. An authorized representative of the Owner shall furnish the addresses for the associated devices in Microsoft Excel format in a documented transmittal. Should Owner change the IP address structure after approval of the list, Owner may be responsible for additional fees involved with reprogramming.
- H. Quality Assurance:
1. Provide materials documenting experience requirements of the manufacturer and Installing Contractor. Provide documentation of the training and other applicable certifications of the Contractor.
 2. Provide system checkout test procedure to be performed at acceptance. Test procedures shall include all external alarm events.

1.6 SYSTEM DESCRIPTION

- A. This section describes the furnishing, installation, programming and commissioning of a complete, turnkey access control system. The terms "access control system" and "security management system", or SMS, may be used interchangeably herein.
- B. Company, manufacturer, and product names used in this section are for identification purposes only. All trademarks and registered trademarks are the property of their respective owners.
- C. Performance Statement: This section and the accompanying access control-specific design documents are performance based, describing the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the equipment constraints described and the performance required of the system, as presented in these documents, the vendor and the Contractor are solely responsible for determining all wiring, programming, and miscellaneous equipment required. The Contractor shall be responsible for determining quantities of materials required for a complete and operational system. Floor plan drawings and schedules have been developed to aid the Contractor in determining device quantities and installation locations, but, where discrepancies between floor plans and schedules arise, the greater number shall govern.
- D. Basic System Description:
1. The access control system shall provide the following functionality:
 - a. Electronic control access to designated areas.

- b. Validation of cardholder credentials by use of personnel database, card formats, PINs. The system shall compare the time, location, and unique credentials of an attempted entry with information stored in the database.
- c. Access to designated areas will be validated only when a user's credential has a valid number for its facility and the number is valid for the current time and for the reader where it is used.
- d. The system software shall access the hardware that validates the person and monitors the security of a building by use of intelligent system controllers, reader interfaces, locks, readers, inputs and outputs. When access has been validated, a signal to the portal locking device shall be activated to enable alarm free access at that location.
- e. The system shall be configured by use of application software.
- f. The system shall monitor activities using operator monitoring software which includes graphical maps which display alarms, status and activity.
- g. The system shall differentiate and restrict administrative and operational access through use of password authentication.
- h. The system shall report on various aspects of the system by use of reports, both default and customizable. Reports shall be able to be printed.
- i. The system shall have the capability to report alarms both audibly and visually.
- j. The system shall control hardware from the monitoring station by use of manual actions and events.
- k. The system shall provide record and data management by use of journals. There shall be a full audit trail.
- l. The system shall allow for data to be imported from other products by use of database migration tools. These products may include Human Resources databases for name and/or time and attendance information, information from previous access control systems consisting of badge numbers from credentials that will be re-used, Microsoft Excel spreadsheets, or other systems as defined herein.
- m. The system shall allow access using a web interface or a mobile application for use on the iOS and Android operating systems.

E. Integrations, Software Development Kit (SDK) and Application Programming Interface (API):

- 1. The manufacturers of the systems that are integrated shall make an SDK available to other manufacturers.
- 2. Prior to the release of this section, the manufacturers of the systems that are to be integrated shall have made available to each other all APIs to perform the specific integrated functions required in this section.
- 3. The integrations shall be completed and tested, and shall have been implemented on at least one system of similar size prior to the release of this section. The integrations shall not be accomplished for the first time for this project unless written pre-approval has been granted by Owner to Contractor prior to bid deadline.
- 4. During the warranty period, should a new API or version of software be released by the SMS manufacturer or any of the manufacturers of systems or devices that are integrated, that API or version of software shall be installed in the appropriate system or device defined in this section at no charge to Owner. Should any loss of functionality in the integration be exposed through this installation, as compared to the accepted system, Contractor shall correct the functionality at no charge to Owner.
- 5. Any and all development costs for specified functionality or inter-system integrations shall be included in the Contractor's bid. No additional costs or fees for the integrations shall be charged to Owner from the time of notice to proceed through system acceptance.

1.7 OWNER FURNISHED MATERIAL

- A. Telephone service
- B. Data circuit / internet service

C. Active telephone service equipment, such as key system, PBX or VOIP switch equipment

D. Active computer network equipment:

1. Routers
2. Switches
3. Hubs
4. Wireless access points
5. Uninterruptible power supplies for Owner furnished products

E. Active computer equipment:

1. SMS server - refer to Part 2 for details
2. SMS workstation(s) - refer to Part 2 for details
3. SMS badging station(s) - refer to Part 2 for details
4. Uninterruptible power supplies for Owner furnished products

1.8 LICENSING REQUIREMENTS

A. All user licenses required for system operation shall be included in the Contractor's bid. User licenses shall include server and workstation software, network controllers, card readers, printers, badging stations, and any other licensing that is required by the manufacturer for operation of any system component.

1. Licenses shall be provided on a one-to-one basis. One license shall be provided for each device requiring a license. In the event the manufacturer requires the purchase of a block of licenses, license blocks provided shall be no greater than what is required for the number of devices in this project. Contractor shall document the number of remaining licenses in the project record documents and Operations and Maintenance data.
2. In addition to the licensing requirements listed above, provide licensing and configuration of system administration/operation software for workstations. The workstation licenses shall be concurrent use seats, and the client software shall be able to be loaded on an unlimited number of workstations at no extra cost to the Owner. Contractor shall install client software on the same number of machines as licenses provided. As part of the training, Contractor shall demonstrate to Owner how to install client software on additional workstations.
3. Northern State University will be transitioning to Lenel S2 from the existing Transact system. The system described herein is an extension of the foregoing LenelS2system. All licensing shall be new for each installed device. The Contractor shall not use any of Owner existing (spare) licenses for any new components.
4. All Contractor-furnished software shall contain a perpetual, permanent license in which no other fees beyond the single payment for the work of this section are required in order to use the proposed software indefinitely. Owner understands that, after the initial warranty period has expired, maintenance and technical support fees may be required annually, quarterly, or monthly in order to receive software updates and technical support. However, it remains the option of Owner to purchase or decline this service. If Owner chooses to discontinue or never purchase this service, the software shall continue to be legally licensed for use. All software shall be the latest version released, and all Contractor-furnished servers and workstations shall be current on all patches and updates for all software on machines at time of acceptance of the associated systems.
5. The SMS shall require only a single license key present on the server for the SMS to operate. The key shall be a physical device or a software key. License keys shall not be required at the client workstations.

1.9 PROJECT RECORD DOCUMENTS

A. Submit documents under the provisions of Section 28 05 00.

- B. Provide final system block diagram showing any deviations from shop drawing submittal.
- C. Provide statement that system checkout test, as outlined in the shop drawing submittal, is complete and satisfactory.
- D. Provide schedules documenting:
 - 1. Controller installation locations including specific door numbers being controlled.
 - 2. All terminal block wiring, including cable numbers.
- E. Warranty: Submit written warranty and complete all Owner registration forms.
- F. Complete all operation and maintenance data manuals as described below.

1.10 OPERATION AND MAINTENANCE DATA

- A. Submit documents under the provisions of Section 28 05 00.
- B. Manuals: Final copies of the manuals shall be delivered within 14 days after completing the installation test. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of the contractor responsible for the installation and maintenance of the system, and the factory representatives for each item of equipment for each system. The manuals shall have a table of contents and labeled sections. The final copies delivered after completion of the installation test shall include all modifications made during installation, checkout, and acceptance testing. Manuals shall be submitted in electronic format only, Adobe PDF. The manuals shall consist of the following:
 - 1. Hardware Manual: The manual shall describe all equipment furnished including:
 - a. General description and specifications.
 - b. Installation and check out procedures.
 - c. System and equipment layout and electrical schematics to the control board and field device level. For multiple devices wired identically, only one wiring diagram is required per door configuration, to be labeled "TYPICAL".
 - d. Alignment and calibration procedures.
 - e. Manufacturers repair parts list indicating sources of supply.
 - 2. Software Manual: The software manual shall describe the functions of all software and shall include all other information necessary to enable proper loading, testing, and operation. The manual shall include:
 - a. Definition of terms and functions.
 - b. System use and application software.
 - c. Initializations, startup, and shutdown procedures.
 - d. Reports generation.
 - e. Details on forms customization and field parameters.
 - 3. Operator's Manual: The operator's manual shall fully explain all procedures and instructions for the operation of the system including:
 - a. Computers and peripherals.
 - b. Log in/Log out procedures.
 - c. Use of system, command, and applications software.
 - d. Recovery and restart procedures.
 - e. Graphic alarm presentation.
 - f. Use of report generator and generation of reports.
 - g. Data entry.
 - h. Operator commands.

- i. Alarm messages.
 - j. System permissions functions and requirements.
4. Maintenance Manual: The maintenance manual shall include descriptions of maintenance for all equipment including inspection, cleaning, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.

1.11 WARRANTY

- A. Unless otherwise noted, provide warranty for one (1) year after date of Substantial Completion for all materials and labor.
- B. Onsite Work During Warranty Period: This work shall be included in the Contractor's bid and performed during regular working hours, Monday through Friday.
- 1. Inspections: The Contractor shall perform two minor inspections at six-month intervals (or more often if required by the manufacturer), and two major inspections offset equally between the minor inspections to effect quarterly inspection of alternating magnitude.
 - 2. Minor Inspections: These inspections shall include:
 - a. Visual checks and operational tests of all equipment, field hardware, and electrical and mechanical controls.
 - b. Mechanical adjustments if required on any mechanical or electromechanical devices.
 - 3. Major Inspections: These inspections shall include all work described under paragraph Minor Inspections and the following work:
 - a. Clean all equipment, including exterior surfaces and accessible and serviceable interior surfaces.
 - b. Perform diagnostics on all equipment.
 - c. Check, test, and calibrate (if required) all sensors.
 - d. Run all system software diagnostics and correct all diagnosed problems.
- C. Operation: Upon the completion of any scheduled adjustments or repairs, Contractor shall verify operation of the SMS.
- D. Service: The Owner will initiate service calls when the SMS is not functioning properly. If requested by the Owner, the Contractor shall respond or remain at the site after normal business hours, and the Owner shall reimburse the Contractor for the incremental cost difference between premium labor rates and standard labor rates. This reimbursement applies to premium labor rates that do not exceed time-and-one-half rates after normal business hours and double-time rates for Sundays and holidays. The Owner shall be furnished with telephone number(s) where service personnel can be reached 24/7/365. Qualified service personnel shall be at the site within 24hours after receiving a request for service.
- E. Records, Logs and Work Requests: Contractor shall keep records and logs of each task completed under and outside of warranty. These logs shall be maintained in Microsoft Word or Excel. The log shall include the model and serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, description of work performed, the amount and nature of the material used, and the time and date of commencement and completion of the work. Complete logs shall be kept and shall be available for review on site, demonstrating that planned and systematic adjustments and repairs have been accomplished for the SMS. The Contractor shall deliver a record of the work performed within three (3) business days after work is completed. Defective items that have been replaced shall be given to the Owner. Should the replacement item be a temporary replacement until the removed item is repaired, Contractor shall retain possession of the defective item for repair and subsequent re-installation.

- F. System Modifications: Modifications by the Contractor are allowed after system acceptance. Contractor shall make recommendations for system modification in writing to the Owner. No system modifications shall be made without prior, written approval of the Owner. Any modifications made to the system shall be incorporated into the Operations and Maintenance Manuals, and other documentation affected. The Owner shall be provided with electronic restorable versions of all configurations prior to the modifications being made.
- G. Software: At no charge, Contractor shall provide to Owner all updates released by manufacturer during the period of the warranty and verify operation of the system upon installation. These updates include system software updates, patches, bug fixes and revisions, as well as firmware updates. These updates shall be accomplished in a timely manner, fully coordinated with SMS administrators and operators, shall include training for the new changes/features, and shall be incorporated into Operations and Maintenance Manuals and software documentation.
- H. Refer to the individual product sections for further warranty requirements of individual system components.

1.12 ANNUAL SERVICE CONTRACT

- A. Provide annual cost for extended service and maintenance agreement after the first year for the access control system according to the following terms:
 1. The term of the warranty shall begin on the system acceptance date and shall continue for one (1) year. The extended service and maintenance warranty shall begin following this first year if accepted by the Owner. The term shall be automatically renewed for successive one-year periods unless canceled in writing by the Owner with Contractor confirmed receipt, up to the date of expiration. The service and maintenance agreement shall include the following basic services to the Owner, including all necessary parts, labor and service equipment:
 - a. Repair or replace any security equipment item that fails to perform as initially installed, as specified, or as determined per the manufacturer's performance criteria.
 - b. Perform preventive maintenance on the security equipment during the 6th month and 12th month of the service contract. This preventive maintenance shall include cleaning, realignment, inspection, and testing of security devices. The Owner shall receive a written report of these inspections that identifies the security system's status and, if required, a list of all necessary repairs or replacements.
 - c. Provide maintenance on the SMS system software. At no charge, the Contractor shall provide to Owner all updates released by the manufacturer during the period of the service contract and verify operation of the system upon installation. These updates include system software updates, patches, bug fixes and revisions, as well as firmware updates. These updates shall be accomplished in a timely manner, fully coordinated with SMS administrators and operators, shall include training for the new changes/features, and shall be incorporated into the Operations and Maintenance Manuals and software documentation. Contractor shall not be responsible for maintenance of Owner data.
 2. The Contractor shall be compensated for any repairs or maintenance provided as a result of Owner abuse, misuse, intentional damage, accidental damage, or power fluctuations exceeding specified equipment tolerances.
 3. Service: Owner will initiate service calls when the SMS is not functioning properly. If requested by Owner, Contractor shall respond or remain at the site after normal business hours, and the Owner shall reimburse the Contractor for the incremental cost difference between premium labor rates and standard labor rates. This reimbursement applies to premium labor rates that do not exceed time-and-one-half rates after normal business hours and double-time rates for Sundays and holidays. Owner shall be furnished with telephone number(s) where service personnel can be reached 24/7/365.
Qualified

service personnel shall be at site within 24hours after receiving a request for service.

- B. Provide complete terms and conditions of warranty and service.
- C. The Owner will enter into a contract directly with the vendor. This specification section is not a contract between the Owner and the vendor to perform these services.

PART 2 - PRODUCTS

2.1 ELECTRONIC ACCESS CONTROL SYSTEM MANUFACTURERS

- A. LenelS2 OnGuard
- B. Should the access control manufacturer offer, as an option, the use of hardware by Mercury Security, the Contractor proposed solution shall utilize this hardware. Contractor shall state whether or not the software is compatible with the SCP, AP and EP families of Mercury Security hardware. For future additions or defective hardware replacements, the system shall not be "locked" to require Mercury Security hardware be purchased only from the access control software manufacturer or from the original Installing Contractor.
- C. Approval of Alternate Manufacturers:
 - 1. Contractors seeking approval for alternate manufacturers for any devices or software in this section shall submit requests for approved equals as defined by Division 1 in addition to submitting:
 - a. Bill of materials for each piece of hardware and software proposed.
 - b. Manufacturer's data sheet for each piece of equipment proposed.
 - c. Line-by-line typewritten statement of compliance or non-compliance comparing Part 2 of this section with the published specifications of the proposed alternate products. This compliance statement shall be signed by an officer of the local contractor branch office that proposes to install the alternate product and either an officer of the manufacturer or an officer of the manufacturer's representative.
 - 2. Refer to the project drawings for manufacturer and model numbers for the Basis of Design products.

2.2 FIELD CONTROL HARDWARE

- A. Interior Control Panels:
 - 1. Control boards, power distribution and terminals shall be enclosed in a NEMA 1 rated enclosure that is key lockable. Contractor shall not furnish padlock. All enclosures that are part of this project shall be keyed alike. Contractor shall furnish and install a mechanically fastened tamper switch on the interior of the enclosure.
 - 2. Control boards are allowed to be in an enclosure separate from the power supplies/power distribution. Should they be in separate enclosures, the interface wiring shall be in rigid metallic conduit, RMC, with Myers hubs at both ends of the conduit.
 - 3. Control panels shall be rack mountable in an enclosure specifically for rack mounting. Control boards and power supplies shall be located in the enclosure. The enclosure shall have screw or compression terminals on the rear panel for connection of field devices.
 - 4. Intra-enclosure wiring shall be dressed using tie wraps and/or covered plastic wire way. Hook-up wires for identical purposes shall have the same color insulation. For example, if one input pair utilizes green and white insulated conductors, all similar inputs shall use green and white insulated conductors. The same color scheme shall be followed for all access control panels that are part of this project.
 - 5. Cabling from field devices such as readers, door position switches, request-to-exit

devices and locking devices shall not be directly terminated to the control boards and power supplies. The field devices shall be terminated to terminals located on the left side, right side or both sides of the enclosure back panel. Intra-enclosure wiring shall be routed from the terminals to the control boards and power distribution. Quantity and functional sequence of the terminals shall be identical portal to portal.

6. All devices inside the enclosure, less cabling and batteries, shall be mechanically fastened to a removable solid or perforated metal back panel with either:
 - a. Metal or plastic standoffs
 - b. DIN rail
7. Hook and loop fasteners, double sided tape or adhesives are not allowed to attach devices to the back panel. Mounting devices to the interior of the door shall only be allowed when the following two (2) conditions are met:
 - a. The access control hardware manufacturer offers prefabricated enclosures with devices mounted to the interior of the door.
 - b. Only the same devices that the access control manufacturer mounts to the interior of the door are allowed to be mounted in a different enclosure, and those devices shall be mounted in an identical manner.
8. 120V 20A input power shall be hard wired to a circuit breaker disconnect and to one duplex receptacle on the interior of the enclosure. Should devices in the enclosures require plug-in transformers/power supplies, the receptacle shall be utilized. One (1) power strip with integrated circuit breaker shall be located in the bottom of the enclosure as needed.
9. Power to the locking devices shall be provided by a power distribution board with no fewer than four (4) outputs. Each lock shall be individually protected. The power distribution board shall:
 - a. Provide protection with fuses or positive temperature coefficient (PTC) devices.
 - b. Provide control so that each output is individually selectable as latching or non-latching with fire alarm activation.
 - c. Provide control so that each output shall have Fail Safe and Fail Secure terminals.
 - d. Provide a fire alarm input with associated trigger LED.
 - e. Provide an individual LED per output to indicate when an input has been triggered and the associated output has been activated.
 - f. Accept a dry, closed contact input to activate the individual lock outputs.
 - g. Provide a dry, Form C relay that energizes on activation of the fire alarm input. This output may then be used as a fire alarm input to other power distribution boards in the same or a different enclosure, or may provide input to another device such as a multi-pole relay.
10. A minimum of four (4) 12V 7 AH rechargeable, sealed, lead acid batteries shall be located in the bottom of the enclosure. Two of the batteries shall be connected in series for 24V devices, and two batteries shall be connected in parallel for 12V devices. Contractor shall provide additional batteries as needed to power all devices for a minimum of <Insert> hours. Connections to the batteries shall be made with appropriate terminals crimped on the connecting conductors. Batteries shall be clearly labeled in a permanent manner with the date of installation.
11. Power to control boards, readers and auxiliary devices such as request-to-exit motion detectors shall be provided by a power distribution board with no fewer than four (4) outputs. All devices powered by the same voltage at an individual portal shall be protected by the same fuse or PTC unless current requirements dictate otherwise. Individual fuses or PTCs may protect more than one control board.
12. All access control panels, when populated with control boards and power supplies, shall have the following capacities:
 - a. Control of a minimum of two (2) portals.

- b. Spare capacity of a minimum of one (1) access control portal, two (2) auxiliary inputs and two (2) auxiliary outputs greater than the requirements of the project at the time of system specification.
 - c. Five (5) spare fuses of each type used, to be in their original packaging, to be located in each power supply enclosure.
 - d. 50% spare current capacity on all power supplies located in unconditioned spaces and 40% spare capacity for those in conditioned spaces. Lower spare capacities are allowable based on prior approval of Contractor-provided power calculations.
13. Locations where enclosures may be mounted are shown on the plans. Final location, with approval of Owner's representative, shall be selected by Contractor based on distribution of controlled portals and devices.
 14. At time of Substantial Completion, Contractor shall furnish a schematic diagram of intra-enclosure wiring and a complete bill of materials for the enclosures and the devices located within. This documentation shall include a schedule of fuses and the device(s) that each fuse protects. This documentation shall be placed by Contractor in a Contractor-furnished print pocket located on the inside of the enclosure door.

B. Exterior Control Panels:

1. Control panels, power distribution and terminals shall be located in a NEMA 4X stainless steel enclosure that is pad-lockable. Contractor shall not furnish padlock. Enclosures shall have a tamper switch mechanically attached to the interior of the enclosure.
2. Control boards and power supplies shall be in the same enclosure.
3. Intra-enclosure wiring shall be dressed using tie wraps and/or covered plastic wire way. Hook-up wires for identical purposes shall have the same color insulation. For example, if one input pair utilizes green and white insulated conductors, all similar inputs shall use green and white insulated conductors. The same color scheme shall be followed for all access control panels which are part of this project.
4. All devices inside of the enclosure shall be mechanically attached to a removable solid or perforated metal back panel. Hook and loop fasteners, double sided tape or adhesives are not allowed in order to attach devices to the back panel. Mounting devices to the interior of the door is not allowed.
5. 120V 20A input power shall be hardwired to a circuit breaker disconnect and to one (1) duplex receptacle located within the enclosure. Should devices require plug-in transformers/power supplies, the receptacle shall be utilized. One (1) power strip with integrated circuit breaker shall be located in the bottom of the enclosure as needed.
6. Power to devices and gate activation relays shall be provided by a power supply and power distribution board with no fewer than four (4) outputs. The power distribution board shall provide protection with fuses or positive temperature coefficient (PTC) devices.
7. Activation of gate operator inputs shall be via an ice cube, plug-in, DPDT, DIN rail-mounted relay, located on the inside of the access control enclosure. The relay shall have a manual check button and an indicator LED.
8. Devices inside of enclosure shall be rated for the temperatures to which they will be exposed. Contractor shall furnish and install a heater and ventilation rated for use in the enclosure to meet the temperature ratings of the devices in the enclosure.
9. All access control panels, when populated with power supplies and control boards, shall have the following capacities:
 - a. Control of a minimum of two (2) access control portals.
 - b. Spare capacity of a minimum of one (1) access control portal, one (1) auxiliary input and one (1) auxiliary output greater than the requirements of the project at time of system acceptance.
 - c. Five (5) spare fuses of each type used, to be in their original packaging, to be located in the enclosure.
 - d. 50% spare current capacity on all power supplies located in unconditioned spaces and 40% spare capacity for those in conditioned spaces. Lower spare capacities are allowable based on prior approval of Contractor provided power calculations.

10. All strands of fiber that are routed to the enclosure shall be terminated with landed patch panel style connectors. Refer to Section 27 15 00 for fiber connector type.
11. All cables that enter the enclosure shall be in rigid metal conduit, RMC, or liquid tight flexible conduit, with Myers hubs at both ends of the conduit. Conduits shall enter the enclosure only from the bottom.
12. At time of Substantial Completion, Contractor shall furnish a schematic diagram of intra-enclosure wiring and a complete bill of materials for the enclosure and the devices located within. This documentation shall be placed by Contractor in a Contractor-furnished print pocket located on the inside of the enclosure door.

C. Intelligent System Controllers (ISC):

1. The controller shall communicate with the host via an on board 10/100/1000 Base T Ethernet port.
2. The controllers shall be a distributed architecture with full peer-to-peer networking capability. Parent/Child controller configurations are not acceptable. All controllers in the system shall be capable of operating in a standalone mode if communication is lost with the server or main controller. In no case shall a controller depend on communication with an upstream controller for proper standalone operation.
3. The communications bus shall be supervised for wiring integrity. If a communication failure is detected, the system shall report the loss. All controllers unable to receive communication shall operate as standalone devices including grant/deny decisions, complete with event buffers. All events shall be uploaded to the server upon restoration of communications.
4. Controllers shall be AES 128-bit symmetrical block encryption devices conforming to FIPS-197.
5. Controllers shall support a minimum of SHA-2 authentication security.
6. The controllers shall utilize flash memory or similar technology, allowing program updates to be downloaded from the server. Program storage shall be in ROM.
7. The controllers shall have the capacity for [15,000]<Insert> cardholders and[45,000]<Insert> transactions. All access decisions involving these cardholders shall be made at the lowest controller level without communication to the server.
8. Handle all non-host related access control monitoring and decision making.
9. LED indicators for power, fault and communications.
10. Provide for local and global input/output linking:
 - a. The SMS shall support a global linkage feature whereby any input/output/event shall be linked to any other input/output/event in the SMS. Input/output linkages shall be able to span across intelligent system controllers.
 - b. System administrators shall be able to create global input/output function lists, each consisting of a sequence of actions to be performed, such as changing card reader modes, activating outputs, and opening or closing anti-pass back areas. Each function list may include up to six actions.
11. Reporting of transactions and status information to the server.
12. Interface with standard reader technologies without special interface hardware, additional logic panels or other integrators. Supported technologies shall include:
 - a. 13.56 MHz Contactless Smart with or without biometrics or keypad
 - b. 13.56 MHz Multi-technology Smart
 - c. Proximity, with or without keypad
 - d. Magnetic stripe, with or without keypad
 - e. Wiegand
 - f. Bar code
 - g. Keypad
 - h. Biometric, with Wiegand output

D. Reader Interface Module (RIM):

1. Reader interface modules are not shown on the plans. Refer to the installation section of this specification for allowable equipment mounting locations. It is the responsibility of the Contractor to determine the number and configuration of reader interface modules required based on the inherent characteristics of each product line and the requirements and restrictions described in this document.
2. RIM shall interface with and accept data from TTL, Wiegand and RS-485 type readers and door hardware.
3. RIM shall provide a minimum of three (3) inputs per portal for portal position, request to exit and auxiliary input.
4. RIM shall provide a minimum of two (2) outputs per portal for locking device and auxiliary output. Each output shall be Form C and shall be rated at 3A at 28VDC.
5. RIM shall communicate to controller by RS-485.

E. Input Control Module (ICM):

1. The input control module shall provide supervised and non-supervised alarm input zones and monitor/report line fault conditions, alarm conditions, power faults and tampers.
2. Input control modules are not shown on the plans. Refer to the installation section of this specification for allowable equipment mounting locations. It is the responsibility of the Contractor to determine the number and configuration of input control modules required, based on the inherent characteristics of each product line and the requirements and restrictions described in this document.
3. UL 294 and 1076 listed.
4. Each input configurable for normally open or normally closed.
5. Each input configurable for timing.
6. Each input configurable for end of line resistance.
7. Status LEDs for communication to the host, heartbeat and input status.
8. Communications line supervision.
9. AES 128 bit encryption.
10. 2-wire RS485 communications.
11. No fewer than eight (8) inputs per board/control module.
12. Alarm Masking: The ability to mask the alarm input on a time zone basis.
13. Activate Output: The ability for any input to activate any output.
14. Configuration of Debounce Time: The ability to control the amount of time that an input state change must remain consistent in order for it to be considered a real change of state.
15. Elevator control support for number of floors shown on the drawings.
16. Global Linkage: The ability to link outputs with inputs that are attached to any ICM/output control module (OCM).
17. Checkpoint: The ability to configure an input as a designated stop on one or more guard tours.
18. Entry/Exit Delay: The ability to set up entry/exit delays for inputs that are attached to any ICM. This shall include:
 - a. Non-Latched Entry: When an input activates, the alarm will not be reported until the entry delay expires. If the input is still active when the entry delay expires, the alarm will be reported. If the input is not active when the entry delay expires, then the alarm will not report.
 - b. Latched Entry: When an input activates, the alarm will not be reported until the entry delay expires. If the input is still active when the entry delay expires and the alarm has not been masked, the alarm will be reported. If the input has been masked when the entry delay expires, then the alarm will not report.
 - c. Exit Delay: When an input activates, the alarm will not be reported (operates as if masked) until the exit delay expires. If the input is still active when the exit delay expires, the alarm will be reported. If the input is not active when the exit delay expires, the alarm will not be reported.

F. Output Control Module (OCM) and Functionality:

1. Output control modules are not shown on the plans. Refer to the installation section of this specification for allowable equipment mounting locations. It is the responsibility of the Contractor to determine the number and configuration of output control modules required, based on the inherent characteristics of each product line and the requirements and restrictions described in this document.
2. The output control module(s) shall provide Form C relay contacts for load switching, rated at 3A at 28VDC.
3. Each relay shall support "On" "Off" and "Pulse."
4. Outputs can be pulsed from 0.1 seconds to 24 hours.
5. Status LEDs for communication to the host, heartbeat and relay status.
6. 2-wire RS485 communications.
7. No fewer than eight (8) outputs per board/control module.
8. Communications line supervision.

2.3 APPLICATION SOFTWARE

A. General Performance:

1. The application software, in conjunction with the associated hardware, shall have the following features, functionality and capabilities. The functions that are to be implemented shall be determined in the planning conference between Contractor and Owner referenced in Part 3 of this section.
2. All Users:
 - a. All users shall be capable of being authenticated against Active Directory using LDAP before being granted system access. Should the Owner not use Active Directory, the system shall provide a built-in login and credential management tool to permit rules-based access rights on a per-user basis.
 - b. The access rights shall be selectable on a per-user basis. In addition, user groups shall be capable of being assigned whereby each user group has a common set of access rights. Users shall be capable of being assigned to these user groups by the system administrator.
3. Operators:
 - a. Operator Groups: A minimum of 32 operator groups, allowing specific system module privileges to be accessed with each module being granted specific views, edit and execute privileges.
 - b. Operator Levels: System access shall require a valid operator name and password, governing a specific operator's level of access to each menu item.
 - c. The SMS shall allow a system operator to login over another system operator who is already logged into the same client workstation without the need to reboot the system. This process shall log the first system operator off alarm monitoring and log the new system operator on, changing any permission necessary for that system operator.
4. Logs, Status, Maintenance, Diagnostics:
 - a. Historical Log: The system shall allow event history to be written to the hard disk in an archive format. At a minimum, the system shall support 500,000 transactions. Warning messages shall be generated at a user defined level of capacity. The system shall have the ability to offload the archive files to removable media automatically or manually.
 - b. System Status: The system shall query the status of any or all of the system's access control points, inputs and outputs.
 - c. System Maintenance/Diagnostics: The system shall provide for remote diagnostic capabilities. In addition, online diagnostics and communications maintenance shall be able to be activated from the operator interface.

5. Administrator:
 - a. The SMS shall provide system administrators with the ability to segment their access control SMS field hardware devices into various zones or areas where alarm monitoring client workstations will monitor. These zones shall be assigned an alphanumeric name using up to a minimum of 64 characters.
 - b. The SMS shall allow other devices such as card readers, input and output modules and intelligent system controllers to be automatically part of the monitoring zone when an intelligent system controller is selected, and it shall allow the system administrator to define which devices such as card readers, etc. belong to that monitor zone.
 - c. Updating of monitor zones shall take place in real time and without requiring operators to re-login.

6. General:
 - a. Elevator control support for the number of floors and cabs shown on the drawings.
 - b. The SMS shall use an open architecture where all data must reside on a single database and must be accessible in real time to every SMS workstation or web-based client connected to the network. The system database shall be used to create and maintain the cardholder database. A screen designer module shall allow the creation and editing of custom database tables and data entry screens.
 - c. The SMS shall be able to connect to and interface bi-directionally with external data sources using all of the following methods:
 - 1) ASCII with support for XML-formatted text exchange of data activated both manually and automatically.
 - 2) ASCII with support for XML-formatted text exchange of data using a direct table interface activated both manually and automatically.
 - 3) Real time exchange of data via Active Directory/LDAP utilizing an API supported by the SMS manufacturer. The live exchange of data shall permit exposure of SMS events and transactions to other data sources in real time and allow for receipt of data into the SMS, permitting this data to be acted upon and trigger linked events in the SMS in real time.
 - d. Security: Access privileges within the application software shall be permitted by use of a password protection system. The cardholder database shall have the following password security levels.
 - 1) A minimum of six (6) unique operator access levels
 - 2) Ability to view only the database fields
 - 3) Ability to restrict operator viewing to any of the individual database screens within a record
 - 4) Ability to restrict operator viewing to any of the database partitions
 - e. Cardholder Configurations: Each cardholder shall be capable of having up to five (5) access levels actively assigned to their account.
 - f. System shall have cardholder identifications for "Visitor" and "Escort", with an associated optional validity period assignable with an activation and deactivation date.
 - g. Cardholder database screen shall have the following data associated with each cardholder:
 - 1) Last edit by operator with edited date and time
 - 2) Last date/time card was used
 - 3) Last reader giving valid access
 - 4) Last reader denying access
 - 5) Anti-pass back status

- h. The system shall provide advanced query capability with the following search criteria: equal to, not equal to, greater than, greater than or equal to, less than, less than or equal to, like, is empty, is not empty, is between, and, or, not.
 - i. Access Control Configuration: The configuration application shall be password protected, restricting what each individual may edit or display inside the configuration application.
 - j. Text descriptions of access points such as doors.
- 7. Time Zones:
 - a. The SMS shall be capable of creating and storing up to 255 time zones. Each time zone shall have a minimum of six (6) intervals. Each interval shall be assignable to any day of the week.
 - b. Each time zone shall be assignable to an alphanumeric name. Time zones shall be applied to access levels, card reader modes, alarm inputs, alarm outputs, and alarm masking and logging functions. Time zones shall be allowed to belong to any or all access levels so that the time zone only has to be defined once.
- 8. Access Levels:
 - a. The SMS shall be capable of defining a minimum of multiple access levels per cardholder.
- 9. Temporary Access Levels:
 - a. The SMS shall be capable of assigning temporary access levels inclusive of the assignable access levels.
- 10. Access Groups:
 - a. The SMS shall be capable of assigning access groups.
 - b. Each access group shall be assignable to an alphanumeric name.
- 11. Precision Access Levels:
 - a. The SMS shall be capable of assigning precision access levels in addition to the access levels, with the ability to assign unlimited card reader and time zone combinations. Precision access levels provide capability of assigning a unique access level on a per card basis.
 - b. Each precision access level shall be assignable to an alphanumeric name.
- 12. Holidays:
 - a. The SMS shall provide holiday assignments using an embedded calendar. Access rights, card reader modes, and alarm masking schedules must be able to be altered when the current date is designated as a holiday.
 - b. Dates for Daylight Saving Time changes shall be definable and shall take effect automatically.
 - c. The SMS shall support holiday ranges that allow a single holiday to span across multiple calendar days.
- 13. Database Segmentation:
 - a. The SMS shall be required to support data segmentation whereby each segment shall have its own set of cardholders, field hardware, and system parameters (time zones, access levels, etc.).
 - b. This project will require that the database be segmented into Owner defined quantity

segments by the Contractor.

14. Field Hardware Communications:

- a. The SMS shall support communications with the intelligent system controllers (ISCs) by the following protocols:
 - 1) RS-232
 - 2) RS-485
 - 3) TCP/IP
 - 4) Open Supervised Device Protocol (OSDP)
- b. Upon loss of communications between the SMS server and the ISC, an alarm shall be created with a time stamp. Upon re-established communication, the SMS and the ISC shall automatically re-synchronize from the point of communication loss without operator intervention.

15. Dual Path Field Hardware Communication:

- a. The SMS shall support dual path communications between the SMS server and the ISCs. This shall allow for a redundant communication path in the event the primary path fails. The secondary path shall support all primary path protocols.
- b. In the event of a communication failure of the primary path, the ISC shall initiate a switchover to the secondary path. During this fail switchover period, the ISC shall periodically check to see if the primary path has been re-established and will automatically switch back upon a successful connection. Alarms shall be generated upon loss or restoration of communications.

16. Area Control:

- a. Area control shall be a security method of preventing a person from passing their credential to another person for dual entry into a single location using one card. The SMS shall support the following area control features.
- b. Global Hard Anti-Pass Back:
 - 1) The Global Hard Anti-Pass Back feature shall require that a credential always be used to enter and exit an area. The controlled areas shall have both entry and exit card readers at all portals. Entry and exit readers shall be able to span across multiple ISCs. Areas shall be logically defined under the SMS, and area control shall not be required at all areas. Global Hard Anti-Pass Back shall work in the following manner:
 - a) A cardholder must present his/her credential at the entry card reader of the area that the person wishes to enter. Once access has been granted into the area, the cardholder cannot present the credential to another entry card reader within the same area without first presenting his/her credential to the respective exit card reader of that area. Should a cardholder attempt to use any other card reader in the same area besides the occupied area's exit card reader once access has been granted to that area, the cardholder shall be denied access and an alarm shall be reported to the alarm monitoring client workstation. Nested control areas (areas inside areas) shall be definable with a minimum of 64 entry and exit card readers. It shall be possible to have an area within an area and/or multiple areas that are independent of each other in which Global Hard Anti-Pass Back rules shall apply.
- c. Global Soft Anti-Pass Back:

- 1) The Global Soft Anti-Pass Back feature shall require that a credential be used to enter and exit an area. The controlled areas shall have both entry and exit card readers at all portals. Entry and exit readers shall be able to span across multiple ISCs. Areas shall be logically defined under the SMS, and area control shall not be required at all areas. Global Soft Anti-Pass Back shall work in the following manner:
 - a) A cardholder must present his/her credential at the entry card reader of the area that the person wishes to enter. Once access has been granted into the area, the cardholder cannot present the credential to another entry card reader within the same area without first presenting his/her credential to the respective exit card reader of that area. Should a cardholder attempt to use any other card reader in the same area besides the occupied area's exit card reader once access has been granted to that area, the cardholder shall be allowed access (if that cardholder has the appropriate access level to access the new area), and an alarm shall be reported to the alarm monitoring client workstation. It shall be possible to have an area within an area and/or multiple areas that are independent of each other.

- d. The following summary criteria shall apply under Global Hard or Soft Anti-Pass Back:
 - 1) Initially all card holders are reset to Area 0.
 - 2) Any cardholder shall enter a controlled area any time after Time 0 by presenting a credential to a SMS entry card reader.
 - 3) A cardholder shall not exit the controlled area unless he/she has entered the area presenting a credential to the SMS entry card reader.
 - 4) A cardholder shall not enter the controlled area a second time unless the cardholder has exited that area previously.
 - 5) A cardholder shall be able to enter through any entry card reader and exit through any exit card reader of a single controlled area.
 - 6) These options shall include a "forgiveness" feature that will allow the system administrator to reactively reset the anti-pass back of all cardholders to Area 0, either through a manual override or a time zone command.
 - 7) The SMS shall provide an anti-pass back exempt option for privileged or VIP cardholders. Cardholders with this option will not have anti-pass back rules applied to them.
 - 8) The SMS shall also have a "forgiveness" feature that will allow the system administrator to proactively assign an automatic reset to an individual cardholder. This shall allow the system administrator to reset the anti-pass back of an individual cardholder to Area 0 automatically for a defined number of times.

- e. Timed Anti-Pass Back:
 - 1) Timed Anti-Pass Back shall allow the system administrator to decide how long after a cardholder has presented their credential that they will have to wait before the same credential will be accepted again at the same card reader. This helps prevent multiple swipes by an individual to allow access to others through turnstile doors.

- f. Two-Person Control:
 - 1) Two-Person Rule shall be provided to restrict access to certain areas unless there are two (2) cardholders present. This restricts individuals from being alone in restricted or highly secure areas. When an area is configured for Two-Person Rule, the following criteria shall prevail:

- a) The card reader shall grant access only if two valid cardholders (with authorized access levels) swipe their credentials one after the other. In the event a second authorized card is not presented within 10 seconds of the first authorized credential, the card reader shall reset and the first card will have to be swiped again.
 - b) Once two people occupy an area, individual access shall be granted.
 - c) Individual exit shall be permitted until an area is occupied by only two cardholders, at which point the Two-Person Rule applies for exit.

- g. Occupancy Limit:
 - 1) Occupancy Limit shall restrict the number of cardholders that shall be present in an area at any given time. The Occupancy Limit area shall be able to be defined by the system administrator up to the limits of the cardholder capacity of the system. Once the occupancy limit has been reached, a cardholder must swipe out of the exit card reader before the next cardholder may enter. Each area for which Occupancy Limit is enabled shall be definable with up to 64 entry/exit card readers. Multiple Occupancy Limit areas shall be definable.

- h. Mustering:
 - 1) The SMS shall support Mustering functionality. The Mustering function shall provide an automatic capability for registering cardholders that are on site during an incident. Designated exit and entry card readers shall be used to enter and leave hazardous locations and safe locations. When an incident occurs, a muster report shall be generated that consists of a listing of all personnel that are within the hazardous locations, as well as all personnel that have registered in a safe location.

- i. Alarm Masking Groups:
 - 1) The SMS shall support a group alarm masking feature whereby system administrators shall be able to create groups of alarm inputs that enable them to mask or unmask multiple input control module inputs and card reader inputs simultaneously.
 - 2) The following events shall have ability to be part of an alarm masking group:
 - a) Input Control Module Events
 - b) Alarm Input Active
 - c) Card Reader Events
 - d) Auxiliary Input Active
 - e) Denied Count Exceeded
 - f) Door Contact Tamper
 - g) Door Forced Open
 - h) Door Held Open
 - i) Card Reader Input Tamper
 - 3) Alarm Masking Groups shall be able to be masked as a group or as individual points.
 - 4) Alarm Masking Groups must support the ability to be masked multiple times. Alarm Masking Groups shall be able to be masked and/or unmasked via alarm monitoring commands by guards, via card reader keypad function keys, or via global linkage commands.
 - 5) The SMS shall support "2-man control" for masking Alarm Masking Groups.
 - 6) The SMS shall support an Alarm Masking Group status change (masked to unmasked or unmasked to masked) action to be linked to a function list that is capable of performing many system actions, such as activating a relay

output. The SMS shall support a minimum of 64 Alarm Masking Groups per intelligent system controller, with a minimum of 200 alarm inputs per Alarm Masking Group.

j. Cardholder Escort Control:

- 1) The SMS shall support comprehensive escort functionality based upon access levels. Access levels shall include options for "Escort Required", "Designated Escort", "Not an Escort" and "Does not require an Escort." Contractor shall integrate escort level and designation into badge design in cooperation with Owner.
- 2) The escort feature shall be capable of one-to-one and one-to-many Escort to Escorted functionality.

k. Cardholder Use Limits:

- 1) The SMS shall support a Cardholder Use Limit feature that shall allow system administrators to specify the maximum number of times that a cardholder may use their credential at card readers in the SMS.

l. Extended Individual Strike Times:

- 1) The SMS shall support Extended Individual Strike Times that allows a card reader's strike to be active for an extended period of time beyond the pre-determined standard strike time on a per cardholder basis. The extended strike time shall be user definable up to 255 seconds. Extended strike times shall be set on a card reader by card reader basis.

m. Extended Individual Door Held Open Times:

- 1) SMS shall support Extended Individual Door Held Open Times that allow a card reader's door to be held open for an extended period of time beyond the pre-determined standard held open time on a per cardholder basis. The extended held open time shall be user definable up to eight (8) hours. Extended held open times shall be set on a card reader by card reader basis.

n. Extended, On Demand, Door Held Open Times:

- 1) SMS shall support Extended, On Demand, Door Held Times via a command keypad located in the field. The Extended Held Open command configuration shall consist of a command key sequence that shall be from three to six keys used to enter the number of minutes to extend the door held open time (up to 999 minutes) and a pre-alarm time (from 0 to 30 minutes).
- 2) Only those cardholders having command authority at a given card reader configured for 'Allow User Commands' shall have the ability to execute the Extended Held Open command at that card reader. The Extended Held Open command shall be available after a valid cardholder has received an access grant at the card reader. Cardholder shall have a period of 15 seconds after access grant to enter the extended held open command sequence.

o. Graphical System Overview Tree:

- 1) Graphical System Overview Tree shall display a graphical representation of all field hardware including hardware from other systems which are interfaced. System administrators shall be able to modify a device that is depicted on the Graphical System Overview Tree or see its properties by double clicking on the icon, and the SMS shall bring them to the appropriate form.

- p. Pre-Alarm:
 - 1) The SMS shall support a Pre-Alarm feature at the card reader. The pre-alarm will sound a tone at the card reader prior to the door held open alarm. The pre-alarm setting shall be configurable for up to the maximum allowable door hold open time.

- q. Alarm/Event Logging:
 - 1) All alarms and events in the SMS shall, by default, always be recorded in the database. The SMS shall give system administrators the ability to select, on a time-zone basis, the times that they require the SMS to log specific events to the database.
 - 2) System administrators shall have the option for particular alarm/events to be set to log or not to log on any individual reader and/or input.

- r. Scheduling Utility:
 - 1) The SMS shall provide an integral Scheduling Utility. The Scheduling Utility shall allow system administrators to schedule actions to occur on a one-time or a recurring basis. Recurring schedules shall be configured to begin immediately, last indefinitely, or have optional start and end dates.
 - 2) The Scheduling Utility shall be available from both the system administration and alarm monitoring modules.
 - a) The types of actions that shall be schedulable include, but are not limited to:
 - b) Action Group
 - c) Event Archiving/Purging
 - d) Arm/Disarm Area
 - e) Start of Guard Tour
 - f) Execution of Scripts
 - g) Activate, Deactivate, Pulse Device Output and Device Output Groups
 - h) Global Anti-Pass back Reset
 - i) Download Firmware to equipment.
 - j) Download Database to ISCs
 - k) Execute Function List
 - l) Mask/Unmask Inputs, Input Groups, Alarm Mask Groups, Door Forced Open or Held Open
 - m) Open Door, Open Door Group
 - n) Change Reader Mode
 - o) Automatic Reports
 - p) Reset Use Limit
 - q) Move Bulk Credentials from an Area
 - r) Deactivate Credentials
 - s) Logout Visitors
 - t) Schedule PTZ Presets
 - 3) The Scheduling Utility shall maintain a history log in the database for actions that it executes.

17. Multiple Card Formats:

- a. Each ISC shall support a minimum of eight (8) access control card formats and, if applicable, eight (8) asset formats.

18. Card Reader Cipher Mode:

- a. The SMS shall support a Card Reader Cipher Mode that shall allow authorized cardholders to enter their credential ID by typing it into a card reader keypad, thus emulating the presentation of the credential to the card reader.
19. Denied Access Attempts Counter:
- a. The SMS shall support a Denied Access Attempts Count on a per card reader basis. The "Denied Attempts Count" value shall be configurable from 0 to 255. The following access denial types shall cause the current denied count to be incremented:
 - 1) Unknown PIN entry at a card reader configured as 'PIN or Card' mode.
 - 2) Invalid cipher entry at a card reader in Cipher Mode.
 - 3) Invalid PIN entered for a given card at a card reader configured as 'Card and PIN' mode.
 - 4) Non-matching biometric presented for a given card at a card reader in Biometric Verify mode.
20. Card Reader Time Zone Overrides:
- a. The SMS shall allow for the pre-defined default card reader settings to be overridden or temporarily changed on a time-zone basis. At the beginning of the selected time zone, the selected card reader's operational mode shall be modified from its default mode to any one of the following modes: Locked, Unlocked, Facility Code, Card Only, Card or PIN, Card and PIN, Card and Biometric, Card or PIN and Biometric, and/or Card and PIN and Biometric. The aforementioned options shall be available depending on the type of card reader used.
 - b. Each card reader shall have the ability to have multiple time zone setting overrides assigned to them as required by the system administrator.
21. Alarm/Event Routing:
- a. The SMS shall be capable of allowing system administrators to route alarms and events to various alarm monitoring client workstations on the network. The SMS shall allow any alarm or event to be routed to one or multiple client workstations on the network regardless of where the alarm is generated in the field. Alarms shall be routed to client workstations on a device-by-device level.
 - b. The SMS shall be capable of automatic re-routing of an alarm from workstation X to workstation Y if the alarm is not responded to within a user definable time period.
 - c. The SMS shall implement network synchronization such that in the event that an alarm is routed to multiple client workstations, once the first client workstation acknowledges the alarm, the alarm shall be cleared from all other client workstations. As such, alarms that are routed to an Alarm Monitoring client workstation that does not have a System Operator logged in shall be queued so that all unacknowledged alarms will report to that client workstation once a System Operator has logged into the SMS. Alarms/Events shall be routed based on default settings or time zone control.
22. Alarm Attributes:
- a. The system administrator shall have the ability to configure how the SMS handles the annunciation of alarms on an individual basis. Each alarm and/or event shall have the option(s) to:
 - 1) Display at one or more alarm monitoring client workstation.
 - 2) Allow higher priority alarms to be displayed on the alarm monitoring client workstation ahead of lower priority alarms.
 - 3) Require the field device that generated the alarm to be restored to its

- normal state before the alarm is cleared.
- 4) Print the alarm to the local event printer.
- 5) Have a customized voice message annunciate at the client workstation.
- 6) Have the alarm breakthrough to the alarm monitoring window should the system operator be working in another application
- 7) Allow system operators to change the journal entry once the alarm has been acknowledged.
- 8) Ensure that the alarm will not be able to be deleted from the alarm monitoring window upon acknowledgment.
- 9) Display text and audio instructions outlining the procedures to follow when responding to the alarm.
- 10) Automatically call-up associated maps.
- 11) Automatically call up the associated cardholder record.
- 12) Automatically call up the associated cardholder photo using the video verification function.
- 13) Require a password to view the alarm.
- 14) Require a password to acknowledge the alarm.
- 15) Require acknowledgment to clear.
- 16) Allow mandatory journal entry upon acknowledgment.
- 17) Use pre-defined journal entries for alarms.
- 18) Select the option for journal entry based upon the specific alarm.
- 19) Send surveillance interface commands to the surveillance system.
- 20) Automatically send an e-mail message.
- 21) Automatically send an alphanumeric page.
- 22) Have the alarm appear on the alarm monitoring window with a flashing colored coded bar across the alarm for high priority alarms.
- 23) Have the alarm, when acknowledged, display an alternative flashing color coded bar across the alarm than for the original alarm color.
- 24) Trigger a function list(s) when the alarm is acknowledged.
- 25) Require user logon for acknowledgment.
- 26) Have the ability to mark an alarm as "In Progress" where the system shall silence any repeating audio notifications on the workstation where the alarm was routed, and remove the alarm sprite notification on the graphical map. Additional operators' monitoring alarms shall be notified that the alarm has been marked "In Progress".

23. Alarm-Event Mappings:

- a. The SMS attributes in Alarm Attributes shall be assignable on a 'global' basis to all devices that share an alarm description. Thus, the 'Door Forced Open' alarm attributes shall apply to any door with a card reader that is forced open in the SMS. The SMS shall have the capability to assign a unique group of alarm attributes to specific device/alarm combinations to override the global settings for specific case settings. Each device/alarm combination shall have the ability to have its own unique attribute set if the system administrator desires.

24. System Downloads:

- a. The SMS shall provide for the downloading of data to the ISCs. Downloads shall load SMS information such as time zones, access levels, alarm configurations, cardholder information and card reader configurations.
- b. All ISCs on the SMS shall be capable of either full or selective downloads to individual intelligent system controllers, and bi-directionally so that alarms will still report to their respective alarm monitoring client workstations as cardholder information is being downloaded.
- c. Information on cardholder status, credential status, time zones or access levels shall download in real time as they are added, modified, or deleted from the SMS.

25. Portal Configuration Options:
- a. The SMS shall include the following options for each portal on the system:
 - 1) Allow user commands such as manual door unlock
 - 2) Rename auxiliary inputs
 - 3) Rename auxiliary outputs
 - 4) Independently supervise REX and DPS
 - 5) Configure REX and DPS as Normally Open or Normally Closed
 - 6) Deny if duress
 - 7) Assume door used
 - 8) Alarm masking
 - 9) Activate outputs
 - 10) Two card control
 - 11) Checkpoint
 - 12) Do not activate strike on REX
 - 13) The ability to allow system administrators to determine on a time-zone basis to log or not to log on a card reader by card reader basis
 - 14) Access grants
 - 15) Access denied
 - 16) Card reader status alarms
 - 17) The SMS shall allow for user definable door strike functionality for each card reader in the SMS
 - 18) The SMS shall allow for each card reader to be selected as either an 'In' reader, 'Out' reader, or 'None' to allow for ease of reporting time and attendance basic 'Time In' and 'Time Out' data.
 - 19) Enforce Use Limit: This option shall enable card use limits at the card reader. limiting the number of times that cardholders may use their credential to gain access at the card reader
 - 20) Supervise Door: Sets the SMS so that the card reader door contact is wired as a supervised input
26. The SMS shall allow for one or more access points in a specified area to be armed and disarmed directly from a control keypad.
27. Real-Time, Live Video User Verification:
- a. The SMS shall have the capability of interfacing to a surveillance system and displaying a live video image next to a stored cardholder image record. This feature shall be system configurable.
28. Traces:
- a. The SMS shall allow for a live or historical trace on any ISC, ICM, alarm input, credential (cardholder), intrusion detection device, monitor zone, or card reader. If applicable, the SMS shall allow for a trace on any asset, intercom, or camera. Multiple traces may be run simultaneously. The SMS shall allow system operators to filter alarm types from the history trace window. Alarms that shall be filtered from the trace window are access granted alarms, access denied alarms, system alarms, duress alarms, and area control alarms.
 - b. Destination Assurance: The system shall provide the ability to alert the system operator when a cardholder does not reach a required location and present their credential after entering at a designated checkpoint in a designated period of time.
29. Real-Time, Dynamic Graphical Maps:
- a. The SMS shall support graphical maps that display device and group status, function lists[**and video cameras**] dynamically in real time. The maps may be configured to appear on command or when specified alarms are selected for

acknowledgment. Map device icons shall have the ability to dynamically change shape and/or color to reflect the current state of the device.

- b. The SMS shall support all map formats listed below:
 - 1) Adobe Photoshop (.psd)
 - 2) AutoCAD DXF (.dxf)
 - 3) Encapsulated Post Script (.eps)
 - 4) JPEG (.jpg)
 - 5) TIFF (.tif)
 - 6) Windows Metafile (.wmf, .emf)
 - 7) Windows Bitmap (.bmp, .dib)
- c. The SMS shall support map hierarchies or maps within maps. There shall be no limit to the number of maps that shall be nested hierarchically with each other. Multiple maps may be displayed simultaneously.
- d. The SMS shall support user defined icons for field hardware devices. The SMS shall also give system operators the ability to affect the mode of card readers, open doors, start a trace on a device, mask/unmask alarm inputs, and activate/deactivate/pulse an output from the map icons.
- e. The graphical maps shall have the ability to be printed to a local printer.

2.4 ACCESS CONTROL GRAPHICAL USER INTERFACE (GUI)

- A. A workstation based custom GUI shall be provided for complete display of real time system activity.
- B. The GUI shall provide the following features:
 - 1. Display in real-time, the status of devices by dynamically changing shape or color to indicate status.
 - 2. Acknowledge alarm conditions.
 - 3. Perform manual operations on all monitor and control points.
 - 4. Perform graphic editing functions.
 - 5. Customization of icons color or shape based on status.
- C. Graphical representations shall be made of the following activity:
 - 1. Cardholder Activity: Access granted (including duress), access denied, lost card used, stolen card used, inactive card used, unescorted visitor.
 - 2. Input Point Activity: Input condition (normal, abnormal, cut, short, shunt, unshunt).
 - 3. Output Point Activity: On status (automatic, by operator, by link), off status (automatic, by operator, by link), access level on, access level off.
 - 4. Door Activity: Auto unlock, auto lock, closed, opened, forced open, left open, door switch cut, door switch shorted, REX status (cut, shorted, normal, abnormal), input unlock, operator lock, operator unlock.
 - 5. Controller Activity: Controller on-line, controller off-line, controller communications normal, communications cut.
 - 6. System Activity: System error, workstation start, workstation stop, printer off-line, printer unavailable, printer overflow, unknown card.
 - 7. Regional Group Activity: Occupancy restriction (high limit, low limit), anti-pass back (entry, exit), policy violation, escort left, number of escorts, numbers of users, number of visitors.
- D. The GUI shall display custom graphical screens, developed by the SMS vendor with electronic maps provided by Owner.
- E. The system shall have the ability to automatically call up specific maps. Each input point shall be linked to a primary map.
- F. Graphical editing software shall be included, allowing the Owner to create and edit the

graphical screens.

- G. Graphics screens shall be developed using a minimum of eight (8) colors from a palette of 64 available.
- H. The system shall operate on a Windows workstation as provided and recommended by the SMS vendor.

2.5 CREDENTIALS AND BADGING

A. Badging Station:

1. Provisioning:

- a. **[The workstation(s) shall be furnished by the Contractor and shall meet the specifications defined by the SMS software manufacturer to meet or exceed the functionality and performance specifications of the system and integrations defined in this and related sections. Contractor shall coordinate with Owner for possible requirements to utilize a specific manufacturer. Contractor-furnished workstation(s) shall have a three (3) year limited warranty.][The workstation(s) shall be furnished by the Owner and shall meet the specifications defined by the SMS software manufacturer to meet or exceed the functionality and performance specifications of the system and integrations defined in this and related sections. Contractor shall furnish specifications to the Owner in writing as part of the submittals.]**

2. Software:

a. General:

- 1) The SMS shall support a credential design module that is integral to the SMS source code with the ability to create and maintain credential designs. Features shall include the ability to support:

- a) Complete credential design and layout tools
- b) Chroma key
- c) Image import
- d) Ghosting
- e) Signature capture
- f) Barcodes
- g) Smart chip support

b. Licensing

- 1) Required badging/credential management licensing shall be furnished.

3. Hardware:

- a. Desktop configuration.
- b. Provide workstation with performance requirements that meet manufacturer recommendation.
- c. One (1) minimum 19" flat screen LCD monitor
- d. Printer:

- 1) Printer manufacturer shall be:

- a) HID Fargo DTC1250e

- 2) The SMS shall support a printer with industry standard and Microsoft certified drivers. The printer shall support:
 - a) Double sided printing at a resolution of no less than 300 dpi, full color on the front, monochrome on the back
 - b) Edge to edge printing
 - c) High speed printing per card of a minimum of 7 seconds for monochrome and 35 seconds for YMCKO
 - d) Holographic overlay
 - e) Inline magnetic stripe encoding
 - f) Inline Contactless Smart card encoding
 - g) An input feeder/hopper with a minimum capacity of 100 cards and an output stacker/hopper with a minimum capacity of 30 cards

e. Images:

1) Camera:

- a) The badging station shall be compatible with flash lighting and USB connected cameras, allowing the capture of a cardholder image at a minimum resolution of 3 mega pixels.
- b) SMS image capture, storage, and hardware compression techniques must be in compliance with the ANSI standard or JPEG (Joint Photographic Experts Group).
- c) The SMS shall provide the ability to capture a cardholder's image through the use of any industry standard scanner or digital camera that utilizes a TWAIN interface. Images shall be able to be scanned at up to 16.7 million colors for a true color scanned image. When using a digital camera that supports multiple resolutions, the system shall allow the operator to select the desired resolution.
- d) Include required USB interface box, camera, camera power supply, integral or external integrated flash, tripod and 4' x 4' wall mounted white backdrop.

2) Image Import:

- a) The SMS shall allow system operators to have the ability to import a cardholder's image at the time of enrollment.

4. Badge Design:

- a. Provide training and work in conjunction with Owner for development of four (4) badge designs.

5. Supplies:

a. Print Ribbons:

- 1) Print ribbons shall be provided to print 100) badges, plus one spare ribbon of the same type and capacity.

b. Cleaning Kits:

- 1) One cleaning kit shall be provided for every ribbon provided.

c. Lanyards and Sleeves:

- 1) Lanyards and badge sleeves shall be furnished by Owner.

d. Badge Quantities:

- 1) Badge quantities and types shall be as defined below.

B. Credentials:

1. Multi-Technology Cards: 13.56 MHz radio frequency identification electronics, passive design. Card shall meet ISO 15693 and ISO 14443B2 standards.
 - a. Maximum Dimensions: CR 79: 3.313" x 2.063" x 0.04", CR 80: 3.375" x 2.125" x 0.04".
 - b. Construction to be of PVC or polyester laminate
 - c. Each card shall contain a unique serial number.
 - d. Cards shall contain options for various memory capacities of 2k, 16k or 32k with a fixed number of application areas or areas which are sized by dynamic allocation.
 - e. Each application area shall contain a unique authentication key. The card and reader shall require matching keys in order to function together. All RF communication between card and reader shall be encrypted using a secure algorithm.
 - f. The card shall be protected with DES or 3DES encryption algorithms.
 - g. The cards shall be provided with custom keys uniquely matched to individual sites/customers to allow a non-interchangeable, high level of security through the use of formatting programs such as HID iClass Elite or Corporate 1000.
 - h. Cards shall be encoded with bit lengths that are compatible with all other components of the SMS.
 - i. Application areas shall be reserved for future applications as Owner requires.
 - j. Cards shall support programming and updating of custom applications after issue.
 - k. Cards shall be capable of having a photo and/or other graphical images printed directly on the surface of the card.
 - l. Provide optional slot punch-outs on the short and long edge of the card.
 - m. Provide multi-technology cards. Cards shall be individually numbered with sequential matching of internal and external numbers.
 - n. Cards shall be provided with a lifetime warranty.
2. Contactless Smart Fobs: 13.56 MHz radio frequency identification, passive design.
3. Contactless Smart Fobs: 125 kHz radio frequency identification, passive design.
4. Adhesive Tags: 13.56 MHz radio frequency identification, passive design
5. Adhesive Tags: 125 kHz radio frequency identification, passive design.
 - a. Fobs:
 - 1) Maximum Dimensions: 2" x 1.25" x 0.4". Constructed of molded and ultrasonically sealed polycarbonate body. The molded body shall contain a hole for attachment to a keychain.
 - 2) Supports attachment to keychain.
 - 3) Meets ISO 15693 and 14443B2 standards.
 - 4) Read range shall not be affected by body shielding or environmental conditions.
 - b. Adhesive Disk:
 - 1) Maximum Dimensions: 1.4" diameter
 - c. Each credential shall contain a unique serial number.
 - d. Credential shall contain at least three memory capacities from 2k, 4k, 8k, 16k or 32k with associated allocation areas.
 - e. Each application area shall contain a unique authentication key. The credential and reader shall require matching keys in order to function together. All RF communication between the credential and reader shall be encrypted using a secure algorithm.

C. Credential Management:

1. The SMS shall support a Credential Management and Enrollment module that is integral to the SMS source code with the ability to create and maintain the cardholder database. Features shall include the ability to:
 - a. Add, modify and delete records based upon permissions
 - b. Capture photo images, biometric information and signatures
 - c. Print credentials
 - d. Boolean search on any single or multiple fields
 - e. Customization of screen layout and field names
 - f. Advanced customization of fields, field names and screen tabs (pages) with optional Forms Designing and Editing module
 - g. Determine single or multiple active credentials
 - h. Assign access levels and access groups
 - i. Bulk assignment/modification/deletion of access levels
 - j. Bulk deletion of cardholder records.

2. The SMS shall support the following bar codes:
 - a. Code 3 of 9 (3:1)
 - b. Code 93
 - c. UPCA
 - d. EAN 13
 - e. EAN 8
 - f. Code 128 A
 - g. Code 128 B
 - h. Code 128 C
 - i. Codabar
 - j. PostNET (Zip + 4 Postal)
 - k. Code 3 of 9 (2:1)
 - l. Interleaved 2 of 5 (2:1)
 - m. PDF-417 (2D)
 - n. Code 128 Auto
 - o. UCC-128
 - p. MSI Plessey
 - q. Extended Code 3 of 9
 - r. Extended Code 93
 - s. 2D Aztec

2.6 PORTAL DEVICES

A. Credential Readers:

1. Manufacturers:
 - a. HID Multiclass SE
 - b. Pre-approved equal

2. Multi-Technology:
 - a. Compatible with 125 kHz proximity, 13.56 MHz Contactless Smart card, MIFARE, DESFire EV1.
 - b. Backwards compatibility with legacy 13.56 MHz Contactless Smart cards and 125 kHz proximity access control formats, including 26, 32, 35, 37 bit as well as HID Corporate 1000 format.

3. Card readers manufactured specifically for non-access control applications shall not be

- acceptable.
- 4. FIPS 201 compliant.
- 5. Provide compatibility with most access control systems by providing card data outputs in Wiegand and Clock/Data.
- 6. Allow the firmware to be updated in the field without the need to remove the reader from the wall.
- 7. Secure mounting methods using tamper resistant screws.
- 8. An audio beeper that provides various tones to signify access granted, access denied, power up and diagnostics.
- 9. Tri-color LED or three (3) LEDs for visual notification of various conditions.
- 10. ISO1443A, 1443B and 15693 compliant.
- 11. The ability to transmit an alarm from an integrated tamper switch.
- 12. Support dual authentication of identity through the combined use of access badge and personal identification number (PIN) on an integrated 12 key keypad.
- 13. PBT polymer or UL94 polycarbonate.
- 14. Read Range:
 - a. Using 125 kHz cards or 13.56 MHz Contactless Smart cards, minimum operational read range shall not be less than one (1) inch after the readers have been installed in their permanent locations.
- 15. Operational voltage of 5-16 VDC, with operating temperature range of -31° F to 150° F and rated for outdoor use with a minimum rating of IP55.
- 16. Readers and credentials shall be compatible with each other and shall be from the same manufacturer.
- 17. Available in sizes to be mounted to standard single gang box or to a mullion. Maximum sizes:
 - a. Single gang box mount, with or without keypad: 5.1" x 3.1" x 1.1"
 - b. Mullion mount: 6.0" x 1.9" x 0.9"
- 18. Lifetime warranty against defects in material and workmanship.

B. Request-To-Exit Motion Detector:

- 1. Manufacturers:
 - a. Bosch DS 160 Series
 - b. Pre-approved equal
 - c. Refer to drawings for approved manufacturers.
- 2. Door monitor with sounder alert. Sounder alert shall have adjustable volume.
- 3. Adjustable latch time.
- 4. Selectable fail safe/fail secure.
- 5. Activation LED.
- 6. 12 or 24 VDC operation.
- 7. Sequential logic input.
- 8. Two (2) Form C contacts.
- 9. Tamper switch.
- 10. Field of view masking.

C. Request-To-Exit Button:

- 1. Manufacturers:
 - a. Dynalock 6290 Series
 - b. Seco-Larm SD7213 Series
 - c. RCI 991 Series
 - d. Pre-approved equal

- e. Refer to drawings for approved manufacturers.
 - 2. 0-60 second adjustable pneumatic action.
 - 3. Contacts shall be one of the following:
 - a. DPDT
 - b. SPDT double break with isolated common
 - c. DPST
 - d. Normally closed SPST with normally open SPST
 - 4. One and one-half inches (1-1/2") to two inches (2") red mushroom button.
 - 5. Stainless steel or aluminum plate labeled "EXIT" or "PUSH TO EXIT".
 - 6. Available in mullion mount.
- D. Door Position Switch:
- 1. Manufacturers:
 - a. GE
 - b. GRI
 - c. Honeywell
 - d. Pre-approved equal
 - 2. Interior or Perimeter Door:
 - a. One (1) inch or 0.75 (3/4) inch diameter, recessed
 - b. DPDT contacts
 - c. 0.75" to 1.25" (3/4" to 1-1/4") gap for wood door
 - d. Maximum 0.375" to 0.625" (3/8" to 5/8") gap for steel door
 - e. Basis of Design: UTC/GE/Sentrol 1076D
- E. Cable:
- 1. Composite cable is allowed, although sufficient conductors may not be available in composite cables for all portal configurations. Contractor shall be responsible for additional required cables beyond one composite cable to each portal to meet functional requirements of the system.
 - a. Reader: 18 AWG, 3 pair, stranded, overall shield. Shield shall be grounded at control panel end only.
 - b. Request to Exit Motion Detector: 22 AWG, 4 conductor, stranded.
 - c. Door Position Switch: 22 AWG, 2 conductor, stranded.
 - d. Request to Exit Button: 22 AWG, 4 conductor, stranded.
 - e. Lock: Minimum 18 AWG, 4 conductor, stranded.
 - 1) Lock may require heavier gauge cable depending on door hardware solution power requirements. Contractor shall coordinate with door hardware provider for higher current devices and shall adjust the gauge of the lock cable accordingly.
 - f. Auxiliary Devices: Refer to plans for requirements.
- F. Locks and Door Hardware:
- 1. Electric/electronic locks shall be furnished and installed by the door hardware provider.
 - 2. Access Control Contractor shall interface with and terminate cables to locks.
 - 3. Access Control Contractor shall coordinate with door hardware provider for specified sequences of operation at the various portals.

4. Electrified cylindrical and electrified mortise locks shall have an integrated request-to-exit device.
5. Electric strikes shall have an integrated latch bolt monitor, and the dead latch shall be seated properly so that the strike cannot be defeated by manipulation.
6. Magnetic locks shall have a magnetic bond sensor.
7. Refer to architectural specifications and/or the architectural door schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with the manufacturer's instructions and recommendations for installation of all products.
- B. Provide all system wiring between all components as shown on the project drawings or as directed by the manufacturer, whichever is the more stringent requirement.
- C. Network controllers shall be installed centralized in the nearest telecommunications room(s). Mount controllers to the structural walls in a location coordinated with other utilities. Coordinate exact location with Owner prior to installation. Provide dedicated +120 VAC power circuit to the controllers using #12 AWG wiring from the nearest electrical power distribution panel board.
- D. Provide wiring and connection to all electrified locking hardware devices. Complete programming and testing of all electrified locking hardware devices.
- E. Install all credential readers in accordance with manufacturer's instructions where shown on floor plans, in accordance with the Americans with Disabilities Act (ADA) requirements. Provide wiring and connection to all credential readers. Complete programming, adjustment, and testing of all credential readers.
- F. Provide wiring and connection to all hardware request-to-exit devices that are integral to electrified door hardware. Provide wiring and connection to all request-to-exit motion detectors. Complete programming and testing of all integrated request-to-exit devices. Where possible, avoid false activation by persons passing by but not exiting.
- G. Install all request-to-exit motion detectors in accordance with manufacturer's instructions directly above the door frame, centered on the door opening. Adjust sensitivity to permit operation on motion of persons within 2'-0" of door. Avoid false activation by persons passing by where possible.
- H. Install all request-to-exit pushbuttons in accordance with manufacturer's instructions where shown on floor plans, in accordance with the Americans with Disabilities Act (ADA) requirements. Provide wiring and connection to all request-to-exit pushbuttons. Complete programming, adjustment and testing of all request-to-exit pushbuttons.
- I. Install all door alarm contacts in accordance with manufacturer's instructions either recessed in the door header or surface mounted as required. Provide wiring and connection to door alarm contact devices. Complete programming, adjustment and testing of all door alarm contacts.
- J. Install all duress switches in accordance with manufacturer's instructions, surface mounted under counter in locations shown on plans. Verify exact mounting location with Owner prior to cable rough-in or installation. For hard wired devices, provide wiring and connection to duress switch devices. For wireless duress switch devices, mount receivers in accessible locations. Complete programming, adjustment and testing of all duress switch devices. Wireless testing shall include signal reception when transmitter is in all sections of the area in which it will be used in normal operations.

- K. Install, wire, configure, adjust, program and test all access control system servers, workstations, badging workstations and other user interfaces.
- L. Install, wire, configure, adjust, program, and test all specified interfaces and integrations between access control and other systems. Contractor shall provide all cabling, wiring, terminations, components, devices, accessories, hardware, software and other material and accessories necessary to complete all specified interfaces and integrations and make them fully operational.
- M. All low voltage access control cabling shall be routed with other low voltage cabling and shall route through cable tray and non-continuous cable support pathways to the fullest extent possible.
- N. Electronic access control system cabling shall not be spliced.
- O. Flexible conduit is not allowed except with prior approval. Refer to Section 26 05 33 for conduit requirements. Refer to Section 27 05 28 for cable hanger and support requirements.
- P. Each cable shall be appropriately identified, as defined on the record documents, at each end's termination point using pressure sensitive label strips.
- Q. The conductor color code used in terminating system cabling at system devices shall remain consistent from device to device for each unique device type throughout the project.
- R. Install and tighten all connectors in accordance with manufacturer's instructions using the appropriately designed tools recommended by the manufacturer for that purpose. Do not strip or damage connectors, terminals, or equipment by over tightening termination fasteners.
- S. Grounding and Bonding Requirements:
 - 1. Provide a minimum of 6AWG bonding conductor from each electronic access control system control panel, power supply and surge suppression device to the nearest telecommunications grounding busbar. Actual bonding conductor size is determined by its length; refer to Section 27 05 26 for grounding and bonding conductor sizing criteria.
 - 2. Cables containing shields shall not have the shields grounded at conduits, boxes, racks, etc. Ground the shield only at the control panel end.
- T. Coordinate installation of all devices with other trades and utilities in the vicinity.
- U. Cabling shall be plenum rated when installed outside conduit in plenum ceilings.

3.2 FIELD QUALITY CONTROL

- A. Where these specifications require a product or assembly without the use of a brand or trade name, provide a product that meets the requirements of the specifications as supplied and warranted by the system manufacturer. If the product or assembly is not available from the system vendor, provide product or assembly as recommended by the system manufacturer.
- B. Periodic observations will be performed during construction to verify compliance with the requirements of the specifications. These services do not relieve the Contractor of responsibility for compliance with the contract documents.
- C. Furnish products listed and classified by Underwriters Laboratories, Inc. (UL) as suitable for purpose specified and indicated.

3.3 MANUFACTURER AND INTEGRATOR COMBINED FIELD SERVICES

- A. Installation shall be performed by a factory-trained and certified Contractor.

- B. The Contractor shall provide a comprehensive, site-specific customer planning guide for the system. The Contractor shall conduct conference(s) with the Owner prior to any installation to discuss the programming and configuration options of the system and the planning guide.
- C. The Contractor shall include labor for all planning and all programming activities required to implement the Owner's access policies for each system point and each operator and administrator. Any software programmable access policy, within the bounds of the hardware specified, shall be included.
- D. It shall be the responsibility of the Contractor to provide a complete, functional system as described by the design documents. These responsibilities include:
 - 1. Complete hardware setup, installation, wiring and software configuration of the system server, all workstations and all peripheral hardware.
 - 2. Complete programming of all operator software in accordance with the Owner's access policies determined by the planning guide conference(s).
 - 3. Manual data entry of 200cardholders based on a printed roster provided by the Owner.
 - 4. Configuration of the network software for operation of the system. Templates shall be established representative of all user access right levels.
 - 5. Programming of all cardholder database screens including cardholder information screens, report templates, queries, etc. Encoding of 200credentials shall be included.
 - 6. Programming of all custom graphic GUI screens including devices.
 - 7. Complete system diagnostic verification.
- E. The SMS Installation Contractor shall be present at meetings to coordinate all door hardware requirements with the door hardware vendor.

3.4 SYSTEM DOCUMENTATION

- A. Complete documentation shall be provided for the system. The documentation shall describe:
 - 1. All operational parameters of the system
 - 2. Complete documentation of programming and access policies
 - 3. Complete operating instructions for all hardware and software
- B. The following sections shall be provided in the system documentation:
 - 1. System Administrator Manual: Provides an overview and a step-by-step guide and instructions detailing all system administrator responsibilities and functions.
 - 2. User Manual: A step-by-step guide and instructions detailing all system user functions.
 - 3. Alarm Monitoring Manual: A step-by-step guide and instructions detailing all alarm monitoring system functions and responsibilities.
 - 4. Technical Maintenance Manual: A comprehensive document providing all maintenance actions, system testing schedules, troubleshooting flowcharts, functional system layout, wiring diagrams, block diagrams and schematic diagrams.
 - 5. Refer to Part 1 for details.

3.5 SYSTEM TRAINING

- A. All labor and materials required for on-site system training by a certified representative of the system manufacturer shall be provided. Training shall be conducted at the project site using the project equipment.
- B. Coordinate training days and times with Owner.
- C. Provide a training outline agenda describing the subject matter and the recommended audience for each topic.

- D. At a minimum, the following training shall be conducted:
1. System Administrators: A course detailing the system functions, configurations and operations. Provide training on all aspects of the system including data import/export, report, cardholder management, system workstation and server configuration and maintenance, software and hardware configuration and peripheral hardware operation.
 2. Operators: A course detailing the operational features of all aspects of the user interface. Topics shall include alarm monitoring functions, reports, error handling, alarm handling, output relay control, operation of integrated systems interface, and general overview of the report hardware.
 3. GUI Editing: Conduct detailed training on using the GUI editing software. Topics shall include the editing of existing graphical maps and the creation of new graphical maps.
- E. Minimum on-site training times shall be:
1. System Administrators: Eight (8) hours.
 2. Operators: Eight (8) hours.
 3. GUI Editing: Eight (8) hours.
 4. Integrations : Eight (8) hours.
 5. Badging System: Eight (8) hours.
 6. Four (4) additional hours of training each quarter for the 12-month period of the project warranty shall be provided. A minimum of half of this additional training shall be on site; the remainder may be support by telephone or email. Contractor shall document this training, including dates performed, trainer and Owner representative(s) present. Each phone call or email shall be documented as a minimum of 15 minutes duration.
 7. Operators and administrators are present 24 hours a day, 7 days a week. Contractor shall coordinate with Owner to provide training for all appropriate personnel, which may require Contractor to be present on site during non-business hours. Therefore, the hours in any or all categories defined above may be divided among the various shifts.

3.6 SYSTEM ACCEPTANCE

- A. The SMS vendor shall submit for review a formal acceptance and system checkout program. The system checkout procedures shall include all system components, software and functionality. The Contractor shall perform the tests and document all results under the supervision of the manufacturer's systems engineer.
- B. All operational scenarios, as defined by the customer planning guide, shall be tested to simulate the actual use of the system in the normal operating environment. The successful completion of these operational scenarios shall be documented.
- C. The system shall not be accepted until all requirements of system documentation and training have been completed.

END OF SECTION

SECTION 28 31 01 - FIRE ALARM AND DETECTION SYSTEMS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Fire alarm and detection systems.
- B. One-way emergency communications system with voice notification within-building, coverage.
- C. Contacts: Automatic Building Controls, Inc. - Monte Dumke (605) 359-1175

1.2 RELATED WORK

- A. Section 26 05 53 - Electrical Identification: Refer to electrical identification for color and identification labeling requirements.

1.3 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in smoke detection and fire alarm systems with ten years' experience.
- B. Installer: A factory-authorized Electrical or Security Contractor licensed with the State and local jurisdiction with five years' experience in the design, installation, and maintenance of fire alarm systems by that manufacturer.
- C. Qualifications: The person managing/overseeing the preparation of shop drawings and the system installation/programming/testing shall be trained and certified by the system manufacturer and shall be Fire Alarm Certified by NICET, minimum Level 3. This person's name and certification number shall appear on the start-up and testing reports.

1.4 REFERENCES

- A. ASME A17.1 - Safety Code for Elevators and Escalators
- B. NFPA 70 - National Electrical Code (NEC)
- C. NFPA 72 - National Fire Alarm and Signaling Code
- D. NFPA 101 - Life Safety Code
- E. UL 2017 - General Purpose Signaling Devices and Systems
- F. UL 217 / 268 - Standard for Smoke Alarms / Smoke Detectors for Fire Alarm Systems

1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 26 05 00 & as noted below.
 - 1. Failure to comply with all the following and all the provisions in 26 05 00 will result in the shop drawing submittal being rejected without review.
 - 2. Failure to submit the fire alarm without all requirements fulfilled in a single comprehensive submittal will be grounds to require a complete resubmittal.
- B. Provide product catalog data sheets as shop drawings.
 - 1. Provide a product catalog data sheet for each item shown on the Electrical Symbols List

- and for each piece of equipment that is not shown on the drawings, but required for the operation of the system.
2. Where a particular Electrical Symbols List item has one or more variations (such as those denoted by subscripts, etc.) a separate additional product catalog data sheet shall be provided for each variation that requires a different part number to be ordered. The corresponding Electrical Symbols List symbol shall be shown on the top of each sheet.
 3. Where multiple items and options are shown on one data sheet, the part number and options of the item to be used shall be clearly denoted.
- C. Submit CAD Floor Plans as Shop Drawings:
1. The complete layout of the entire system, device addresses, auxiliary equipment, and manufacturer's wiring requirements shall be shown.
 2. Indicate the precise routing of notification appliance circuits under the provisions of circuit survivability. Refer to "Wiring" under Part 3 - Execution of this specification section for requirements.
 3. A legend or key shall be provided to show which symbols shown on the submittal floor plans correspond with symbols shown on the Contract Documents.
- D. About all fire alarm circuits, provide the following: manufacturer's wiring requirements (manufacturer, type, size, etc.) and voltage drop calculations.
- E. Provide installation and maintenance manuals under provisions of Section 26 05 00.
- F. Submit manufacturer's certificate that system meets or exceeds specified requirements.
- G. Provide information on the system batteries as follows: total battery capacity, total capacity used by all devices on this project, total available future capacity.
- H. Voice Alarm Communication System: Submit equipment rack or console layout, grounding schematic, amplifier power calculations, and wiring diagram.
- I. Incident Commander Display: Submit sample display screen layouts and list of functions for Authority Having Jurisdiction (AHJ) review and coordination.
- J. Emergency Communication System: Submit equipment rack or console layout, grounding schematic, amplifier power calculations, and wiring diagram.
- K. Submit photocopy proof of NICET certification of the person overseeing the preparation of drawings and installation/testing.
- L. When required to comply with local or state regulatory reviews, the fire alarm submittal shall have a NICET Certification of the state in which the project is completed. NOTE: The Architect/Engineer cannot stamp and seal submittal drawings not prepared under their supervision.

1.6 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Provide quantity equal to 2 percent (2%) of amount of each type installed, but no less than two (2) units of each type.
 - a. Smoke and heat detectors, manual pull stations, duct smoke detectors, monitor modules, control modules and relays.
 - b. Notification Appliances: Speakers, speaker strobes, and strobes.

2. Keys: The installing contractor shall collect all equipment spare keys provided with each lockable or resettable device/cabinet minimum of one (1) set each and shall turn over to the Owner upon completion.
3. All spare parts shall be housed in metal cabinet labeled "Fire Alarm Spare Parts."
4. Portable Firefighter Emergency Handset Phones: Provide . Locate in the.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 26 05 00.
- B. Store and protect products under provisions of Section 26 05 00.

1.8 REGULATORY REQUIREMENTS

- A. System: UL or FM Global listed.
- B. Conform to requirements of NFPA 101.
- C. Conform to requirements of Americans with Disabilities Act (ADA).
- D. Conform to UL 864 Fire Alarm, UL 1076 Security, UL2017 General Signaling, and UL 2572 Mass Notification Communications.

1.9 SYSTEM DESCRIPTION

- A. Performance Statement: This specification section and the accompanying fire alarm specific design documents describe the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the equipment described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all wiring, programming and miscellaneous equipment required for a complete and operational system.
- B. Section of the specifications includes the furnishing, installation and connection of the microprocessor controlled, intelligent reporting, fire alarm equipment required to form a complete coordinated system that is ready for operation. It shall include, but is not limited to, alarm initiating devices, emergency communication systems, control panels, auxiliary control devices, annunciators, power supplies, and wiring as indicated on the drawings and specified herein.
- C. Graham Hall - Existing Fire Alarm System: Graham Hall fire alarm system requires to be separated from Lincoln Hall prior to demolition of Lincoln hall. Utilize the existing fire alarm headend from Briscoe Hall and relocate to room in Graham Hall as shown and provide all items, components, devices, hardware, software, programming, expansion components, conduit, wiring etc. needed for a complete and operational system. This includes, but is not limited to, additional power supplies, initiating devices and circuits, signaling devices and circuits, monitoring devices and circuits, auxiliary control and related devices such as, door holders and their control, smoke damper control, fan shutdown, etc. The Graham Fire alarm system shall be dedicated to Graham Hall and tied into the existing campus Johnson Control system for alarm and supervisory signals. The existing fire alarm system shall be interfaced with the new fire alarm system relocated panel such that the existing fire alarm system's functionality, integrity and annunciation shall be equivalent to pre-construction conditions, unless noted otherwise. The functionality and integrity shall be maintained during construction. The entire system shall be able to be completely reset from any single reset location point. The entire system shall be annunciated at any annunciation location.
- D. Graham Hall - The contractor shall include field verifying and tracing all fire alarm wiring that serves Graham Hall from Lincoln Hall; intercepting the wiring and making any and all connections to the Graham Hall.

- E. Extending the existing Siemens Fire Alarm System: Existing control panel shall remain and shall be operational throughout construction. The system shall only be disabled to make new connections and to modify the programming. A fire watch shall be provided for all areas affected during outages. All system outages must be scheduled with the Owner at least one week prior. Individual devices may be disabled as needed based on construction activities to reduce the potential for false alarms, but all devices must be operational when the Contractor is not physically on site. New initiating devices may be connected to the existing signaling line circuits where capacity is available. Provide additional signaling line circuits as needed based on existing and new device quantity, including replacement of existing panel components. Provide new notification circuits to serve the new devices, including all necessary power supplies, amplifiers, batteries, and 120-volt input circuits. All new devices shall be programmed to provide the same sequence of operation as the existing devices of the same type, unless noted otherwise.
- F. Lincoln Hall - new building fire alarm will be an addressable system with voice.
- G. Fire Alarm System: NFPA 72; Automatic and manual fire alarm system, non-coded, analog-addressable with automatic sensitivity control of certain detectors, multiplexed signal transmission.
- H. Voice Communication: The facility shall have an emergency voice alarm communication system. The digitized recorded voice message shall notify occupants that a fire condition has been reported. Emergency manual voice override shall be provided.
- I. Emergency Communication System (ECS): A system capable of reproduction of prerecorded, synthesized, or live messages with voice intelligibility to indicate the existence of an emergency situation and communicating information necessary to facilitate an appropriate response and action. The system shall provide alerting in the building.
- J. System Supervision: Provide electrically supervised system, with supervised Signal Line Circuit (SLC) and Notification Appliance Circuit (NAC). Occurrence of single ground or open condition in initiating or signaling circuit places circuit in TROUBLE mode. Component or power supply failure places system in TROUBLE mode.
- K. Alarm Reset: Key-accessible RESET function resets alarm system out of ALARM if alarm initiating circuits have cleared.
- L. Lamp Test: Manual LAMP TEST function causes alarm indication at each zone at fire alarm control panel and at annunciator panels.
- M. Drawings: Only device layouts and some equipment have been shown on the contract drawings. Wiring and additional equipment to make a complete and functioning system has not been shown, but shall be submitted on the shop drawings.

1.10 PROJECT RECORD DOCUMENTS

- A. Submit documents under the provisions of Section 26 05 00.
- B. Include location of end-of-line devices.
- C. Provide a CAD drawing of each area of the building (minimum scale of 1/16" = 1'-0") showing each device on the project and its address. Devices shall be shown in their installed location and shall be labeled with the same nomenclature as is used in the fire alarm panel programming.
- D. Submit test results of sound pressure level (dBA) and intelligibility (STI) with the rooms tested designated on the floor plan. Notification devices shall have the tap wattage designated.

1.11 OPERATION AND MAINTENANCE DATA

- A. Submit data under provisions of Section 26 05 00.
- B. Include operating instructions, and maintenance and repair procedures.
- C. Include results of testing of all devices and functions.
- D. Include manufacturer's representative's letter stating that system is operational.
- E. Include the CAD floor plan drawings.
- F. Include shop drawings as reviewed by Architect/Engineer and local Authority Having Jurisdiction.

1.12 WARRANTY

- A. Provide one (1) year warranty on all materials and labor from Date of Substantial Completion.
- B. Warranty requirements shall include furnishing and installing all software upgrades issued by the manufacturer during the one (1) year warranty period.

1.13 ANNUAL INSPECTION/TESTING AND SERVICE CONTRACT

- A. Provide cost to furnish service, inspect, and test all devices of the fire alarm system per the requirement of NFPA for one (1) year, starting one year after the Date of Substantial Completion. Submit written reports of inspection testing per NFPA 72, Chapter 14.
- B. Provide an alternate cost for a complete inspection/testing and service/maintenance contract for the fire alarm system for one (1) year two (2) years, starting one year after the Date of Substantial Completion. Submit sample contract terms and conditions for review with shop drawings.
- C. Owner may enter into a contract directly with the vendor after shop drawing submittals. This specification is not a contract between the Owner and the vendor to perform these services.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Siemens Fire Safety

2.2 FIRE ALARM CONTROL PANEL (FAP)

- A. Control Panel: Modular, power-limited electronic design. Provide surface wall-mounted enclosure as shown on plans. Enclosure shall be minimum 0.060 steel with provisions for electrical conduit connections into the sides and top. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.
- B. Each Signaling Line Circuit (SLC loop) shall not be loaded over 80% of the maximum device capacity. For example, in the minimum system capacity column listed below, if the fire alarm manufacturer's system capacity of analog sensors per loop is 99 devices, then no more than 79 devices shall be wired on that loop. The minimum system capacity shall be as follows:
 - 1. Minimum Total Addressable Points: 250
 - 2. Minimum Total SLC Loops (including board, ready for field connections): 4
 - 3. Panel Expansion Capability, Minimum Total SLC Loops: 10
 - 4. Minimum Node Capacity for Network System: 100

- C. Signal Line Circuit (SLC) and Notification Appliance Circuit (NAC) Boards:
1. Class X. All devices shall have built in class X isolation.
 2. Each board shall communicate directly with each addressable analog sensor and binary input to determine normal, alarm, or trouble conditions. Analog signals would be used for automatic test and determination of maintenance requirements.
 3. Each board shall contain its own microprocessor and shall be provided to monitor addressable inputs and to control addressable outputs (addressable relays). The board shall communicate and provide power to all devices on its loop over a single pair of wires, except where 4-wire devices require a separate power circuit.
- D. Central Processing Unit:
1. The central processing unit (CPU) shall communicate with the monitor and control all other modules in the panel. Removal, disconnection or failure of any control panel module shall be detected and reported to the CPU.
 2. The CPU shall execute all control-by-event programs for specific action to be taken if a designated situation is detected in the system. A real-time system clock for time annotations on the display and printer shall be included.
 3. All power for the unit shall be supervised and supplied by the FAP.
- E. Display:
1. The board shall provide all controls and indicators used by the system operator and may also be used to program all control panel parameters.
 2. The board shall provide an alphanumeric array for display of custom alphanumeric labels for all addressable points. It shall also provide indicators for AC Power, System Alarm, System Trouble, Display Trouble and Signal Silence.
 3. Displayed descriptions of addressable points shall include actual room names/numbers selected by the Owner. This information shall be obtained prior to programming. Room names/numbers shown on floor plans shall not be used.
 4. The board shall provide a touch key-pad with control capability to command all system functions and entry of any alphanumeric information. Twenty different passwords with four levels of security shall be supported to prevent unauthorized manual control or programming.
- F. Memory: The CPU and display interface board shall be augmented by non-volatile field programmable memory. EPROM memory will also be allowed provided the memory is burned in with minimum expansion capability equal to the total system capacity of the panel. Memory shall not be lost upon primary and secondary power failure.
- G. Serial Interface Board: The board shall provide interfaces to a printer, LCD display and other monitoring devices through RS-232 connections. The minimum operational distance between the board and the peripheral devices shall be 500 feet. Up to three (3) RS-232 outputs shall be supported.
- H. Power Supply:
1. Input power shall be 120 VAC, 60 Hertz. Output power shall be as noted on the device specifications and drawings. Each component of the fire alarm system requiring 120 VAC input power shall be served from a dedicated branch circuit. Provide two #12 conductors and one #12 ground in 3/4" conduit to a dedicated 20A/1P circuit breaker with a red handle and a manufacturer's standard handle lock-on device. Identify/label breaker and branch circuit in accordance with NFPA requirements and Specification Section 26 05 53.
 2. Adequate to supply 125% of all control panel and peripheral power needs as well as 125% of power required for all external audio-visual devices. The power supply may be increased as needed by adding additional modular expansion power supplies. Over-

current protections shall be provided on all power outputs.

3. All power supplies shall be designed and installed to meet UL and NFPA requirements for power-limited operation on all external initiating and indicating circuits.
4. The power supply shall provide integral charger for use with internal batteries. Battery capacity shall be sufficient for operation of the entire system for 24 hours in a non-alarm state followed by alarm mode for 15 minutes, plus 25% spare capacity for future devices.

I. Surge Protection:

1. All fire alarm control panels, NAC panels, etc. shall be provided with a surge protection device (SPD). The SPD shall be UL listed to Standard 1449 Rev 3. The unit should be clearly labeled in accordance with Identification Section 26 05 53. The SPD shall have thermal fuses to protect against fire in short circuit conditions. The unit shall provide visual indication that the unit is protecting and functioning.
2. Any communications or signaling circuits associated with the fire alarm system, which leave or enter a facility, shall be provided with a surge protection device. The devices shall be as recommended by the fire alarm system manufacturer.

J. Dual Digital Communicator:

1. Provide dual phone line interface capable of fire alarm notification to the local fire department, fire protection agency, or monitoring service. Communicator shall report in SIA and most major communication formats, with the capability of transmitting each device address point in a format compatible with the central station receiver.
2. Monitoring fees and initial connection charges are not part of this project.
3. Communicator shall be fully supervised and shall operate on loop start phase lines ahead of the building PBX system.
4. Communicator shall be FCC registered. Contractor shall provide two RJ31X jacks. Contractor to provide connection of communicators to Owner's telephone system as shown on the drawings.
5. Approvals: UL listed - UL 864/NFPA 72, FM approved.
6. The communicator shall be provided integral to the fire alarm panel as furnished by the fire alarm panel manufacturer. If the panel construction requires a separate unit, the unit shall be as manufactured by Silent Knight, Ademco, or fire alarm panel manufacturer approved equal.

K. IP-GSM Digital Cellular Fire Communicator:

1. Provide digital internet / cellular phone interface capable of fire alarm notification to the local fire department, fire protection agency, or monitoring service. Monitoring fees and initial connection charges are not part of this project.
2. Contractor to provide connection of communicator to Owner's Ethernet 10/100 Base network connection. Wiring shall be in 1" conduit.
3. Communicator shall convert fire alarm control panel phone outputs into Ethernet packets and transmit to GSM networks in area including 2G, 3G, and 4G.
4. Communication shall include system status including individual addressable device status, power loss, low battery and earth fault, and 24-hour test signal.

2.3 Fire Alarm Pathway Class and Survivability Level

A. Pathway Class:

1. Pathway Class X: Circuits capable of transmitting an alarm signal during an open or a non-simultaneous single ground fault on a circuit conductor wiring system. Wiring of outgoing and return conductors shall be physically separated by a minimum of 50 feet or by a 2-hour rated enclosure.
2. Pathway Class B: Circuits NOT capable of transmitting an alarm beyond the location of the fault condition. Wiring of outgoing and return conductors is permitted to be run in the

- same conduit or cable.
3. Pathway Class: SLC for addressable devices with less than 50 devices can be Class A or B, and more than 50 devices shall be Class X.

B. Pathway Survivability Level:

1. Pathway Survivability Level 0: Circuits have no requirements for pathway survivability beyond the requirements of the code.
2. Pathway Survivability Level 1: Circuits are protected by an automatic sprinkler system and installed in metal raceways.
3. Pathway Survivability Level 2: Pathway survivability includes one or more of the following:
 - a. Listed 2-hour fire-rated circuit integrity (CI) or fire-resistive cable.
 - b. Pathway installed in a 2-hour fire-rated enclosure or assembly.
4. Pathway Survivability Level 3: Circuits protected by an automatic sprinkler system and one or more of the following:
 - a. Listed 2-hour fire-rated circuit integrity (CI) or fire-resistive cable.
 - b. Pathway installed in a 2-hour fire-rated enclosure or assembly.
5. Shared Pathway Designation Level 1: Physical segregation of life safety and non-life safety data is not required. Life safety data shall be the priority.
6. Shared Pathway Designation Level 2: Provide physical segregation of all life safety and non-life safety data.
7. Shared Pathway Designation Level 3: Provide pathways with equipment dedicated to the life safety system.

C. Interconnection of Multiple Fire Alarm Panels:

1. The pathways of interconnected fire alarm panels or systems shall be as follows:
2. Pathway Class X: Circuits with redundant pathways capable of transmitting an alarm signal during an open or a non-simultaneous single ground fault on a circuit conductor wiring system. Wiring of outgoing and return conductors shall be physically separated by a minimum of 50 feet or by a 2-hour rated enclosure.
3. Pathway Survivability Level 2: Pathway survivability includes one or more of the following:
 - a. Listed 2-hour fire-rated circuit integrity (CI) or fire-resistive cable.
 - b. Pathway installed in a 2-hour fire-rated enclosure or assembly.
4. Pathway Survivability Level 3: Circuits protected by an automatic sprinkler system and one or more of the following:
 - a. Listed 2-hour fire-rated circuit integrity (CI) or fire-resistive cable.
 - b. Pathway installed in a 2-hour fire-rated enclosure or assembly.

2.4 SIGNALING LINE CIRCUIT DEVICES

- A. Combination Devices: Subscripts identify combination type devices when applicable. Contractor shall provide the combination device or provide multiple device(s) to meet the functionality when the manufacturer does not offer the required functionality with a single device.
- B. Signal Line Device(s):
 1. All devices must have built in isolation for Class X circuits.

2. Subscripts: Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
 - a. Device type as follows:
 - 1) W = Weather Proof
 - 2) WG = Wire guard is required
 - 3) Candela Ratings:
 - a) ## = 15 Candela, 30 Candela; 75 Candela; 110 Candela; 177 Candela
 - b) CD = NICET designer shall select Candela rating as required to provide full coverage of the space.
 - b. Sequence of operation as follows:
 - 1) A = Atrium
 - 2) CA = Clean Agent System
 - 3) CR = Computer Room
 - 4) E = Elevator Recall
 - 5) D = HVAC Control
 - 6) DH = Door Hold Release
 - 7) DIPS = Dual Interlock Pre-Action System
 - 8) FD = Fire Door Release
 - 9) MP = Medical Procedure Room
 - 10) S = Sleeping / Patient Room
 - 11) SW = Stairwell

C. Smoke Detectors:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
 - a. Device types as follows:
 - 1) Blank = Photoelectric
 - 2) AT = Attic (located in)
 - 3) BR = Beam Receiver
 - 4) BT = Beam Transmitter
 - 5) CO = Combination Smoke / Carbon Monoxide
 - 6) COH = Combination Smoke / Carbon Monoxide / Heat
 - 7) COS = Combination Smoke / Carbon Monoxide / Strobe
 - 8) H = Combination Smoke / Heat Detectors
 - 9) ION = Ionization Type
 - 10) ID = In-Duct Detector
 - 11) SA = Stand Alone with Sounder
 - 12) SB = Sounder Base
 - 13) SV = Stand Alone with Sounder and 177 Candela Strobe
 2. Analog Photoelectric Type Sensor: Shall use the photoelectric principle to measure smoke density and send data to the control panel representing the analog level of smoke density measured.
 3. (CO) Combination Smoke / Carbon Monoxide:
 - a. Multi-criteria sensor for photoelectrical smoke sensing and carbon monoxide (CO) detection. Carbon monoxide electrolytic sensing module shall provide toxic gas sensing to UL2034 and UL2075 standards.
 - b. The combined photoelectric smoke detection CO module shall have separate

- sensors that adjust the detection profile in response to the input from the sensors.
 - c. The combined photoelectric smoke detection / CO module shall have selectable modes of operation for OSHA compliant toxic gas sensing, enhanced fire sensing, and nuisance alarm reduction mode.
 - d. The detector shall use only one address on the SLC.
 - e. CO sensor cartridge element shall be field replaceable.
- 4. (COH) Combination Smoke / Carbon Monoxide/Heat Detector:
 - a. Multi-criteria sensor for photoelectrical smoke sensing, heat and carbon monoxide (CO) detection. Carbon monoxide electrolytic sensing module shall provide toxic gas sensing to UL2034 and UL2075 standards.
 - b. Combined photoelectric smoke detection / heat / CO module shall have separate sensors that adjust the detection profile in response to the input from the sensors.
 - c. The combined photoelectric smoke detection / CO module shall have selectable modes of operation for OSHA compliant toxic gas sensing, enhanced fire sensing, and nuisance alarm reduction mode.
 - d. The detector shall use only one address on the SLC.
 - e. CO sensor cartridge element shall be field replaceable.
- 5. (COS) Combination Smoke / Carbon Monoxide/ Strobe Detector:
 - a. Multi-criteria sensor for photoelectrical smoke sensing, carbon monoxide (CO) detection, and 177 Candela strobe. Carbon monoxide electrolytic sensing module shall provide toxic gas sensing to UL2034 and UL2075 standards.
 - b. Combined photoelectric smoke detection / heat / CO module shall have separate sensors that adjust the detection profile in response to the input from the sensors.
 - c. The combined photoelectric smoke detection / CO module shall have selectable modes of operation for OSHA compliant toxic gas sensing, enhanced fire sensing, and nuisance alarm reduction mode.
 - d. The detector shall use only one address on the SLC.
 - e. CO sensor cartridge element shall be field replaceable.
- 6. (H) Combination Smoke / Heat Detector:
 - a. Multi-criteria sensor for photoelectrical smoke sensing and rate of rise heat detection. Carbon monoxide electrolytic sensing module shall provide toxic gas sensing to UL2034 and UL2075 standards.
 - b. The detector shall use only one address on the SLC
- 7. (ION) Analog Ionization Type Sensor: Shall use the dual chamber ionization principle to measure smoke density and send data to the control panel representing the analog level of smoke density measured.
- 8. (SB) Analog Photoelectric Type Sensor with Sounder Base
- 9. Each smoke detector shall connect directly to an SLC loop, unless listed as stand alone.
- 10. Each detector shall be mounted, where shown on the drawings, on a twist-lock base with all mounting hardware provided. Provide a two-piece head/base design.
- 11. Each detector shall have a manual switching means to set the internal identifying code (address) of that detector, which the control panel shall use to identify its address with the type of sensor connected.
- 12. Dual alarm and power indicators shall be provided that flash under normal conditions and remain continuous under alarm or trouble conditions. Remote indicator terminals shall be provided. Provide a remote LED indicator device if detector is not visible from a floor standing position.
- 13. A test means shall be provided to simulate an alarm condition.
- 14. Where operation is noted as required below 32°F and/or above 120°F, a conventional device shall be installed with a unique monitor module located in the nearest available location with maintained temperatures between 32°F and 120°F.

D. Duct Smoke Detectors, Sampling Tube Type:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
 - a. Device types as follows:
 - 1) # = Equipment or system
 - b. Duct-type smoke detectors shall use the same analog photoelectric sensor technology, with the same features specified for standard smoke detectors, except with additional features as specified below.
 - c. Provide sampling tubes and mounting hardware to match the duct to which it is attached. Where the detector housing is larger than the duct height, Contractor shall fabricate a mounting bracket for the detector and attach according to the fire alarm manufacturer's recommendations.
 - d. Provide a remote alarm LED indicator device (FA-241) or (FA-242) if detector is not visible from a floor-standing position. If detector is located above a suspended ceiling, mount remote indicator in ceiling directly below detector with a white single-gang faceplate labeled: Duct Smoke Detector.

E. Manual Pull Stations:

1. Manual pull station, addressable, single action with plastic breakrod, reset key lock, semi-flush mount, red high abuse plastic or cast metal construction with white lettering. Provided with all necessary mounting hardware.
2. Manual stations shall connect directly to an SLC loop. Stations shall provide address setting means using rotary decimal or DIP switches.
3. Where operation is noted as required below 32°F and/or above 120°F, a conventional device shall be installed with a unique monitor module located in the nearest available location, with maintained temperatures between 32°F and 120°F.

F. Manual Pull Stations with Cover:

1. Manual pull station, addressable, double action with plastic breakrod, reset key lock, semi-flush mount, red high abuse plastic or cast metal construction with white lettering. Provide device with clear Lexan tamper resistant cover with integral 9V battery powered alarm that sounds when shield is lifted. Provided with all necessary mounting hardware.
2. Manual stations shall connect directly to an SLC loop. Stations shall provide address setting means using rotary decimal or DIP switches.
3. Where operation is noted as required below 32°F and/or above 120°F, a conventional device shall be installed with a unique monitor module located in the nearest available location, with maintained temperatures between 32°F and 120°F.

G. Heat Detectors:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
 - a. Device types as follows:
 - 1) Blank = Combination Rate of Rise / Fixed Temp
 - 2) AT = Attic (located in)
 - 3) F = Fixed Temp
 - 4) RC = Rate Compensated
2. Combination rate of rise and 135°F fixed temperature analog thermal type sensor. Factory programmed to alarm at 135°F and at 15°F per minute rate-of-rise. Sensor shall

measure heat level and send data to the control panel representing the analog level of thermal measurement and rate-of-rise.

3. (F) 200°F fixed temperature. Provide a remote addressable monitor module to interface with addressable system as shown on the plans.
4. (RC) Rate Compensated
5. Provide a two-piece head/base design, with a manual switching means to set the internal identifying code (address) of that detector, which the control panel shall use to identify its address with the type of sensor connected.
6. Heat detectors shall connect directly to SLC loops. Where fixed temperature or explosion proof detectors are used, one monitor module may be used to monitor all detectors in one room/area as shown on the drawings.
7. Detectors shall be mounted, where shown on the drawings, on a twist-lock base with all mounting hardware provided.
8. Provide a remote LED indicator device if detector is not visible from a floor-standing position.
9. Dual alarm and power indicators shall be provided that flash under normal conditions and remain continuous under alarm or trouble conditions. A connection for attachment of a remote indicator shall be provided.
10. A test means shall be provided to simulate an alarm condition.
11. Where operation is noted as required below 32°F and/or above 120°F, a conventional device shall be installed with a unique monitor module located in the nearest available location with maintained temperatures between 32°F and 120°F.

H. Monitor Modules:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
 - a. Device types as follows:
 - 1) Blank = Refer to Plans
 - 2) KB = Knox Box Monitor
2. Monitor Module shall connect directly to an SLC loop and receive power from a separate 24 VDC circuit. It shall interface initiating devices with the control panel using Style D or Style B circuits. Contractor Option: Use an interface module (2-wire operation) for Style B circuits connected to normally-open dry contacts, such as a flow switch.
3. The module shall be mounted in an enclosure located in an accessible service location as near as possible to the device(s) being monitored, or where shown on the drawings. All mounting hardware shall be provided.
4. The module shall supply the required power to operate the monitored device(s).
5. The module shall provide address setting means using rotary decimal or DIP switches.

I. Addressable Control Module:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation
 - a. Device types as follows:
 - 1) Blank = Refer to Plans
 - 2) DH = Door Hold Open
 - 3) PD = Hold Open Override
2. Relay that represents an addressable control point used primarily for the control of auxiliary devices as indicated on the drawings. Contractor to provide additional child relay(s), as required, rated for the electrical load being controlled (Contractor to match voltage, amps, etc.).

3. Relay shall connect directly to an SLC loop and receive power from a separate 24 VDC circuit.
4. The relay shall be mounted in an enclosure located in an accessible service location as near as possible to the device(s) being controlled, unless otherwise shown on the drawings. All mounting hardware shall be provided.
5. The relay shall supply 24 VDC power to the device(s) being controlled, unless otherwise indicated on the drawings.

J. Isolation Module:

1. Provide fault isolation modules or isolator detector base capable of isolating and removing the fault from Class A or Class X addressable loop data circuits while allowing the remaining data loop to continue operation. Provide isolation modules or bases between every device.

2.5 NOTIFICATION APPLIANCE DEVICES

A. Combination Devices: Subscripts identify combination type devices when applicable. Contractor shall provide the combination device or provide multiple device(s) to meet the functionality when the manufacturer does not offer the required functionality with a single device.

B. Notification Appliance Device(s):

1. Subscripts: Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
 - a. Device types as follows:
 - 1) W = Weather Proof
 - 2) WG = Wire guard is required
 - 3) Candela Ratings:
 - a) ## = 15 Candela; 30 Candela; 75 Candela; 110 Candela; 177 Candela
 - b) CD = NICET designer shall select Candela rating as required to provide full coverage of the space.

C. Notification Device(s):

1. Wall Mounted: White housing with red lettering or pictogram.
2. Ceiling Mounted: White housing with red lettering or pictogram.

D. Visual Alarm Devices:

1. Wall or ceiling mounted, refer to plans.
2. High intensity (Candela rating as scheduled on the drawings) xenon strobe or equivalent under a lens. Candela rating shall be visible from exterior of the device.
3. The maximum pulse duration shall be 0.2 seconds with a maximum duty cycle of 40%. The flash rate shall be 1 Hz. Where more than two strobes are visible from any one location, the fire alarm visual devices shall be synchronized.
4. Device, housing, and backbox shall be UL listed for fire alarm/emergency applications.
5. (W) Weatherproof Visual Notification Device: High intensity strobe, square housing, 75 Candela rating, suitable for wet locations. Provide with weatherproof back box.
 - a. Mounting: Semi-flush wall.
 - b. Conduit shall not be exposed.

E. Audio (Speaker) Alarm Devices:

1. Wall or ceiling mounted, refer to plans.
2. Sound rating shall be dependent on the tap (wattage) setting. Tap settings shall be available in 3 dBA increments. A minimum of four (4) tap settings should be available to allow field adjustment of the sound output across a minimum range of 78 to 87 dBA, 400Hz to 4KHz (6 dBA cutoff) frequency range. Speakers shall operate on a 25-volt or 70-volt RMS system, unless otherwise noted on drawings.
3. Speakers shall clearly reproduce a signal consisting of a live or prerecorded human voice and with voice intelligibility.
4. Speaker, housing, and backbox shall be UL listed for fire alarm/emergency applications.
5. Wall Mounted: Speaker, square housing, flush or semi-flush mounted.
6. Ceiling Mounted: 4" speaker, round housing, flush mounted (provide tile bridge where applicable).

F. Emergency Combination Audio (Voice) and Visual Alarm Device:

1. Wall or ceiling mounted, refer to plans.
2. Combine speaker and visual components shall have a clear lens for fire alarm annunciation strobe and an amber lens for the alert strobe into a single device. Refer to the corresponding paragraphs above for requirements of each component.
3. (W) Weatherproof Voice/Visual Notification Device: Speaker with high intensity 75 Candela rated strobe. 25-volt or 70-volt VRMS with a minimum of four (4) tap settings which shall allow field adjustment of the sound output across a minimum range of 78 to 87 dBA (UL 1480), 400 Hz to 4 KHz (6dBA cutoff) frequency range.
 - a. Mounting: Semi-flush wall.
 - b. Conduit shall not be exposed.

G. Emergency Visual Alarm Device:

1. Wall or ceiling mounted, refer to plans.
2. High intensity xenon strobe or equivalent shall have a clear lens for fire alarm annunciation strobe and an amber lens for the alert strobe. Candela rating shall be visible from exterior of the device.
3. The maximum pulse duration shall be 0.2 seconds with a maximum duty cycle of 40%. The flash rate shall be 1 Hz. Where more than two strobes are visible from any one location, the fire alarm visual devices shall be synchronized.
4. Device, housing, and backbox shall be UL listed for fire alarm/emergency applications.
5. (W) Weatherproof Visual Notification Device: High intensity strobe, square housing, 75 Candela rating, suitable for wet locations. Provide with weatherproof back box.
 - a. Mounting: Semi-flush wall.
 - b. Conduit shall not be exposed.

2.6 DOOR HOLD-OPEN DEVICES

A. FA-270; Electromagnetic Door Holder Devices:

1. Surface wall mounted.
2. Voltage: 24VAC.
3. Holding force shall be 25 pounds minimum.
4. Provide fail-safe operation; power failure releases door.
5. Provide self-adjusting swivel catch plate with pivot points to adjust to door alignment changes.
6. Provide all hardware and wiring needed to accommodate the complete functioning door holder installation.
7. Ensure that the door hardware and trim projections are compatible with total projection of door release.
8. Provide firm anchoring for the electromagnet, such that the mounting box and device will

not move independently from the wall or floor they are mounted to. This device and mounting will function as a doorstop and hold the force of the door closer mechanism.

9. Follow manufacturer recommended installation and location instructions unless noted otherwise.
10. Electromagnetic door holder devices, housing, and back box shall be UL listed.

2.7 NOTIFICATION APPLIANCE CIRCUIT PANEL (NAC)

- A. As shown on the plans or as a Contractor option if not shown, furnish and install NAC extender panels as necessary to provide remote power supply for notification appliance circuits (NAC). Contractor shall indicate quantity and locations of each NAC on the shop drawing submittals.
- B. Each NAC shall be self-contained remote power supply with batteries, and battery charger mounted in a surface lockable cabinet. Battery capacity shall be sufficient for operation for 24 hours in a non-alarm state followed by alarm for 15 minutes, plus 25% spare capacity for future devices. Each NAC provides a minimum of up to 4 outputs, 2A continuous, or 6A full load total capacity.
- C. Power for each NAC shall be from a local 120 VAC circuit. Provide two #12 conductors and one #12 ground in 1/2" conduit to each NAC from a dedicated 20A/1P circuit breaker with a red handle and a manufacturer's standard handle lock-on device. Coordinate panel and circuit number with the Architect/Engineer prior to installation.
- D. NAC extender panels may be installed only in locations coordinated with Architect/Engineer.
- E. Mounting: Surface.

2.8 ANNUNCIATION

- A. Remote LCD Annunciators:
 1. Auxiliary annunciators shall indicate alarm and trouble conditions visually and audibly as shown on the drawings. Provide local TROUBLE ACKNOWLEDGE, TEST, and ALARM SILENCE capability. Minimum 80-character display.
 2. Communications and power to the annunciators shall be supervised. The annunciator shall receive power from the fire alarm control panel.
 3. A single key switch shall enable all switches on the annunciator.
 4. Mounting: Flush.
- B. Facility Management Control System (FMCS) Interface:
 1. Provide addressable relays to report the following to the FMCS via dry contact monitoring on the FMCS:
 - a. General Alarm
 - b. System Trouble
 - c. Supervisory Alarm
 - d. Other Alarms (if applicable)
 2. Provide BACnet IP interface for fire alarm panel to communicate status with the FMCS. Provide list of points and descriptions to FMCS supplier.
 - a. UL listed to Standard 864. Provide RJ45 connection and cable.
- C. FA-241; Fire Alarm Remote Indicator:
 1. Red LED type.

2. Mounts flush to a single gang box.

D. FA-242; Fire Alarm Remote Indicator and Test Switch:

1. Red LED type.
2. Key switch test selector.
3. Mounts flush to a single gang box.

2.9 CONNECTIONS TO AUXILIARY DEVICES PROVIDED BY OTHERS

A. Smoke and Fire/Smoke Damper Controller:

1. Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
2. Device types as follows:
 - a. + = Indicates equipment system associated with smoke or fire/smoke damper.
3. Motorized type 24 VAC, furnished and installed by MC. Fire alarm control and power connections by EC. A subscript is used to identify the device with a specific air handler or zone for its sequence of operation. Refer to the Fire Alarm Operation Matrix on the drawings and the sequence of operation descriptions in this specification section for additional requirements.
4. The EC provides:
 - a. Fire alarm control and power connections by EC.
 - b. Fire alarm addressable control module (FA-161) located within 5 feet of smoke damper.
 - c. Smoke detection, selected by NICET designer based on duct size, ventilation airflow, and specific field conditions. Detector shall be mounted within 5 feet of smoke damper. Approved options include:
 - 1) Smoke Detector (FA-120) (ID) In-Duct Detector. In-duct smoke detector in ducts less than 18". Detector shall be listed for use in HVAC ductwork.
 - 2) Duct Smoke Detector (FA-122). Sampling type duct detector (FA-122) in ducts 18" and larger.
 - d. Remote indicator (FA-241) or Remote Indicator with test switch (FA-242) mounted in visible location. Refer to drawings for mounting location or verify location with engineer when not shown.
 - e. The smoke damper shall close upon activation of the detector, and a supervisory signal shall be sent to the fire alarm control panel. Refer to the Fire Alarm Operation Matrix and these specifications for complete requirements.
5. Provide an enclosure and equipment for interface of dampers with the fire alarm system and temperature control system.

B. Flow Switch:

1. (FA-260) Connection to flow switch to monitor fire protection flow switch or discharge output contacts. Normally open dry contacts for fire alarm interface. Furnished and installed by MC; wired by EC.
2. Provide a dedicated monitor switch for each sprinkler flow switch.

C. Tamper / Monitor Switch:

1. Connection to monitor switch to monitor fire protection system supervisory switches or output contacts. Normally open dry contacts for fire alarm interface. Furnished and installed by MC; wired by EC.
2. Tamper switches in the same room or system may be monitored by a single monitor

- switch when shown grouped on the plans.
3. Subscripts: Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
 4. Device types as follows:
 - a. Blank = Refer to Plans
 - b. PIV = Post Indicator Valve

D. Door Hold Device:

1. Subscript: Subscripts are used to define the device type, installation, and identify the device with a specific sequence of operation.
 - a. DH - Door Hold Open
 - b. PD = Hold Open Override
2. Integral with door hardware, 24 VAC. Furnished and installed by GC. Fire alarm control and power connections by EC.
3. (PD) Hold open override connection to GC-provided power door operator. EC shall intercept the hold open switch wiring (unless specific contacts for this purpose are provided on the door) and connect addressable relay to override this switch and allow the door to close. All modifications to the power door operator shall be coordinated with the GC.

2.10 WIRING

- A. Fire alarm wiring/cabling shall be furnished and installed by the Contractor in accordance with manufacturer recommendations and pursuant to National Fire Codes. Cabling shall be UL listed and labeled as complying with Electrical Code for power-limited fire alarm signal service.
- B. Fire Alarm Cable:
 1. Manufacturers:
 - a. Comtran Corp.
 - b. Helix/HiTemp Cables, Inc.
 - c. Rockbestos-Suprenant Cable Corp.
 - d. West Penn Wire/CDT.
 - e. Radix.

PART 3 - EXECUTION

3.1 SEQUENCES OF FIRE ALARM OPERATION

- A. General:
 1. Refer to the Fire Alarm Operation Matrix on the drawings for basic requirements and system operation.
 2. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
- B. Panel/Annunciator Alarm, Trouble, Supervisory Indication:
 1. Appropriate system Alarm, Trouble, or Supervisory LED shall flash at the control panel, transponder, and annunciator locations.
 2. A local signal in the control panel shall sound.

3. The LCD display shall indicate all information associated with the condition, including the name of the item, type of device and its location within the protected premises.
4. history storage equipment shall log the information associated with the fire alarm control panel (FAP) condition, along with the time and date.
5. Transmit the appropriate signal (supervisory, trouble, alarm) to the central station via the digital communicator.
6. Transmit the appropriate signal (supervisory, trouble, alarm) to the building automation system via addressable relays tied to contact monitors on the system.

C. Audible Alarms Sequence:

1. Audible alarms throughout the building shall sound.
2. Audible alarms within the floor or where the emergency signal originated floors shall sound.
3. Separate voice announcements shall be played in different fire compartments depending on proximity to the device that initiated the alarm. Refer to the requirements above for the Voice Command Center programming.

D. Visual Alarms Sequence:

1. Visual alarms throughout the building shall flash.
2. Visual alarms within the floor or fire/smoke compartment where the emergency signal originated floors shall flash.

E. Smoke Damper Control Sequence:

1. The fire alarm system shall utilize an addressable relay to open the power connection to smoke or fire/smoke dampers and allow them to close. Coordinate other requirements with damper installer.
2. Where a damper is in a main air duct, where closure of that single damper will entirely block airflow in the duct system, the smoke damper sequence shall also initiate the AHU and mechanical fan shutdown sequence for the affected unit.
3. The AHU and mechanical fan shutdown sequence shall be initiated only when ALL the dampers associated with that unit or mechanical fan are closed. Otherwise, the AHU or mechanical fan shall continue to serve other areas.
4. Smoke and fire/smoke dampers located in branch ductwork shall be closed individually or in groups, as identified on the plans.
5. All smoke and fire/smoke dampers shall be closed throughout the building.

F. AHU and Mechanical Fan Shutdown Sequence:

1. The fire alarm system shall utilize addressable relays to de-energize all AHU motor controllers and mechanical fans. Coordinate other requirements with HVAC installer.
2. The fire alarm system shall directly shut down the AHU or mechanical fan through the local HVAC control device (i.e., variable frequency drive or motor starter).
3. Where a facility has more than one AHU or mechanical fan, each shall be shutdown individually based on input from initiation devices in the area served by the unit or designated for each air distribution system.
4. All AHUs and mechanical fans shall be shutdown simultaneously throughout the building.

G. Door Holder Release Sequence:

1. The fire alarm system shall utilize an addressable relay to open the power connection to integral and magnetic door holders.
2. The fire alarm system shall utilize an addressable relay to open the 'hold' switch circuitry, integral to the power door.
3. Door holders shall release individually based on initiation devices in the vicinity of the door and noted specifically for door closure.

4. All door holders throughout the floor shall release simultaneously.

H. Elevator Recall Sequence:

1. Elevator recall sequences shall meet requirements of ASME/ANSI A17.1 and NFPA 72.
2. Upon signal from a smoke detector in the machine room, hoistway, or any elevator lobby other than the "designated level" the fire alarm shall utilize an addressable relay to signal the elevator to recall to designated level as determined by Authority Having Jurisdiction.
3. Upon signal from a smoke detector in the elevator lobby of the "designated level," the fire alarm system shall utilize an addressable relay to signal the elevator to recall to the "alternate level" as determined by the Authority Having Jurisdiction.
4. All elevators, throughout the building, shall be recalled simultaneously.
5. All elevators that share the same hoistway, machine room or lobby shall be recalled simultaneously. Elevators served by different machine rooms, hoistways and lobbies shall continue to operate.

I. Firefighter's Cab Visual Alarm Sequence:

1. Upon signal from a detector in the machine room or elevator hoistway, the fire alarm system shall utilize an addressable relay to signal the elevator controller to illuminate and flash the firefighters cab visual alarm.

J. Elevator Shutdown Sequence:

1. Elevator shutdown shall meet the requirements of ASME/ANSI A17.1.
2. All elevators that share the same hoistway, machine room, or lobby shall be shut down simultaneously. Elevators served by different machine rooms, hoistways, and lobbies shall continue to operate.
3. The fire alarm system shall utilize an addressable relay to energize the shunt trip of the main elevator breaker, disconnecting power to the elevator.
4. The fire alarm system shall utilize an addressable relay to de-energize the relay on the elevator power module, disconnecting power to the elevator.

3.2 INSTALLATION

A. Install system in accordance with manufacturer instructions and referenced codes.

B. Fire Alarm Control Panel:

1. Install the control panel where shown on the drawings.
2. All expansion compartments, if required, shall be located at the control panel.
3. Install the voice command center and fire command center in the location as indicated on the drawings. This location should be primary fire department "attack" location. Coordinate with the local fire department prior to submitting shop drawings.
4. The fire alarm voice prerecorded messages shall be verified by the Contractor, as approved by the Owner, prior to the shop drawing submittal process.

C. Devices:

1. General:
 - a. All ceiling-mounted devices shall be located where shown on the reflected ceiling and floor plans. If not shown on the reflected ceiling or reflected floor drawings, the devices shall be installed in the relative locations shown on the floor drawings in a neat and uniform pattern.
 - b. All devices shall be coordinated with luminaires, diffusers, sprinkler heads, piping and other obstructions to maintain a neat and operable installation. Mounting locations and spacing shall not exceed the requirements of NFPA 72.

- c. Where the devices are to be installed in a grid type ceiling system, the detectors shall be centered in the ceiling tile.
 - d. The location of all fire alarm devices shall be coordinated with other devices mounted in the proximity. Where a conflict arises with other items or with architectural elements that will not allow the device to be mounted at the location or height shown, the Contractor shall notify the Architect/Engineer to coordinate a different acceptable location.
2. Per the requirements of NFPA, detector heads shall not be installed until after the final construction cleaning unless required by local Authority Having Jurisdiction (AHJ). If detector heads must be installed prior to final cleaning (for partial occupancy, to monitor finished areas or as otherwise required by AHJ), they shall not be installed until after the fire alarm panel is installed, with wires terminated, ready for operation. Any detector head installed prior to final construction cleaning shall be removed and cleaned prior to closeout.
 3. Protection of Fire Alarm System:
 - a. A smoke detector shall be installed within the vicinity of the main fire alarm panel and every NAC extender panel per NFPA 72. A heat detector may be substituted when a smoke detector is not appropriate for the environment of installation.
 4. Analog Smoke and Heat Detectors:
 - a. In elevator shafts and elevator equipment rooms, provide a heat detector for elevator shutdown within 2' of every sprinkler head. Coordinate with fire protection contractor.
 5. Duct-type Analog Smoke Detectors:
 - a. Duct-type analog smoke detectors shall be installed on the duct where shown on the drawings and details. The sampling tubes shall be installed in the respective duct at the approximate location where shown on the electrical drawings to meet the operation requirements of the system.
 - b. All detectors shall be accessible.
 - c. Duct-type detectors shall be installed according to the manufacturer's instructions.
 6. In-Duct Analog Smoke Detectors:
 - a. In-duct analog smoke detectors shall be installed in the duct where shown on the drawings and details. The devices shall be installed in the respective duct at the approximate location where shown on the electrical drawings to meet the operation requirements of the system.
 - b. All detectors shall be accessible.
 7. Manual Pull Stations:
 - a. Stations shall be located where shown and at the height noted on the drawings.
 8. Addressable Relays and Monitor Modules:
 - a. Modules shall be located as near to the respective monitor or control devices as possible, unless otherwise indicated on the drawings.
 - b. All modules shall be mounted in or on a junction box in an accessible location.
 - c. Where not visible from a floor standing position, a remote indicator shall be installed to allow inspection of the device status from a local floor standing location.
 9. SLC Loop Isolation Modules:
 - a. Isolation modules shall be installed to limit the number of addressable devices that

- are incapacitated by a circuit fault.
 - b. Install all Isolation Modules within the fire alarm control panel, unless otherwise indicated on the drawings. Refer to the fire alarm riser diagram for requirements. Refer to the floor plans for areas served by separate isolation modules.
- 10. Notification Appliance Devices:
 - a. Devices shall be located where shown on the drawings.
 - b. Wall-mounted audio, visual and audio/visual alarm devices shall be mounted as denoted on the drawings.
 - c. Where ceiling mounted visual alarm devices or combination audio/visual alarm devices are shown where the ceiling is greater than 30'-0" high, they shall be stem mounted so that the entire unit is below 30'-0". This does not apply to audio-only alarm devices.
- D. Annunciators:
 - 1. Remote Annunciators: The annunciators shall be located where shown on the drawings and approved by the fire marshal.
- E. Wiring:
 - 1. Fire alarm wiring/cabling shall be provided by the Contractor in accordance with the manufacturer's recommendations and pursuant to National Fire Codes.
 - 2. Wiring shall be installed in conduit.
 - 3. Wiring shall be installed in conduit from device to above accessible ceilings. Exposed plenum-rated cable (FPLP) shall be used above accessible ceilings supported every 4 feet or run in cable trays (if applicable) maintaining a minimum of 5-inches clearance from all lighting ballasts. Fire alarm cabling shall not be installed in the same bridge rings or cable trays designated for the cabling of other systems.
 - 4. All junction boxes with SLC and NAC circuits shall be identified on cover. Refer to Identification Section 26 05 13 for color and identification requirements.
 - 5. Fire Alarm Power Branch Circuits: Building wiring as specified in Section 26 05 13.
 - 6. Notification Appliance Circuits shall provide the features listed below. These requirements may require separate circuits for visual and audible devices.
 - a. Fire alarm temporal audible notification for all audio appliances.
 - b. Synchronization of all visual devices where two or more devices are visible from the same location.
 - c. Ability to silence audible alarm while maintaining visual device operation.
 - 7. Notification Appliance Circuits shall not span floors.
 - 8. Signal line circuits connecting devices shall not span floors or.
 - 9. Signal line circuits connecting devices shall be provided with an isolation module at each floor separation or as otherwise shown on the drawings.
 - 10. No wiring other than that directly associated with fire alarm detection, alarm or auxiliary fire protection functions shall be in fire alarm conduits. Wiring splices shall be avoided to the extent possible, and if needed, they shall be made only in junction boxes, and enclosed by plastic wire nut type connectors. Transposing or changing color coding of wires shall not be permitted. All conductors in conduit containing more than one wire shall be labeled on each end, in all junction boxes, and at each device with "E-Z Markers" or equivalent. Conductors in cabinets shall be carefully formed and harnessed so that each drops off directly opposite to its terminal. Cabinet terminals shall be numbered and coded, and no unterminated conductors are permitted in cabinets or control panels. All controls, function switches, etc. shall be clearly labeled on all equipment panels.
- F. Fire Alarm Cabling Color Code: Provide circuit conductors with insulation color coding as follows, or using colored tape at each conductor termination and in each junction box. Where

standards have been developed, these will be complied with.

1. Power Branch Circuit Conductors: In accordance with Section 26 05 53.
 2. Signaling Line Circuit: Overall red jacket with black and red conductors.
 3. DC Power Supply Circuit: Overall red jacket with violet and brown conductors.
 4. Notification Appliance Circuit: Overall red jacket with blue and white conductors.
 5. Door Release Circuit: Gray conductors.
 6. Central Station Trip Circuit: Orange conductors.
 7. Central Station Fire Alarm Loop: Black and white conductors.
- G. Devices surface mounted in finished areas shall be mounted on surface backboxes furnished by fire alarm equipment supplier. Backboxes shall be painted to match device, shall be the same shape and size as the device shall not have visible knockouts.
- H. Make conduit and wiring connections to door release devices, sprinkler flow and pressure switches, sprinkler valve monitor switches, fire suppression system control panels, duct analog smoke detectors and all other system devices shown or noted on the Contract Documents or required in the manufacturer's product data and shop drawings.

3.3 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 26 05 00.
- B. Test in accordance with NFPA 72, Chapter 14 and local fire department requirements. Submit documentation with O & M manuals in accordance with Section 14.6 of the Code.
- C. Contractor shall test and adjust the fire alarm system as follows:
1. Speaker taps shall be adjusted to the lowest tap setting which achieves a sound level higher than or equal to the greatest of the following:
 - a. 70dBA.
 - b. 15 dBA above ambient levels as indicated in NFPA 72 Table A.18.4.3.
 - c. 15 dBA above measured ambient. 5 dBA above the maximum measured sound level with duration of more than 60 seconds.
 - d. As specified on the drawings.
 2. Sound level measurement procedure shall meet the following requirements:
 - a. All measurements shall use the 'A' weighted, dBA, sound measurement scale.
 - b. All measurements shall be taken after furnishings, wall coverings and floor coverings are in place.
 - c. All measurements shall be taken after fixed equipment (HVAC units, etc.) producing ambient noise is installed and is in operation.
 - d. Final ambient sound measurements shall be taken during occupancy and the units shall be re-adjusted at that time, if necessary.
 - e. All sound level measurements shall be taken at a height of 5' above the finished floor level.
 - f. Measurements shall be taken in every unique room. If there are multiple rooms, which have the identical dimensions and function, 10%, or a minimum of two (2) rooms shall be tested. The results from the rooms tested shall be averaged and the remaining rooms may be adjusted per the average.
 - g. Measurements shall be taken on a 20' x 20' grid and the results for all points taken shall be averaged. If the room is smaller than 20' x 20' a minimum of two measurements are required.
 - h. Measurements shall be taken halfway between speakers or halfway between a speaker and the wall. No measurements shall be taken at the extreme edges of the room, nor directly under speakers.

3.4 MANUFACTURER FIELD SERVICES

- A. Provide manufacturer field services under provisions of Section 26 05 00.
- B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.
- C. Note: room numbers depicted on the architectural/engineering drawings will not necessarily reflect the actual room (signage) numbers the Owner selects. Contractor and fire alarm manufacturer shall coordinate the actual room numbers as the Owner directs to identify each device. List shall be a part of the floor plan record drawing to be turned in at project closeout.
- D. Include the services to train up to three of Owner staff in operation, maintenance, and programming of the fire alarm system at manufacturer factory. Airfare and lodging expenses for Owner staff will be by Owner.
- E. System Occupancy Adjustments: When requested by Owner within 12 months of date of Substantial Completion, provide on-site system adjustments to suit actual occupied conditions. For this purpose, provide up to two (2) site visits, four (4) hours each visit, outside normal occupancy hours.

3.5 SYSTEM TRAINING

- A. System training shall be performed under provisions of Section 26 05 00.
- B. Minimum on-site training times shall be:
 - 1. System Operators: One (1) day.

END OF SECTION

ELECTRICAL CONNECTION SCHEDULE

ITEM	VOLTAGE	LOAD CLASS.	QTY @ HP	MOTORS	APPEARANT LOAD	FLA	MCA	OCBP	CIRCUIT NUMBER	WIRE AND RACEWAY	SCCR	DISCONNECT	CONTROLLER / STARTER		COMMENTS
													BY	TYPE	
CH-1 (ALTERNATE)	208 V, 3Ø	HVAC	1 @ 113.1		135.88 kVA	377.6 A	472 A	600 A		(2) SETS OF 3#250 & 1#1 EGC EACH IN 2 1/2" C.	0 A	EC			BY ADD ALTERNATE PROVIDE NEW IN LIEU OF RELOCATING EXISTING
D1N-1-1	B-1	120 V, 1Ø	HVAC	1 @ 1.5	1.00 kVA	8.3 A	10.4 A	20 A	1	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			BY BASE BID, VC RELOCATE FROM LINCOLN. BY ADD ALTERNATE PROVIDE NEW IN LIEU OF RELOCATED BOILER EMERGENCY BOILER SHUTDOWN BY EC.
	B-2	120 V, 1Ø	HVAC	1 @ 1.5	1.00 kVA	8.3 A	10.4 A	20 A	2	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			BY BASE BID, VC RELOCATE FROM LINCOLN. BY ADD ALTERNATE PROVIDE NEW IN LIEU OF RELOCATED BOILER EMERGENCY BOILER SHUTDOWN BY EC.
	CP-1	208 V, 1Ø	HVAC	1 @ 1.5	1.20 kVA	10 A	12.5 A	20 A	3.5	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			COMBINATION STARTER BY EC
	CP-2	208 V, 1Ø	HVAC	1 @ 1.5	1.20 kVA	10 A	12.5 A	20 A	4.6	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			COMBINATION STARTER BY EC
	CP-3	208 V, 3Ø	HVAC	1 @ 7.5	8.83 kVA	24.5 A	30.6 A	50 A	7.9,11	3#8 & 1#10 EGC IN 3/4" C.	0 A	EC			VFD PROVIDED BY TC - INSTALLED BY EC
	CP-4	208 V, 3Ø	HVAC	1 @ 7.5	8.83 kVA	24.5 A	30.6 A	50 A	8,10,12	3#8 & 1#10 EGC IN 3/4" C.	0 A	EC			VFD PROVIDED BY TC - INSTALLED BY EC
	CP-5	208 V, 3Ø	HVAC	1 @ 20	21.40 kVA	59.4 A	74.3 A	100 A	13,15,17	3#3 & 1#8 EGC IN 1" C.	0 A	EC			VFD PROVIDED BY TC - INSTALLED BY EC
	CP-6	208 V, 3Ø	HVAC	1 @ 20	21.40 kVA	59.4 A	74.3 A	100 A	14,16,18	3#3 & 1#8 EGC IN 1" C.	0 A	EC			VFD PROVIDED BY TC - INSTALLED BY EC
	CUH-114A	120 V, 1Ø	HVAC	0 - 0.1	0.50 kVA	5 A	6.3 A	20 A	20	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			
	DSA-147	208 V, 1Ø	HVAC	0 - 0	0.50 kVA	5 A	6.3 A	30 A	23,25	2#10 & 1#10 EGC IN 3/4" C.	0 A	EC			
	DSC-147	208 V, 1Ø	HVAC	0 - 0	3.84 kVA	17.5 A	21.9 A	30 A	23,25	2#10 & 1#10 EGC IN 3/4" C.	0 A	EC			
	EH-160	208 V, 1Ø	HVAC	0 - 0	3.00 kVA	15 A	18.7 A	20 A	24,26	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			
	HUH-161	120 V, 1Ø	HVAC	0 - 0.13	0.50 kVA	5 A	6.3 A	20 A	19	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			
	WH-1	120 V, 1Ø	HVAC	0 - 0.05	0.50 kVA	5 A	6.3 A	20 A	21	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			
D1N-1-2	CUH-100A	120 V, 1Ø	HVAC	0 - 0.1	0.50 kVA	5 A	6.3 A	20 A	7	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			
	CUH-100B	120 V, 1Ø	HVAC	0 - 0.1	0.50 kVA	5 A	6.3 A	20 A	9	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			
	EH-ELEV	208 V, 1Ø	HVAC	0 - 0	2.50 kVA	12 A	15 A	20 A	11,13	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			
	EH-ELEV	208 V, 1Ø	HVAC	0 - 0	2.50 kVA	12 A	15 A	20 A	12,14	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			
	SP-1	208 V, 1Ø	HVAC	0 - 1	1.66 kVA	8 A	10 A	20 A	8,10	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			SUMP ALARM PANEL IN CUST 204A, TC TO MONITOR ALARM PANEL
D1N-P-1	AC-1	208 V, 3Ø	HVAC	0 - 7.5	8.72 kVA	24.2 A	30.3 A	40 A	22,24,26	3#8 & 1#10 EGC IN 3/4" C.	0 A	EC			
	AHU-100 RET.	208 V, 3Ø	HVAC	1 @ 7.5	8.72 kVA	24.2 A	30.3 A	40 A	7,9,11	3#8 & 1#10 EGC IN 3/4" C.	0 A	EC			DUCT SMOKE DETECTOR SHUTDOWNS BY EC. CO2/HUMIDITY SENSORS IN RA DUCT, VFD'S PROVIDED BY TC, INSTALLED BY EC
	AHU-100 SUP.	208 V, 3Ø	HVAC	1 @ 15	14.77 kVA	41 A	51.3 A	80 A	1,3,5	3#6 & 1#8 EGC IN 3/4" C.	0 A	EC			DUCT SMOKE DETECTOR SHUTDOWNS BY EC. CO2/HUMIDITY SENSORS IN RA DUCT, VFD'S PROVIDED BY TC, INSTALLED BY EC
	AHU-200 RET.	208 V, 3Ø	HVAC	1 @ 7.5	8.72 kVA	24.2 A	30.3 A	40 A	8,10,12	3#8 & 1#10 EGC IN 3/4" C.	0 A	EC			DUCT SMOKE DETECTOR SHUTDOWNS BY EC. CO2/HUMIDITY SENSORS IN RA DUCT, VFD'S PROVIDED BY TC, INSTALLED BY EC
	AHU-200 SUP.	208 V, 3Ø	HVAC	1 @ 15	14.77 kVA	41 A	51.3 A	80 A	2,4,6	3#6 & 1#8 EGC IN 3/4" C.	0 A	EC			DUCT SMOKE DETECTOR SHUTDOWNS BY EC. CO2/HUMIDITY SENSORS IN RA DUCT, VFD'S PROVIDED BY TC, INSTALLED BY EC
	AHU-300 RET.	208 V, 3Ø	HVAC	1 @ 10	11.10 kVA	30.8 A	38.5 A	40 A	19,21,23	3#8 & 1#10 EGC IN 3/4" C.	0 A	EC			DUCT SMOKE DETECTOR SHUTDOWNS BY EC. CO2/HUMIDITY SENSORS IN RA DUCT, VFD'S PROVIDED BY TC, INSTALLED BY EC
	AHU-300 SUP.	208 V, 3Ø	HVAC	1 @ 20	19.81 kVA	55 A	68.8 A	80 A	13,15,17	3#4 & 1#8 EGC IN 1" C.	0 A	EC			DUCT SMOKE DETECTOR SHUTDOWNS BY EC. CO2/HUMIDITY SENSORS IN RA DUCT, VFD'S PROVIDED BY TC, INSTALLED BY EC
	DSA-115	208 V, 1Ø	Power	0 - 0	0.50 kVA	6 A	6.3 A	30 A	37,39	2#10 & 1#10 EGC IN 3/4" C.	0 A	EC			
	DSC-115	208 V, 1Ø	HVAC	0 - 0	3.84 kVA	17.5 A	21.9 A	30 A	37,39	2#10 & 1#10 EGC IN 3/4" C.	0 A	EC			
	EF-1	120 V, 1Ø	HVAC	1 @ 0.75	1.02 kVA	8.5 A	10.6 A	20 A	14	2#12 & 1#12 EGC IN 3/4" C.	0 A	VC			NORMALLY CLOSED 120V MOTORIZED DAMPER BY VC TO OPEN WITH FAN OPERATION, WIRED BY EC
	EF-2	120 V, 1Ø	HVAC	0 - 0	0.10 kVA	0.8 A	1 A	20 A	16	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			INTEGRAL CONTROLS, FACTORY INSTALLED POWER CORD.
	EF-3	120 V, 1Ø	HVAC	0 - 0	0.10 kVA	0.8 A	1 A	20 A	18	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			INTEGRAL CONTROLS, FACTORY INSTALLED POWER CORD.
	ELEVATOR	208 V, 3Ø	Power	0 - 0	27.00 kVA	65 A	80 A	100 A	25,27,29	3#3 & 1#8 EGC IN 1" C.	0 A	EC			
	HUH-M300	120 V, 1Ø	HVAC	0 - 0.17	0.50 kVA	5 A	6.3 A	20 A	20	2#12 & 1#12 EGC IN 3/4" C.	0 A	EC			
S3N-1-1	CH-1	208 V, 3Ø	HVAC	1 @ 123.5	139.90 kVA	388.2 A	485.3 A	600 A	9	(2) SETS OF 3#250 & 1#1 EGC EACH IN 2 1/2" C.	0 A	EC			BY BASE BID, VC RELOCATE FROM LINCOLN

LIGHTING SEQUENCE OF OPERATION

NOTES:
 1. (L#) DENOTES THE LIGHTING SEQUENCE OF OPERATIONS FOR THIS SPACE.
 2. (B) PUSH BUTTON REFERS TO SCENE QUANTITY. CONTROL STATION SHALL BE CAPABLE OF (RAISE/LOWER AND) SWITCHING ON/OFF FOR MULTIPLE SCENES AS INDICATED ON SHEETS AND THE LIGHTING SEQUENCE OF OPERATIONS (L#).
 3. COORDINATE QUANTITIES OF BUTTONS FOR CONTROL STATIONS WITH LIGHTING CONTROL MANUFACTURER.
 4. (Z#) DENOTES LIGHTING CONTROL ZONE. PROVIDE SEPARATE CONTROL OF EACH CONTROLLED ZONE. LUMINAIRES ASSOCIATED WITH THE SAME ZONE SHALL OPERATE TOGETHER WITHIN THE SAME PROGRAMMED SCENE.
 5. VERIFY AND COORDINATE ALL TIME CLOCK SETTINGS WITH OWNER PRIOR TO FINAL PROGRAMMING.
 6. VERIFY AND COORDINATE ALL PUSH BUTTON WALL DEVICES AND QUANTITIES OF INDIVIDUAL BUTTONS WITH SCENES AND ZONES PER LOCATION.
 7. VERIFY AND COORDINATE ALL PUSH BUTTON QUANTITIES AND SCENE NAMES WITH OWNER PRIOR TO SUBMITTING ENGRAVING TEMPLATE TO MANUFACTURER.

PLAN ID	SEQUENCE	COMMENTS
(LC1)	SEQUENCE: LIGHTING CONTROL PROVIDES VACANCY CONTROL AND MANUAL SWITCHING IN THIS SPACE IN THIS SPACE. ON: LIGHTS TURN VIA MASTER SWITCH. OFF: LIGHTS AUTOMATICALLY TURN OFF AFTER THE SPACE HAS BEEN VACANT FOR 30 MINUTES.	
(LC2)	SEQUENCE: LIGHTING CONTROL PROVIDES OCCUPANCY AND DAYLIGHTING CONTROL IN THIS SPACE. ON: LIGHTS TURN ON VIA OCCUPANCY SENSOR. DAYLIGHTING: LIGHTS WILL CONTINUOUSLY ADJUST TO THE PRESENCE OF DAYLIGHT TO MAINTAIN 35 FOOT-CANDLES AT +30". OFF: LIGHTS AUTOMATICALLY TURN OFF AFTER THE SPACE HAS BEEN VACANT FOR 30 MINUTES.	
(LC3)	SEQUENCE: LIGHTING CONTROL PROVIDES OCCUPANCY CONTROL IN THIS SPACE. ON: LIGHTS TURN VIA OCCUPANCY SENSOR. OFF: LIGHTS AUTOMATICALLY TURN OFF AFTER THE SPACE HAS BEEN VACANT FOR 30 MINUTES.	
(LD1)	SEQUENCE: LIGHTING CONTROL PROVIDES VACANCY CONTROL AND MANUAL DIMMING IN THIS SPACE. ON: LIGHTS TURN ON USING WALL CONTROL TO PREVIOUS SETTING. ADJUST: LIGHTS ARE RAISED / LOWERED CONTROLLED USING A WALL CONTROLLER, 1-100%. OFF: LIGHTS TURN OFF USING A WALL CONTROLLER. LIGHTS AUTOMATICALLY TURN OFF AFTER THE SPACE HAS BEEN VACANT FOR 30 MINUTES.	
(LD2)	SEQUENCE: LIGHTING CONTROL PROVIDES VACANCY CONTROL AND MANUAL DIMMING IN THIS SPACE. ON: LIGHTS TURN ON USING WALL CONTROL TO PREVIOUS SETTING. ADJUST: LIGHTS ARE RAISED / LOWERED CONTROLLED USING A WALL CONTROLLER, 1-100%. DAYLIGHTING: LIGHTS WILL CONTINUOUSLY ADJUST TO THE PRESENCE OF DAYLIGHT TO MAINTAIN 35 FOOT-CANDLES AT +30". OFF: LIGHTS TURN OFF USING A WALL CONTROLLER. LIGHTS AUTOMATICALLY TURN OFF AFTER THE SPACE HAS BEEN VACANT FOR 30 MINUTES.	
(LD2)	SEQUENCE: LIGHTING CONTROL PROVIDES VACANCY CONTROL AND MANUAL DIMMING IN THIS SPACE. ON: LIGHTS TURN ON USING WALL CONTROL TO PREVIOUS SETTING. ADJUST: LIGHTS ARE RAISED / LOWERED CONTROLLED USING A WALL CONTROLLER, 1-100%. DAYLIGHTING: LIGHTS WILL CONTINUOUSLY ADJUST TO THE PRESENCE OF DAYLIGHT TO MAINTAIN 35 FOOT-CANDLES AT +30". OFF: LIGHTS TURN OFF USING A WALL CONTROLLER. LIGHTS AUTOMATICALLY TURN OFF AFTER THE SPACE HAS BEEN VACANT FOR 30 MINUTES.	
(LD2)	SEQUENCE: LIGHTING CONTROL PROVIDES VACANCY CONTROL AND MANUAL DIMMING IN THIS SPACE. ON: LIGHTS TURN ON VIA OCCUPANCY SENSOR TO 100% MAXIMUM OUTPUT. OFF: LIGHTS AUTOMATICALLY TURN OFF AFTER THE SPACE HAS BEEN VACANT FOR 30 MINUTES.	
(LD2)	SEQUENCE: LIGHTING CONTROL PROVIDES VACANCY CONTROL AND MANUAL DIMMING IN THIS SPACE. ON: LIGHTS TURN ON USING WALL CONTROL. OFF: LIGHTS TURN OFF USING WALL CONTROL.	
(LD4)	SEQUENCE: LIGHTING CONTROL PROVIDES MANUAL SWITCHING AND OCCUPANCY CONTROL IN THIS SPACE. ON: LIGHTS TURN ON VIA OCCUPANCY SENSOR TO 100% MAXIMUM OUTPUT. OFF: LIGHTS TURN OFF BY WALL SWITCH OR AFTER THE SPACE HAS BEEN VACANT FOR 30 MINUTES.	
(PC1)	SEQUENCE: SWITCH LIGHTS ARE CONTROLLED IN THIS SPACE. ON: LIGHTS TURN ON AT DUSK VIA INTEGRAL PHOTO-CELL. OFF: LIGHTS TURN OFF AT DAWN VIA INTEGRAL PHOTOCELL.	

FLOORBOX SCHEDULE

TAG NAME	TYPE MARK	DESCRIPTION	NOTES
FB-1	POWER	LEGRAND 640 OR APPROVED EQUAL, ON-GRADE FLOOR BOX, SURFACE COVER PLATE TYPE WITH COLOR SELECTED BY ARCHITECT. PROVIDE QUAD RECEPTACLE / REQUIRED COMPARTMENTS POWER. 3/4" C. MINIMUM FOR POWER UNLESS NOTED OTHERWISE. NOTE: EXACT LOCATION TO BE COORDINATED WITH OWNER.	1, 2, 3, 4, 5
FB-2	POWER, DATA, AV	LEGRAND 640 OR APPROVED EQUAL, ON-GRADE FLOOR BOX, SURFACE COVER PLATE TYPE WITH COLOR SELECTED BY ARCHITECT. PROVIDE QUAD RECEPTACLE / REQUIRED COMPARTMENTS FOR DATA AND POWER. 1" C. MINIMUM FOR DATA UNLESS NOTED OTHERWISE. 3/4" C. MINIMUM FOR POWER UNLESS NOTED OTHERWISE. 1-1/4" C. MINIMUM FOR AUDIO/VISUAL - UNLESS NOTED OTHERWISE. COORDINATE DATA AND AV WITH LOW VOLTAGE AND AV INSTALLER. NOTE: EXACT LOCATION TO BE COORDINATED WITH OWNER.	1, 2, 3, 4
PT-1	POWER	LEGRAND 64T OR APPROVED EQUAL, POKE-THRU FLOOR BOX, SURFACE COVER PLATE TYPE WITH COLOR SELECTED BY ARCHITECT. PROVIDE QUAD RECEPTACLE / REQUIRED COMPARTMENTS FOR POWER. 3/4" C. MINIMUM FOR POWER UNLESS NOTED OTHERWISE. NOTE: EXACT LOCATION TO BE COORDINATED WITH OWNER.	1, 2, 3, 4, 5
PT-2	POWER, DATA, AV	LEGRAND 64T OR APPROVED EQUAL, POKE-THRU FLOOR BOX, SURFACE COVER PLATE TYPE WITH COLOR SELECTED BY ARCHITECT. PROVIDE QUAD RECEPTACLE / REQUIRED COMPARTMENTS FOR DATA AND POWER. 1" C. MINIMUM FOR DATA UNLESS NOTED OTHERWISE. 3/4" C. MINIMUM FOR POWER UNLESS NOTED OTHERWISE. 1-1/4" C. MINIMUM FOR AUDIO/VISUAL - UNLESS NOTED OTHERWISE. COORDINATE DATA AND AV WITH LOW VOLTAGE AND AV INSTALLER. NOTE: EXACT LOCATION TO BE COORDINATED WITH OWNER.	1, 2, 3, 4

- NOTES:
 1. COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO INSTALLATION.
 2. PROVIDE SAMPLE TO OWNER AND ARCHITECT PRIOR TO PROCUREMENT.
 3. COORDINATE FINISH AND COLOR WITH ARCHITECT.
 4. COORDINATE INSTALLATION REQUIREMENTS WITH MANUFACTURER.
 5. CONNECTION REQUIREMENTS SHALL BE CONFIRMED IN SHOP DRAWING SUBMITTAL.

LED LUMINAIRE SCHEDULE

ITEM	DESCRIPTION	L	MTG	DIMENSIONS			ANSI WATTS	PER	TYPE	QTY	DELIVERED LUMENS (MIN)	DRIVER		MANUFACTURER AND MODEL	NOTES
				L	W	H						VOLTS	TYPE		
A	2X4 ARCHITECTURAL LED TROFFER	F	RE	4'-0"	2'-0"	5 1/2"	30 W	FIX	LED	1	3000	120 V	0-10V	COOPER C2 SERIES LITHONIA BLT SERIES COLUMBIA LCA7 SERIES ORACLE OEVP SERIES	
A1	2X4 ARCHITECTURAL LED TROFFER	F	RE	4'-0"	2'-0"	5 1/2"	25 W	FIX	LED	1	2000	120 V	0-10V	COOPER C2 SERIES LITHONIA BLT SERIES COLUMBIA LCA7 SERIES ORACLE OEVP SERIES	
A2	2X4 LED TROFFER	F	RE	4'-0"	2'-0"	5 7/7256	25 W	FIX	LED	1	2000	120 V	0-10V	COOPER C2 SERIES LITHONIA BLT SERIES COLUMBIA LCA7 SERIES ORACLE OEVP SERIES	
AA-ALT	SITE LIGHT, 12 FOOT POLES, ALUMINUM.	PL	RE	0"	0"	0"	80 W	FIX	LED	1	9530	120 V	EB	USA ARCH LIGHTING CLX-LED SERIES	PROVIDE AN ALLOWANCE OF \$3000 PER FIXTURE (LIGHT FIXTURE WILL BE INCLUDED ONLY IF ADD ALTERNATE #1 IS ACCEPTED.)
AA-B	SITE LIGHT, 12 FOOT POLES, ALUMINUM.	PL	SP	0"	0"	0"	80 W	FIX	LED	1	9530	120 V	EB	USA ARCH LIGHTING CLX-LED SERIES	PROVIDE AN ALLOWANCE OF \$3000 PER FIXTURE.
B	LINEAR LED PENDANT MOUNT, LENGTH AS PER PLANS	F	SP	<varies >	4"	1 5/8"	18 W	FT	LED	1	1200/1000 PER FT	120 V	0-10V	AXIS LIGHTING SLTPOI SERIES PINNACLE EDGE EVID SERIES NULITE LYNCS SERIES	
B1	1 INCH SURFACE LINEAR	F	RE	<varies >	3"	1/2 2 91/128	6 W	FT	LED	1	321 PER FT	120 V	0-10V	COOPER LIGHTING DEFINE 1 SERIES PINNACLE EDGE EVID SERIES NULITE REGOLO 1 SERIES	FLUSH FROSTED LENS. MOUNTED BETWEEN AND EVEN WITH BOTTOM OF WOOD SLATS
B2	LINEAR LED LIGHT, LENGTH AS PER PLANS	F	RE	<varies >	4"	3"	6 W	FT	LED	1	500 PER FT	120 V	0-10V	AXIS LIGHTING - SCULPT PINNACLE EDGE EVID SERIES NULITE REGOLO 1 SERIES	FROSTED LENS, ASSYMETRIC DISTRIBUTION
B3	LINEAR LED LIGHT	F	RE	4'-0"	4"	2"	4 W	FT	LED	1	500 PER FT	120 V	0-10V	CORELITE CONTINUA S04 SERIES EXTANT HTG-3PRLP SERIES LUX EOS 4.0 S SERIES ALW LIGHTPLANE LPX4 SERIES	
B4	LINEAR LED LIGHT, LENGTH AS PER PLANS	F	RE	<varies >	1"	2"	4 W	FT	LED	1	500 PER FT	120 V	0-10V	CORELITE CONTINUA S04 SERIES EXTANT HTG-3PRLP SERIES LUX EOS 4.0 S SERIES ALW LIGHTPLANE LPX4 SERIES	
B5	LINEAR LED LIGHT, LENGTH AS PER PLANS	F	RE	8'-0"	1"	2"	4 W	FT	LED	1	500 PER FT	120 V	0-10V	CORELITE CONTINUA S04 SERIES EXTANT HTG-3PRLP SERIES LUX EOS 4.0 S SERIES ALW LIGHTPLANE LPX4 SERIES	
C	2" PENDANT LIGHT	N	SP		6"	2"	13 W	FIX	LED	1	1200	120 V	0-10V	SPECTRUM LIGHTING CR2 SERIES AMERLUX ROOK 250 SERIES LUMENWERX AE2CYP SERIES ALTRA V SERIES	
D	6" RECESSED DOWNLIGHT	M	RE		8	6"	18 W	FIX	LED	1	2000	120 V	0-10V	LITHONIA LDN6 SERIES PRESCOLITE LBRP SERIES SPECTRUM SGE4 SERIES MAXILUME H44 SERIES	MATTE DIFFUSE FINISH, WHITE PAINTED FLANGE MEDIUM DISTRIBUTION.
D1	4" RECESSED DOWNLIGHT	M	RE		8	4"	20 W	FIX	LED	1	2500	120 V	0-10V	LITHONIA LDN4 SERIES PRESCOLITE LBRP SERIES SPECTRUM SGE4 SERIES MAXILUME H44 SERIES	MATTE DIFFUSE FINISH, WHITE PAINTED FLANGE MEDIUM DISTRIBUTION.
D2	4" RECESSED DOWNLIGHT	M	RE		8	4"	18 W	FIX	LED	1	1500	120 V	0-10V	LITHONIA LDN6 SERIES PRESCOLITE LBRP SERIES SPECTRUM SGE4 SERIES MAXILUME H44 SERIES	MATTE DIFFUSE FINISH, WHITE PAINTED FLANGE MEDIUM DISTRIBUTION.
E	SINGLE FACE EXIT SIGN	O	CL	1'-1"	2"	9"	3 W	FIX	LED	1	LED	120 V	EM	SURE-LITES APX SERIES COMPASS CE SERIES LITHONIA LQM SERIES ISOLITE RL SERIES	
E1	DOUBLE-FACE EXIT SIGN	O	CL	1'-1"	2"	9"	3 W	FIX	LED	1	LED	120 V	EM	SURE-LITES APX SERIES COMPASS CE SERIES LITHONIA LQM SERIES ISOLITE RL SERIES	
F	RECESSED LINEAR, LENGTH AS PER PLANS	F	FR	<varies >	4"	4 3/16"	5 W	FT	LED	1	400 PER FT	120 V	0-10V	AXIS BEAM 4 SERIES PRUDENTIAL BIONIC PRO4-SLOT LUX EOS 4.0 R SERIES ALW LIGHTPLANE	