STUDIO M
ARCHITECTURE & PLANNING

ADDENDUM

Addendum No: 02

Project: Bloomington Readiness Center

Project No: 23043 Date: 20 June 2024 By: Mike Johnson

This Addendum is issued in accordance with the provisions of "The General Conditions of the Contract for Construction," Article 1, "Contract Documents" and becomes a part of the Contract Documents as provided therein. This Addendum includes:

Part One - Specifications

The following specification sections have been added or revised during the bid process as result of RFI, product substitution, or Architect revision due to coordination with design team.

1. 000110 – Table of Contents
    a. Highlighted sections indicate sections which were added or revised.
2. 081416 – Flush Wood Doors
    a. Added full section.
3. 087100 – Door Hardware
4. 095113 – Acoustical Panel Ceilings
    a. Added Turf and CSI Creative as approved manufacturers
5. 099123 – Interior Painting
    a. Revised Paint Schedule
6. 102213 – Wire Mesh Partitions
    a. Revised size of mesh
7. 105113 – Metal Lockers
    a. Added Lyon as an approved manufacturer
8. 230923 - Direct Digital Control (DDC) System for HVAC
    a. Updated approved vendors to Jackson Systems and ERMCO per owner request.
9. 271513 – Communications Copper Horizontal Cabling
    a. Revised Paragraph 2.6,H to update part numbers and manufacturers.
    b. Revised Paragraph 2.8,C to include Hubbell.
    c. Revised Paragraph 2.9,E to include Hubbell.
    d. Revised Paragraph 2.10 in its entirety.
    e. Revised Paragraph 2.11,C to include Hubbell.

Part Two - Drawings

CIVIL

1. C100 - Demolition Plan
    a. Clarified scope of ABI-1.
2. C200 - Site Layout Plan
    a. Clarified scope of ABI-1.
    b. Revised Key Note A to read- EXISTING ASPHALT TO HAVE CRACKS FILLED SEAL COATED, AND RE-STRIPED. EXTENTS TO BE DIRECTED BY OWNER.
3. C300 - Grading Plan
    a. Clarified scope of ABI-1.
4. C700 - Landscape Plan

a. Clarified scope of ABI-1.

STRUCTURAL

5. S101 – Foundation Plan – Base Bid
    a. Added notes to clarify size of existing columns
6. S101 – 1 – Foundation Plan – ABI 1
    a. Revised slab slope note at patio
    b. Reduced stair width at patio
7. S103-1 – Roof Framing Plan – ABI 1
    a. Removed redundant lines at roof framing plan
8. S301 – Typical Foundation Details
    a. Revised note on Detail 13
9. S501 – Typical Steel Framed Details
    a. Added note on Detail 14 to clarify intumescent paint

ARCHITECTURAL

1. A032 – Floor and Roof Assemblies
    a. Revised Roof R1 & R2 to show beams.
    b. Updated fireproofing assemblies to coordinate with design scope.
2. A051 – Storefront Elevations
    a. Added note 5
3. A051.1 – Storefront Elevations
    a. Added note 5
4. A061 – Door Schedule
    a. Updated doors as indicated on revised full-size sheet.
5. A061.1 – Door Schedule
    a. Updated doors as indicated on revised full-size sheet.
6. A101 – First Floor Overall Plan
    a. Added Door Tag 138 on revised full-size sheet.
7. A101.1 – First Floor Plan
    a. Revised Keynote 5 on revised full-size sheet.
    b. Clarified dimensions in Vestibule 100.1 on revised full-size sheet.
8. A102.1 – Overall Roof Plan
    a. Added dimensions to canopy on revised full-size sheet.
9. A111 – First Floor RCP
    a. Revised lighting to match MEP lighting plan at Distance Learning 127 and Kitchen 146
10. A111.1 – First Floor RCP
    a. Revised ceiling plan per updated construction details.
    b. Added callout for A112.1.
    c. a. Revised keynote 10 and added to plan
    d. Revised ceiling in Conf. Room 102.1
    e. Revised lighting layout to match MEP lighting plan on S2/S3/S6 109.1
11. A111.5 – First Floor RCP
    a. Removed two rows of ceiling tiles on all sides to avoid mechanical ductwork.
12. A112.1 – Enlarged First Floor RCP
    a. Added full size sheet.
    b. Adjusted light fixture to account for revised wall at Recruiting 101.1
13. A131.1 – Plan Details
    a. Revised Detail 4 as indicated on revised full-size sheet.
14. A200.1 – Overall Elevations

   a. Added Elevations 4 & 5 on revised full-size sheet.
15. A203 – Elevations Repair Reference Images
   a. Added cleaning/ repair note
16. A300.1 – Building Sections
   a. Revised Building Section 1 as indicated on revised full-size sheet.
17. A401.1 – Wall Sections
   a. Added roller shade to Section 3.
18. A501.1 – Section Details
   a. Added roller shade to Detail 9.

INTERIOR DESIGN

1. ID001 – Finish Schedule
   a. Revised FR1 frame location
   b. Revised MTL1 installation instructions
   c. Revised MTL4 letter locations
   d. Revised MTL5 material to stainless steel
   e. Revised PT6 to include door frames
   f. Revised TLB1 to include TR1 trim cap on top of tile trim
   g. Revised TL3 product type and grout color
   h. Revised TLB3 tile and grout color
   i. Revised WOM1 product type and color
2. ID101.1 – First Floor Finish Plan
   a. Added keynote 11 for clerestory window notation
   b. Added keynote 2 to south and west first floor windows
   c. Revised wall depth in Recruiting 101.1
3. ID301.1
   a. Revised elevation #4 to show fire alarm annunciator

MECHANICAL

1. MH102.1 – LEVEL 1 MECHANICAL HVAC PLAN – ABI1
   a. UPDATED LAYOUT FOR CONFERENCE ROOM 102.1 PER ARCHITECTURAL CHANGES.
2. M601.1 – MECHANICAL SCHEDULES – ABI1
   a. ADDED LD-1 TO AIR TERMINAL SCHEDULE.

ELECTRICAL

1. E201 – LEVEL 1 LIGHTING PLAN
   a. Revised light fixture type in BSW Office 141.
   b. Revised light fixture type in Supply Sgt. 132.
   c. Adjusted light fixture locations in Boiler 142.
   d. Revised lighting layout in OCIE.
   e. Added light fixture type 'L13"s in Mens Restroom and Womens Restroom to match architectural reflected ceiling plan.
   f. Added Sheet Keynotes #6 and #7.
2. E301 – LEVEL 1 ELECTRICAL PLAN
   a. Revised receptacle layout in Lactation.
   b. Provided 120V circuit for refrigerator in Lactation.
   c. Added a quadruplex receptacle in S1/S4 Conference.
   d. Relocated strobe device in Corridor 100.
   e. Relocated EPO for gas supplies from E401.
   f. Provided keynote #7.

3. E301.1 – LEVEL 1 ELECTRICAL PLAN
    a. Provided callout for Break Room Electrical Plan.
    b. Relocated Fire Alarm Annunciator in Vestibule 100.1.
    c. Relocated (1) receptacle in Vestibule 100.1.
    d. Relocated horn strobe device in Vestibule 100.1.
    e. Removed (2) receptacles and signage power in Vestibule 100.1.
    f. Added remote test station and keynote #5.
4. E401 – ENLARGED ELECTRICAL PLAN
    a. Removed EPO for gas supplies from view. (Added to E301).
5. E602 – ELECTRICAL SCHEDULES
    a. Revised Panel AB to include circuit information for refrigerator in Lactation.
    b. Replaced circuit breaker feeding boilers with a shunt trip circuit breaker.
    c. Replaced circuit breaker feeder chiller with a shunt trip circuit breaker.
6. E602.1 – ELECTRICAL SCHEDULES
    a. Revised Panel AA to remove circuit information for signage in Vestibule 100.1.
    b. Replaced circuit breaker feeding chiller with a shunt trip circuit breaker.

PLUMBING

1. P101 – LEVEL 0 PLUMBING PLAN
    a. Relocated Floor Drain in Men's Locker Room.
2. P102 – LEVEL 1 PLUMBING PLAN
    a. Relocated Floor Drain in Men's Locker Room.

Part Three – Responses to Bid Questions

1. No Civil Specs provided – please issue in Addendum
    Response: All civil specifications needed are included on the provided Construction Documents.

2. On S103.1 – What are these lines? I would assume bracing but no detail show me. IT could be a lot of material and erection time or none.
    Response: The lines on the framing plan are a function of Revit modeling for the roof structure. Lines are not representative of additional scope.

3. Please verify if all sitework for the ABI 1 area should go in the alternate or base bid.
    Response: See revised civil sheets for clarification.

4. I need to clarify the expectations for the clerestory section. The finish plans ask for motorized shades above the clerestory sections For S2, S3, S6 offices and Recruiting. I believe those are found on overall elevations A200.1. I'm curious if the arch sections of the East and West Elevations also need shades? See attached.
    Response: All shades to be provided are noted on the documents. No shades are to be provided on the East elevation. See ceiling plans and ID sheets for locations for roller shades to be installed.

5. On the room finish schedule TL3 and the corresponding base TLB3 are 2 different colors which is unusual. TLB3 is also not available in Ember Flash or abrasive finish. Both also show being grouted with Mapei 113 Brick Red grout which is no longer manufactured by Mapei.

Response: Finish schedule is updated to clarify tile and grout specs. Please reference ID101.1 keynote 11. Change has been bubbled. WT2 on ID001 is the spec called out.

6. Provide wood door specifications
   Response: New spec section 09 91 23 is provided.

7. Note 19 on A101 states to put intumescent fireproofing on existing columns – can someone tell me the size of the columns? TS or Wide Flange and size
   Response: All existing columns are built with 4" 'C' channels. See existing drawings for additional information.

8. I see no notes to spray any existing beams of deck, correct? Just the columns?
   Response: Per the construction type, all structural components must be 1HR rated. The existing structure is concrete block and plank which is holds a 1HR rating. Where there are openings columns and beams are concealed within the block and plank and therefore protected by the existing block and plank. Only where structural steel is exposed by demolition or new structural components are added, in existing building or expansion(ABI 1), will fireproofing need to be added to structural components.

9. Detail on A032 show intumescent on beams – new beams will be supporting a roof deck which can not be sprayed with intumescent it has to be standard spray applied material. Does not make economic sense to spray beams with intumescent. Can new beams supporting roof be standard spray applied material.
   Response: Extent and type of fireproofing is updated on revised sheet A032.

10. Direct Digital Control (DDC) System for HVAC
    Response: Specification section updated in Addendum 02.

11. We are interested in quoting the 102213 Wire Mesh Partitions. We find them at Rooms 131 and 137. What is the height of the wire mesh partitions? There is no section through the area so I don't know what full height will be?
    Response: Wire mesh is required to be meet the Owner requirements for security due to the material being stored within the mesh partitions. Please refer to existing drawings provided to estimate the height. Based on Architect knowledge the approximate height is 8'-8". There will be coordination required for overhead building services to pass through the partitions which will create various heights and openings along the partition wall. The openings are required to be 2" maximum in height and 96 sq. in. maximum. See reference to Owner requirements in Interior Design Finish Schedule.

Part Four – Product Substitutions

1. ADI-CON™ CW PLUS Waterproofing Admixture
   a. Substitution: Approved
      i. Contractor to ensure manufacturer/product is Buy American Act compliant.
2. Lyon, LLC Knocked Down Metal Lockers Response:
   a. Substitution: Manufacturer is approved
      i. Product must be able to meet the specifications provided in the Project Manual.

ii. Contractor to ensure manufacturer/product is Buy American Act compliant.

3. Acoustical PET Felt Baffles Substitution Request
    a. Substitution: Approved
        i. Contractor to ensure manufacturer/product is Buy American Act compliant.

Part Five – Existing Drawings

1. The existing drawings provided are those which are in possession of the Owner and shared with the Architect. The existing drawings are not known to be complete or accurate of the current built conditions, but are representative of the original design and structure. The Architect has used these for reference along with site visits and photographs to document the existing current building to establish the Scope for the Project. The accuracy and completeness of the existing drawings is unknown and Contractor will be responsible to establish the Work based on the known conditions and Contract Documents.

END ADDENDUM 02

SECTION 000110 - TABLE OF CONTENTS

DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS
000105 SEALS PAGE
000110 TABLE OF CONTENTS
002000 STATE ADMINISTRATIVE SECTION
004333 SCHEDULE OF SUBCONTRACTORS, MANUFACTURERS AND PRODUCTS

DIVISION 01 – GENERAL REQUIREMENTS
011000 SUMMARY
012100 ALLOWANCES
012500 SUBSTITUTION PROCEDURES
012600 CONTRACT MODIFICATION PROCEDURES
012900 PAYMENT PROCEDURES
013100 PROJECT MANAGEMENT AND COORDINATION
013300 SUBMITTAL PROCEDURES
013516 ALTERATION PROJECT PROCEDURES
014000 QUALITY REQUIREMENTS
015000 TEMPORARY FACILITIES AND CONTROLS
016000 PRODUCT REQUIREMENTS
017300 EXECUTION
017419 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
017700 CLOSEOUT PROCEDURES
017823 OPERATION AND MAINTENANCE DATA
017839 PROJECT RECORD DOCUMENTS
017900 DEMONSTRATION AND TRAINING

DIVISION 02 – EXISTING CONDITIONS
024119 SELECTIVE DEMOLITION

DIVISION 03 – CONCRETE
031000 CONCRETE FORMING AND ACCESSORIES
032000 CONCRETE REINFORCING
033000 CAST-IN-PLACE CONCRETE
033300 ARCHITECTURAL CONCRETE

DIVISION 04 - MASONRY
040110 MASONRY CLEANING
040140.61 STONE REPAIR
040140.62 STONE REPOINTING
044200 EXERIOR STONE CLADDING

DIVISION 05 – METALS
051200 STRUCTURAL STEEL FRAMING
052100 STEEL JOIST FRAMING
053100 STEEL DECKING
055113 METAL PAN STAIRS
055213 PIPE AND TUBE RAILINGS

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES
061000 ROUGH CARPENTRY
062023 INTERIOR FINISH CARPENTRY
064116 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS
064216 FLUSH WOOD PANELING
066400 PLASTIC PANELING

DIVISION 7 – THERMAL AND MOISTURE PROTECTION
072100 THERMAL INSULATION
072600 VAPOR RETARDERS
072800 FLUID-APPLIED MEMBRANE AIR AND WATER BARRIERS
074113.16 STANDING-SEAM METAL ROOF PANELS
074213.13 FORMED METAL WALL PANELS
074213.23 METAL COMPOSITE MATERIAL WALL PANELS
074293 SOFFIT PANELS
075423 THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING
076200 SHEET METAL FLASHING AND TRIM
077129 MANFACTURED ROOF EXPANSION JONTS

078100 APPLIED FIRE PROTECTION
078123 INTUMESCENT FIRE PROTECTION
078413 PENETRATION FIRESTOPPING
078443 JOINT FIRESTOPPING
079200 JOINT SEALANTS

DIVISION 08 – OPENINGS
081113 HOLLOW METAL DOORS AND FRAMES
081416 FLUSH WOOD DOORS
083113 ACCCESS DOORS AND FRAMES
083323 OVERHEAD COILING DOORS
084113 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
087100 DOOR HARDWARE
088000 GLAZING
088300 MIRRORS

DIVISION 09 – FINISHES
092216 NON-STRUCTURAL METAL FRAMING
092900 GYPSUM BOARD
093013 CERAMIC TILING
095113 ACOUSTICAL PANEL CEILINGS
095123 ACOUSTICAL TILE CEILINGS
096513 RESILIENT BASE AND ACCESSORIES
096516 RESILIENT SHEET FLOORING
096813 TILE CARPETING
097200 WALL COVERINGS
099113 EXTERIOR PAINTING (3)
099123 INTERIOR PAINTING
099300 STAINING AND TRANSPARENT FINISHING
099723 CONCRETE AND MASONRY COATINGS

DIVISION 10 – SPECIAL TIES
101100 VISIUAL DISPLAY UNITS
101416 PLAQUES
101419 DIMENSIONAL LETTER SIGNAGE
101423.16 ROOM-IDENTIFICATION PANEL SIGNAGE
102113.16 PLASTIC-LAMINATE-CLAD TOILET COMPARTMENTS
102213 WIRE MESH PARTITIONS
102600 WALL AND DOOR PROTECTION
102800 TOILET, BATH, AND LAUNDRY ACCESSORIES
104413 FIRE PROTECTION CABINETS
104416 FIRE EXTINGUISHERS
105113 METAL LOCKERS
107529 PLAZA-MOUNTED FLAGPOLES

DIVISION 12 – FURNISHINGS
122413 ROLLER WINDOW SHADES
123661.19 QUARTS AGGLOMERATE COUNTERTOPS

DIVISION 22 – PLUMBING
220500 COMMON WORK RESULTS FOR PLUMBING
220513 COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT
220519 METERS AND GAGES FOR PLUMBING PIPING
220523 GENERAL DUTY VALVES FOR PLUMBING PIPING
220529 HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
220548 VIBRATION AND SEISMIC CONTROLS FOR PLUMBING
220553 IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
220700 PLUMBING INSULATION
221116 DOMESTIC WATER PIPING
221119 DOMESTIC WATER PIPING SPECIALTIES
221123 DOMESTIC WATER PUMPS
221316 SANITARY WASTE AND VENT PIPING
221319 SANITARY WASTE PIPING SPECIALTIES
221329 SANITARY SEWERAGE PUMPS
221413 STORM DRAINAGE PIPING
221423 STORM DRAINAGE PIPING SPECIALTIES
223400 GAS-FIRED WATER HEATERS
224000 PLUMBING FIXTURES
224700 DRINKING FOUNTAINS AND WATER COOLERS

DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)
230500 COMMON WORK RESULTS FOR HVAC
230513 COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT
230516 EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING
230519 METERS AND GAUGES FOR HVAC PIPING
230523.11 GLOBE VALVES FOR HVAC PIPING
230523.12 BALL VALVES FOR HVAC PIPING
230523.13 BUTTERFLY VALVES FOR HVAC PIPING
230523.14 CHECK VALVES FOR HVAC PIPING
230523.15 GATE VALVES FOR HVAC PIPING
230529 HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
230548.13 VIBRATION CONTROLS FOR HVAC
230553 IDENTIFICATION FOR HVAC
230593 TESTING, ADJUSTING, AND BALANCING
230713 HVAC INSULATION
230923 DIRECT DIGITAL CONTROL (DDC) SYSTEM
231123 FACILITY NATURAL-GAS PIPING
232113 HYDRONIC PIPING
232116 HYDRONIC PIPING SPECIALTIES
232123 HYDRONIC PUMPS
232300 REFRIGERANT PIPING
232500 HVAC WATER TREATMENT
233113 METAL DUCTS
233300 AIR DUCT ACCESSORIES
233423 HVAC POWER VENTILATORS
233713 DIFFUSERS, REGISTERS, AND GRILLES
233723 HVAC GRAVITY VENTILATORS
235216 CONDENSING BOILERS
236423.21 AIR-COOLED, SCROLL WATER CHILLERS
237313.10 MODULAR INDOOR CENTRAL-STATION AIR-HANDLING UNITS
238219 FAN COIL UNITS

DIVISION 26 – ELECTRICAL
260500 BASIC ELECTRICAL REQUIREMENTS
260519 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
260526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
260529 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
260533.13 CONDUITS FOR ELECTRICAL SYSTEMS
260533.16 BOXES AND COVERS FOR ELECTRICAL SYSTEMS
260544 SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING
260553 IDENTIFICATION FOR ELECTRICAL SYSTEMS
260574 ELECTRICAL SYSTEM STUDIES
260923 LIGHTING CONTROL DEVICES
262416 PANELBOARDS
262726 WIRING DEVICES
262813 FUSES
262816 ENCLOSED SWITCHES AND CIRCUIT BREAKERS
262913.03 MANUAL AND MAGNETIC MOTOR CONTROLLERS
265119 LED INTERIOR LIGHTING
265219 EMERGENCY AND EXIT LIGHTING
265619 LED EXTERIOR LIGHTING

DIVISION 27 – COMMUNICATIONS
270500 COMMON WORK RESULTS FOR COMMUNICATIONS
270526 GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS
270528 PATHWAYS FOR COMMUNICATIONS SYSTEMS
270553 IDENTIFICATION FOR COMMUNICATIONS SYSTEMS
271100 COMMUNICATIONS EQUIPMENT ROOM FITTINGS
271113 COMMUNICATIONS ENTRANCE PROTECTION
271323 COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING
271513 COMMUNICATIONS COPPER HORIZONTAL CABLING

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY
280513 CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY
280528 PATHWAYS FOR ELECTRONIC SAFETY AND SECURITY
280544 SLEEVES AND SLEEVE SEALS FOR ELECTRONIC SAFETY AND SECURITY PATHWAYS AND CABLING
283111 DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

END OF TABLE OF CONTENTS

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hollow-core flush wood veneer-faced doors for transparent finish.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door trim for openings.
5. Door frame construction.
6. Factory-machining criteria.
7. Factory- finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.
4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Dimensions and locations of blocking for hardware attachment.
6. Dimensions and locations of mortises and holes for hardware.
7. Clearances and undercuts.
8. Requirements for veneer matching.
9. Doors to be factory primed and application requirements.
10. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Mark each door on bottom rail with opening number used on Shop Drawings.

1.4 FIELD CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

2. Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F during remainder of construction period.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Delamination of veneer.
   b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
   c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
2. Warranty also includes installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flush wood doors from single manufacturer.

B. Basis of Design Product: Aspiro Series | Marshfield-Algoma by Masonite Architectural

1. Wood Species: White Birch
2. Color: Rolled Oats

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Provide labels and certificates from AWI certification program indicating that doors and frames comply with requirements of grades specified.
   a. Contractor registers the Work under this Section with the AWI Quality Certification Program at www.awiqcp.org or by calling 855-345-0991.

2.3 LIGHT FRAMES AND LOUVERS

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

1. Wood Species: Same species as door faces .
2. Profile: Manufacturer's standard shape.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
2. Comply with NFPA 80 requirements for fire-rated doors.

B. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.5 FACTORY FINISHING

A. Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
2. Finish faces, all four edges, edges of cutouts, and mortises.
3. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. Architectural Woodwork Standards Grade: Custom.
2. Architectural Woodwork Standards System-5, Varnish, Conversion.
3. ANSI/WDMA I.S. 1A TR-4 Conversion Varnish.
4. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

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

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Install doors and frames to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Install frames level, plumb, true, and straight.

1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
2. Anchor frames to anchors or blocking built in or directly attached to substrates.
   a. Secure with countersunk, concealed fasteners and blind nailing.
   b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
      1) For factory-finished items, use filler matching finish of items being installed.
3. Install fire-rated doors and frames in accordance with NFPA 80.
4. Install smoke- and draft-control doors in accordance with NFPA 105.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
   a. "Metal Doors and Frames"
   b. "Flush Wood Doors"
   c. "Interior Aluminum Doors and Frames"
   d. "Aluminum-Framed Entrances and Storefronts"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
   a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
   a. Wiring Diagrams: For power, signal, and control wiring and including:
      1) Details of interface of electrified door hardware and building safety and security systems.
      2) Schematic diagram of systems that interface with electrified door hardware.
      3) Point-to-point wiring.
      4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
   a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
   a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
   b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
   c. Indicate complete designations of each item required for each opening, include:
      1) Door Index: door number, heading number, and Architect's hardware set number.
      2) Quantity, type, style, function, size, and finish of each hardware item.
      3) Name and manufacturer of each item.
      4) Fastenings and other pertinent information.
      5) Location of each hardware set cross-referenced to indications on Drawings.
      6) Explanation of all abbreviations, symbols, and codes contained in schedule.
      7) Mounting locations for hardware.
      8) Door and frame sizes and materials.
      9) Degree of door swing and handing.
      10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:
   a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
   b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.

f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
   a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
   b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
   a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
   b. Catalog pages for each product.
   c. Final approved hardware schedule edited to reflect conditions as installed.
   d. Final keying schedule
   e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
   f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
   a. Fire door assemblies, in compliance with NFPA 80.
   b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   a. For door hardware: DHI certified AHC or DHC.
   b. Can provide installation and technical data to Architect and other related subcontractors.
   c. Can inspect and verify components are in working order upon completion of installation.
   d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
   a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
   b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:
   a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105

b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
   a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:
   a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
   a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      2) Preliminary key system schematic diagram.
      3) Requirements for access control.
      4) Address for delivery of keys.

2. Pre-installation Conference
   a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Inspect and discuss preparatory work performed by other trades.
   c. Inspect and discuss electrical roughing-in for electrified door hardware.
   d. Review sequence of operation for each type of electrified door hardware.
   e. Review required testing, inspecting, and certifying procedures.
   f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:
   a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

1.06 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
   a. Mechanical Warranty
      1) Locks: 10 years
      2) Exit Devices: 10 years
      3) Closers: 30 years
   b. Electrical Warranty
      1) Exit Devices: 3 years
      2) Closers: 2 years

1.08 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."

1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.

B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer’s recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with “Metal Doors and Frames”, “Flush Wood Doors”, “Stile and Rail Wood Doors” to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Ives 5BB series

2. Acceptable Manufacturers and Products:
   a. Hager BB1191/1279 series
   b. McKinney TB series
   c. Best FBB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
   a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
   b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
   a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. 2 inches or thicker doors:
   a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Exterior Doors: Non-removable pins
   d. Out-Swinging Interior Lockable Doors: Non-removable pins
   e. Interior Non-lockable Doors: Non-rising pins

9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Select
   b. Hager

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.

4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Von Duprin EPT-10

2. Acceptable Manufacturers and Products:
   a. No Substitute

B. Requirements:

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

2.06 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Rockwood
   b. Hager

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.07 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Rockwood
   b. Hager

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.

2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.08 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage L9000 series

2. Acceptable Manufacturers and Products:
   a. Best 45H series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-3/5-inch x 3/5 inch with 180-degree visibility. Provide messages color-coded using ANSI Z535 Safety Red with full text and/or symbols, as scheduled, for easy visibility. When applicable allows for lock status indication on both sides of the door.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
   a. Lever Design: 06A.

2.09 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Von Duprin 99/33A series

2. Acceptable Manufacturers and Products:

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.

14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.10 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage/Von Duprin PS900 Series

2. Acceptable Manufacturers and Products:
   a. No Substitute

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
   a. 12/24 VDC Output, field selectable.
   b. Class 2 Rated power limited output.
   c. Universal 120-240 VAC input.
   d. Low voltage DC, regulated and filtered.
   e. Polarized connector for distribution boards.
   f. Fused primary input.
   g. AC input and DC output monitoring circuit w/LED indicators.
   h. Cover mounted AC Input indication.
   i. Tested and certified to meet UL294.
   j. NEMA 1 enclosure.
   k. Hinged cover w/lock down screws.
   l. High voltage protective cover.

2.11 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer:
   a. Best Coremax series

2. Acceptable Manufacturers and Products:
   a. No Substitute

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer’s series as indicated. Refer to “KEYING” article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
   a. Open: 7-pin cylinder with small format interchangeable core (SFIC) core with open keyway

2.12 KEYING

A. Scheduled System:

1. New factory registered system:
   a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
   a. Replaceable Construction Cores.
      1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
         a) 3 construction control keys
         b) 12 construction change (day) keys.
      2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:
   a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      1) Master Keying system as directed by the Owner.
   b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
   c. Provide keys with the following features:
      1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
   d. Identification:
      1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
      2) Identification stamping provisions must be approved by the Architect and Owner.
      3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE".
      4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
      5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
   e. Quantity: Furnish in the following quantities.
      1) Permanent Control Keys: 2
      2) Master Keys: per master
      3) Change (Day) Keys: 2 per core plus 10

2.13 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. LCN 4040XP series

2. Acceptable Manufacturers and Products:
   a. Corbin-Russwin DC8000 series
   b. Sargent 281 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.14 ELECTROMECHANICAL CLOSER/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. LCN

2. Acceptable Manufacturers:
   a. Norton
   b. Rixson

B. Requirements:

1. Provide single-point or multi-point hold-open electromechanical closer/holders as specified. Coordinate voltage requirements and provide transformer if necessary.
2. Provide closer/holders that function as full rack and pinion door closer when current is interrupted or continuous hold-open is not engaged.
3. Provide door closers with fully hydraulic, full rack and pinion action with high strength cylinder and full complement bearings at shaft.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.15 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Trimco
   b. Rockwood

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.16 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Trimco
   b. Rockwood

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 1-1/2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.17 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
   a. Glynn-Johnson

2. Acceptable Manufacturers:
   a. Rixson
   b. ABH

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.18 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Trimco
   b. Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.19 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Zero International

2. Acceptable Manufacturers:
   a. National Guard
   b. Reese

B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.20 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:

a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Rockwood
   c. Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.21 MAGNETIC HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. LCN

2. Acceptable Manufacturers:
   a. Rixson
   b. Sargent

B. Requirements:

1. Provide wall or floor mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordinate projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Connect magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

2.22 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Weatherstripping: Clear Anodized Aluminum
8. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.

L. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

M. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

112426 OPT0364708 Version 3

Legend:
Link to catalog cut sheet
Electrified Opening

Hardware Group No. 01

For use on Door #(s):
100

Provide each DE door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	FIRE EXIT HARDWARE	9927-EO-F-LBR-499F		626	VON
1	EA	FIRE EXIT HARDWARE	9927-EO-F-LBRAFL-499F		626	VON
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	MAGNET	SEM7850 12V/24V/120V	⚡	689	LCN
1	EA	OVERLAPPING ASTRAGAL	139A		A	ZER
1	EA	GASKETING	488SBK PSA		BK	ZER

OPERATION: THE DOOR IS NORMALLY HELD OPEN AND UNLOCKED. DOOR MAGNET TO RELEASE UPON ACTIVATION OF THE FIRE ALARM ALLOWING THE DOOR TO CLOSE AND LATCH. FREE EGRESS AT ALL TIMES.

Hardware Group No. 02

For use on Door #(s):
100.1B

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY		628	IVE
1	EA	CONT. HINGE	112XY EPT		628	IVE
1	EA	POWER TRANSFER	EPT10	⚡	689	VON
1	EA	REMOVABLE MULLION	KR4954		689	VON
1	EA	PANIC HARDWARE	99-EO		626	VON
1	EA	ELEC PANIC HARDWARE	QEL-99-NL-OP-110MD 24 VDC	⚡	626	VON
1	EA	RIM CYLINDER	1E72 W/CORMAX CORE		626	BES
1	EA	MORTISE CYLINDER	1E74 W/CORMAX CORE		626	BES
2	EA	90 DEG OFFSET PULL	8190EZHD 8" STD		630-316	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
2	EA	PA MOUNTING PLATE	4040XP-18PA (AS REQ'D)		689	LCN
2	EA	CUSH SHOE SUPPORT	4040XP-30 SRT (AS REQ'D)		689	LCN
2	EA	BLADE STOP SPACER	4040XP-61 (AS REQ'D)		689	LCN
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
2	EA	DOOR SWEEP, BRUSH W/ DRIP	8198AA		AA	ZER
1	EA	THRESHOLD, 1/2"	655A		A	ZER
1	EA	INTERCOM	BY ACCESS CONTROL PROVIDER	⚡		
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER	⚡		B/O
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC (COORDINATE WITH ACCESS CONTROL)	⚡	LGR	SCE
1		NOTE	WEATHERSTRIP BY DOOR/FRAME MANUFACTURER			

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING A VALID CREDENTIAL TO THE READER OR PRESSING REMOTE INTERCOM BUTTON WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH ALLOWING ACCESS. DOOR TO LOCK UPON LOSS OF POWER. FREE EGRESS AT ALL TIMES.

Hardware Group No. 03

For use on Door #(s):
101 104.1 105.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056BDC 06A L583-363		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	PERMANENT CORE	KEYED TO/MATCH EXISTING SYSTEM		626	BES
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP ST-1630		689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 04

For use on Door #(s):
101.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056BDC 06A L583-363		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	PERMANENT CORE	KEYED TO/MATCH EXISTING SYSTEM		626	BES
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP ST-1630		689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 05

For use on Door #(s):
102 103 104 105 106 107.1
107 108.1 108 109 110.1 111.1
112.1 113.1 116 119 122 126
132

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056BDC 06A L583-363		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	WALL STOP	WS401/402CVX		626	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 06

For use on Door #(s):
102.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056BDC 06A L583-363		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)		626	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 07

For use on Door #(s):
103.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	PUSH PLATE	8200 6" X 16"		630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"		630	IVE
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP ST-1630		689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 08

For use on Door #(s):
106.1 115 120 121 141

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056BDC 06A L583-363		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	PERMANENT CORE	KEYED TO/MATCH EXISTING SYSTEM		626	BES
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 09

For use on Door #(s):
109.1 117 124 125

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056BDC 06A L583-363		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	PERMANENT CORE	KEYED TO/MATCH EXISTING SYSTEM		626	BES
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 10

For use on Door #(s):
110 111

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	OFFICE W/SIM RETRACT	L9056BDC 06A L583-363		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	PERMANENT CORE	KEYED TO/MATCH EXISTING SYSTEM		626	BES
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 11

For use on Door #(s):
112 129

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
2	EA	POWER TRANSFER	EPT10	✓	689	VON
1	EA	FIRE RATED REMOVABLE MULLION	KR9954		689	VON
1	EA	ELEC FIRE EXIT HARDWARE	QEL-99-L-DT-F-06 24 VDC	✓	626	VON
1	EA	ELEC FIRE EXIT HARDWARE	QEL-99-L-NL-F-06 24 VDC	✓	626	VON
1	EA	RIM CYLINDER	1E72 W/CORMAX CORE		626	BES
1	EA	MORTISE CYLINDER	1E74 W/CORMAX CORE		626	BES
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	ARMOR PLATE	8402 34" X 1" LDW B-CS		630	IVE
2	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER	✓		B/O
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC (COORDINATE WITH ACCESS CONTROL)	✓	LGR	SCE

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING A VALID CREDENTIAL TO THE READER WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH ALLOWING ACCESS. DOOR TO LOCK UPON LOSS OF POWER. FREE EGRESS AT ALL TIMES.

Hardware Group No. 12

For use on Door #(s):
113

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER			FINISH	MFR
1	EA	CONT. HINGE	112XY EPT			628	IVE
1	EA	POWER TRANSFER	EPT10		✓	689	VON
1	EA	ELEC PANIC HARDWARE	QEL-99-NL-OP-110MD 24 VDC		✓	626	VON
1	EA	RIM CYLINDER	1E72 W/CORMAX CORE			626	BES
1	EA	90 DEG OFFSET PULL	8190EZHD 8" STD			630-316	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH			689	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA (AS REQ'D)			689	LCN
1	EA	CUSH SHOE SUPPORT	4040XP-30 SRT (AS REQ'D)			689	LCN
1	EA	BLADE STOP SPACER	4040XP-61 (AS REQ'D)			689	LCN
1	EA	DOOR SWEEP, BRUSH W/ DRIP	8198AA			AA	ZER
1	EA	THRESHOLD, 1/2"	655A			A	ZER
1	EA	INTERCOM	BY ACCESS CONTROL PROVIDER		✓		
1	EA	CREDENTIAL READER	BY ACCESS CONTROL PROVIDER		✓		B/O
1	EA	POWER SUPPLY	PS902 900-2RS 120/240 VAC (COORDINATE WITH ACCESS CONTROL)		✓	LGR	SCE
1		NOTE	WEATHERSTRIP BY DOOR/FRAME MANUFACTURER				

OPERATION: DOOR NORMALLY CLOSED AND LOCKED. PRESENTING A VALID CREDENTIAL TO THE READER OR PRESSING REMOTE INTERCOM BUTTON WILL MOMENTARILY RETRACT THE PANIC DEVICE LATCH ALLOWING ACCESS. DOOR TO LOCK UPON LOSS OF POWER. FREE EGRESS AT ALL TIMES.

Hardware Group No. 13

For use on Door #(s):
114 118 123 138 130 158
150

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	STOREROOM LOCK	L9080BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	WALL STOP	WS401/402CVX		626	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 14

For use on Door #(s):
114.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	CONT. HINGE	224XY		628	IVE
1	EA	PANIC HARDWARE	LD-99-L-NL-06		626	VON
1	EA	RIM CYLINDER	1E72 W/CORMAX CORE		626	BES
1	EA	SURFACE CLOSER	4040XP SCUSH ST-1595		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	SET	GASKETING	429AA-S		AA	ZER
1	EA	DOOR SWEEP, BRUSH W/ DRIP	8198AA		AA	ZER
1	EA	THRESHOLD, 1/2"	655A		A	ZER

Hardware Group No. 15

For use on Door #(s):
115.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	CLASSROOM LOCK	L9070BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 16

For use on Door #(s):
117.1

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1HW 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	FIRE RATED REMOVABLE MULLION	KR9954		689	VON
2	EA	FIRE EXIT HARDWARE	99-L-F-06		626	VON
2	EA	RIM CYLINDER	1E72 W/CORMAX CORE		626	BES
1	EA	MORTISE CYLINDER	1E74 W/CORMAX CORE		626	BES
2	EA	SURFACE CLOSER	4040XP EDA		689	LCN
2	EA	PA MOUNTING PLATE	4040XP-18PA (AS REQ'D)		689	LCN
2	EA	BLADE STOP SPACER	4040XP-61 (AS REQ'D)		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER

Hardware Group No. 17

For use on Door #(s):
127 140

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	CLASSROOM LOCK	L9070BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436/FS438 (AS REQ'D)		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 18

For use on Door #(s):
128

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	CONST LATCHING BOLT	FB51T/FB61T (AS REQ'D)		630	IVE
1	EA	CLASSROOM LOCK	L9070BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
2	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4040XP ST-1630		689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ		689	LCN
2	EA	KICK PLATE	8400 34" X 1" LDW B-CS		630	IVE
2	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 19

For use on Door #(s):
131 137

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	MORTISE CYLINDER	1E74 W/CORMAX CORE		626	BES
1	EA	NOTE	BALANCE OF HARDWARE BY DOOR/FRAME MANUFACTURER			

Hardware Group No. 20

For use on Door #(s):
133 136

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	AUTO FLUSH BOLT	FB31P/FB41P (AS REQ'D)		630	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	OFFICE W/SIM RETRACT	L9056BDC 06A L583-363		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	COORDINATOR	COR X FL (MB/MBF AS REQ'D)		628	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
2	EA	ARMOR PLATE	8402 34" X 1" LDW B-CS PULL SIDE		630	IVE
1	EA	OVERLAPPING ASTRAGAL	139A		A	ZER
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 21

For use on Door #(s):
139

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	CONST LATCHING BOLT	FB51T/FB61T (AS REQ'D)		630	IVE
1	EA	STOREROOM LOCK	L9080BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
2	EA	OH STOP, CONCEALED	410S		630	GLY
2	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 22

For use on Door #(s):
142A

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	STOREROOM LOCK	L9080BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	ARMOR PLATE	8402 34" X 1" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 23

For use on Door #(s):
142B 143

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	STOREROOM LOCK	L9080BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	SURFACE CLOSER	4040XP SCUSH ST-1595		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	SET	GASKETING	429AA-S		AA	ZER
1	EA	DOOR SWEEP, BRUSH W/ DRIP	8198AA		AA	ZER
1	EA	THRESHOLD, 1/2"	655A		A	ZER

Hardware Group No. 24

For use on Door #(s):
144

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	STOREROOM LOCK	L9080BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 34" X 1" LDW B-CS PULL SIDE		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 25

For use on Door #(s):
145

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	CONST LATCHING BOLT	FB51T/FB61T (AS REQ'D)		630	IVE
1	EA	CLASSROOM LOCK	L9070BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
2	EA	OH STOP, CONCEALED	410S		630	GLY
2	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 26

For use on Door #(s):
146

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 5 X 4.5 (NRP AS REQ"D)		652	IVE
1	EA	CLASSROOM LOCK	L9070BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	SURFACE CLOSER	4040XP SHCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 34" X 1" LDW B-CS PULL SIDE		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 27

For use on Door #(s):
147.2

Provide each RU door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	MORTISE CYLINDER	1E74 W/CORMAX CORE		626	BES
1	EA	NOTE	BALANCE OF HARDWARE BY DOOR/FRAME MANUFACTURER			

Hardware Group No. 28

For use on Door #(s):
147A 147B

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	224XY		628	IVE
1	EA	PANIC HARDWARE	99-NL		626	VON
1	EA	RIM CYLINDER	1E72 W/CORMAX CORE		626	BES
1	EA	SURFACE CLOSER	4040XP SCUSH ST-1595		689	LCN
1	EA	KICK PLATE	8400 34" X 1 1/2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	SET	GASKETING	429AA-S		AA	ZER
1	EA	DOOR SWEEP, BRUSH W/ DRIP	8198AA		AA	ZER
1	EA	THRESHOLD, 1/2"	655A		A	ZER

Hardware Group No. 29

For use on Door #(s):
148.2

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
8	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	CONST LATCHING BOLT	FB51T/FB61T (AS REQ'D)		630	IVE
1	EA	CLASSROOM LOCK	L9070BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
2	EA	OH STOP & HOLDER	100H		630	GLY
2	EA	KICK PLATE	8400 34" X 1" LDW B-CS PULL SIDE		630	IVE
2	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 30

For use on Door #(s):
157

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	PRIVACY W/DEADBOLT W/ OUTSIDE INDICATOR	L9440 06A 09-544 OS-OCC		626	SCH
1	EA	OH STOP, CONCEALED	410S		630	GLY
1	EA	KICK PLATE	8400 34" X 1 1/2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 31

For use on Door #(s):
149

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	AUTO FLUSH BOLT	FB31P/FB41P (AS REQ'D)		630	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	CLASSROOM LOCK	L9070BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	COORDINATOR	COR X FL (MB/MBF AS REQ'D)		628	IVE
1	EA	OH STOP, CONCEALED	410S		630	GLY
1	EA	SURFACE CLOSER	4040XP ST-1630		689	LCN
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	TOP JAMB MTG PLATE	4040XP-18TJ		689	LCN
2	EA	ARMOR PLATE	8402 34" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
1	EA	OVERLAPPING ASTRAGAL	139A		A	ZER
1	EA	GASKETING	488SBK PSA		BK	ZER

Hardware Group No. 32

For use on Door #(s):
151 155

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	STOREROOM LOCK	L9080BDC 06A		626	SCH
1	EA	CORMAX KEYED SFIC CYLINDER	1CM7**2		626	BES
1	EA	OH STOP, CONCEALED	410S		630	GLY
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 33

For use on Door #(s):
152 153 156

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	PUSH PLATE	8200 6" X 16"		630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"		630	IVE
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE
1	EA	WALL STOP	WS401/402CVX		626	IVE
3	EA	SILENCER	SR64		GRY	IVE

Hardware Group No. 34

For use on Door #(s):
154

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5 (NRP AS REQ'D)		652	IVE
1	EA	PUSH PLATE	8200 6" X 16"		630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"		630	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW B-CS		630	IVE
1	EA	KICK PLATE	8400 34" X 1" LDW B-CS PULL SIDE		630	IVE
3	EA	SILENCER	SR64		GRY	IVE

END OF SECTION

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

B. Related Requirements:

1. Section 095123 "Acoustical Tile Ceilings" for ceilings consisting of mineral-base acoustical tiles used with fully concealed suspension systems, stapling, or adhesive bonding.
2. Section 095133 "Acoustical Metal Pan Ceilings" for ceilings consisting of metal-pan units with exposed and concealed suspension systems.

C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 .

B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E 1264.
2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Gypsum.
2. Armstrong Ceiling and Wall Solutions.
3. Certainteed; SAINT-GOBAIN.
4. USG Corporation.
5. TURF
6. CSI Creative

B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Classification: Provide panels as follows:

1. Type and Form: Type III, mineral base with painted finish; .
2. Pattern: As indicated on drawings .

D. Color: As indicated on Drawings .

E. Noise Reduction Coefficient (NRC): Not less than NRC indicated in a schedule .

F. Edge/Joint Detail: As indicated by manufacturer's designation .

G. Thickness: As indicated on Drawings .

H. Thickness: As indicated on Drawings .

I. Modular Size: As indicated on Drawings .

2.4 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong Ceiling & Wall Solutions.
2. USG Corporation.

B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.

1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C 635/C 635M.

C. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 9/16-inch- wide metal caps on flanges.

1. Structural Classification: Intermediate -duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
3. Face Design: Flat, flush .
4. Cap Material: Cold-rolled steel or aluminum.
5. Cap Finish: Painted white .

2.5 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
   a. Type: anchors.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
4. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C 636/C 636M , seismic design requirements, and manufacturer's written instructions.

1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
8. Do not attach hangers to steel deck tabs.
9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. Arrange directionally patterned acoustical panels as follows:
   a. As indicated on reflected ceiling plans.
2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet , non-cumulative.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Primers.
2. Water-based finish coatings.
3. Solvent-based finish coatings.
4. Floor sealers and paints.
5. Dry fall coatings.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
2. Section 055116 "Metal Floor Plate Stairs" for shop priming metal floor plate stairs.
3. Section 055213 "Pipe and Tube Railings" for shop priming pipe and tube railings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Product Schedule: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Benjamin Moore & Co.
2. PPG Paints.
3. Sherwin-Williams Company (The).

B. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range .

2.3 FLOOR SEALERS AND PAINTS

A. Interior Concrete Stain: Penetrating semitransparent stain specifically manufactured for interior and exterior concrete horizontal and vertical surfaces.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Benjamin Moore & Co.
   b. PPG Paints.
   c. Sherwin-Williams Company (The).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and CMUs): 12 percent.
4. Wood: 15 percent.

5. Gypsum Board: 12 percent.
6. Plaster: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

E. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 INSTALLATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 CLEANING AND PROTECTION

A. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

B. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINT PRODUCTS

A. Interior Ferrous Metals: Provide the following finish systems over interior ferrous metal.

1. System Description: (1) coat finish over (1) coat primer. Primer is not required on shop-primed items or if not required by finish coat manufacturer.
2. Primer: First coat (provide red or white color as appropriate for finish coat color) – Sherwin Williams: Waterborne (100% Acrylic), Solventborne, B66-WI, B5OZ Series
3. Second coat – Sherwin Williams Property Solutions or equal. See ID001 for finish type.

B. Interior Galvanized Metals: Provide the following finish systems over interior galvanized metal surfaces:

1. System Description: (1) coat finish over (1) coat primer. Primer is not required on shop-primed items or if not required by finish coat manufacturer.
2. Pretreatment: As recommended by paint manufacturer.
3. Primer: First coat – Sherwin Williams: Waterborne (100% Acrylic), Solventborne, B66-310, B50WZ30
4. Second coat – Sherwin Williams Property Solutions or equal. See ID001 for finish type.

C. Interior Aluminum: Provide the following finish systems over interior aluminum surfaces:

1. System Description: (1) coat finish over (1) coat primer. Primer is not required on shop-primed items or if not required by finish coat manufacturer.
2. Pretreatment: As recommended by paint manufacturer.
3. Primer: First coat – Sherwin Williams: Waterborne (100% Acrylic), Solventborne, B66-310, B50WZ30
4. Second coat – Sherwin Williams Property Solutions or equal. See ID001 for finish type.

D. Interior Gypsum Board, Plaster and Concrete – Non-Wet Areas: Apply to gypsum board, plaster and concrete for non-wet areas. (1) coat to cover.

1. System Description: (1) coat finish over (1) coat primer.
2. Primer – Sherwin Williams: ProMar 400 Zero VOC Primer, B28W4600
3. Second coat – Sherwin Williams Property Solutions or equal. See ID001 for finish type.

E. Interior Gypsum Board, Plaster and Concrete – Wet Areas: Apply to gypsum board, plaster and concrete for wet areas. (1) coat to cover.

1. System Description: (1) coat finish over (1) coat primer.
2. Primer – Sherwin Williams.
3. Second coat – Sherwin Williams Property Solutions or equal. See ID001 for finish type.

END OF SECTION 099123

SECTION 102213 - WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Heavy-duty wire mesh partitions.

1.2 DEFINITIONS

A. Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.

B. Lock Crimp: Deep crimps at points of the intersection that lock wires securely in place.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Wire mesh partitions .

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Indicate clearances required for operation of doors .

C. Delegated Design Submittals: For wire mesh partitions indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wire mesh partition hardware.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7 QUALITY ASSURANCE

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire mesh items with cardboard protectors on perimeters of panels and doors and with posts wrapped to provide protection during transit and Project-site storage. Use vented plastic.

B. Inventory wire mesh partition door hardware on receipt, and provide secure lockup for wire mesh partition door hardware delivered to Project site.

1. Tag each item or package separately with identification, and include basic installation instructions with each item or package.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of construction contiguous with wire mesh units by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Wire Corporation.
2. Indiana Wire Products, Inc.
3. Jesco Industries, Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design wire mesh units.

B. Regulatory Requirements: Comply with applicable provisions in the United States Access Board's ADA-ABA Accessibility Guidelines and ICC A117.1 for doors and gates designated as accessible.

2.3 HEAVY-DUTY WIRE MESH PARTITIONS

A. Mesh:

1. 8 gauge diameter steel wire, resistance welded into 1-1/2-by-2-1/2-inch rectangular mesh.

B. Vertical and Horizontal Panel Framing: 1-1/2-by-3/4-by-1/8-inch cold-rolled steel channels; with holes for 3/8-inch-diameter bolts not more than 12 inches o.c.

C. Horizontal Panel Stiffeners: Two cold-rolled steel channels, 1 by 1/2 by 1/8 inch, bolted or riveted toe to toe through mesh.

D. Top Capping Bars: 3-by-1-inch steel channels.

E. Posts for 90-Degree Corners: 1-1/2-by-1-1/2-by-1/8-inch steel angles or tubes or 2-by-2-by-0.075-inch cold-rolled steel angles or tubes, with holes for 3/8-inch- diameter bolts aligning with bolt holes in vertical framing; with 1/4-inch steel base plates.

F. Accessories:

1. Sheet Metal Base: 0.060-inch- thick, steel sheet.
2. Adjustable Filler Panels: 0.060-inch- thick, steel sheet; capable of filling openings from 2 to 12 inches.

G. Finish: Powder-coated finish unless otherwise indicated.

1. Color: As selected by Architect from manufacturer's full range .

2.4 MATERIALS

A. Steel Wire: ASTM A510/A510M.

B. Steel Plates, Channels, Angles, and Bars: ASTM A36/A36M.

C. Steel Sheet: Cold-rolled steel sheet, ASTM A1008/A1008M, Commercial Steel (CS), Type B.

D. Steel Pipe: ASTM A53/A53M, Schedule 40, unless another weight is indicated or required by structural loads.

E. Steel Tubing: ASTM A500/A500M, cold-formed structural-steel tubing or ASTM A513/A513M, Type 5, mandrel-drawn mechanical tubing.

F. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.

G. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts, nuts, and washers.

H. Post-Installed Anchors: Capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components are zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

I. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting."

J. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.5 FABRICATION

A. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. Furnish bolts, hardware, and accessories required for complete installation with manufacturer's standard finishes.

1. Fabricate wire mesh items to be readily disassembled.
2. Welding: Weld corner joints of framing and grind smooth, leaving no evidence of joint .

B. Heavy-Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.

1. Mesh: Securely clinch mesh to framing.
2. Framing: Fabricate framing with mortise-and-tenon corner construction.
   a. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.
   b. Fabricate partition and door framing with slotted holes for connecting adjacent panels.
3. Fabricate wire mesh partitions with 3 to 4 inches of clear space between finished floor and bottom horizontal framing.
4. Fabricate wire mesh partitions with bottom horizontal framing flush with finished floor.
5. Doors: Align bottom of door with bottom of adjacent panels.
   a. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.
6. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.

2.6 STEEL AND IRON FINISHES

A. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on powder-coat finish, suitable for use indicated, with a minimum dry film thickness of 2 mils2 mils .

1. Color and Gloss: As selected by Architect from manufacturer's full range .

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine floors for suitable conditions where wire mesh items will be installed.

C. Examine walls to which wire mesh items will be attached for properly located blocking, grounds, and other solid backing for attachment of support fasteners.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF WIRE MESH PARTITIONS

A. Anchor wire mesh partitions to floor with 3/8-inch- diameter, postinstalled expansion anchors at 12 inches o.c. through anchor clips located at each post and corner. Shim anchor clips as required to achieve level and plumb installation.

1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.

B. Anchor wire mesh partitions to floor with 3/8-inch- diameter, postinstalled expansion anchors at 12 inches o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.

1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.

C. Anchor wire mesh partitions to walls at 12 inches o.c. through back corner panel framing and as follows:

1. For concrete and solid masonry anchorage, use expansion anchors.
2. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

D. Secure top capping bars to top framing channels with 1/4-inch- diameter, "U" bolts spaced not more than 28 inches o.c.

E. Provide line posts at locations indicated or, if not indicated, as follows:

1. On each side of sliding-door openings.
2. For partitions that are 7 to 9 ft. high, spaced at 15 to 20 ft. o.c.

F. Provide seismic supports and bracing as indicated or, if not indicated, as recommended by manufacturer and as required for stability, extending and fastening members to supporting structure.

G. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.

H. Install doors complete with door hardware.

I. Install service windows complete with window hardware.

J. Weld or bolt sheet metal bases to wire mesh partitions .

K. Bolt accessories to wire mesh partition framing.

3.3 REPAIR

A. Repair Painting:

1. Wire brush and clean rust spots, welds, and abraded areas immediately after installation, and apply repair paint with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
   a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
2. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

B. Repair of Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

3.4 ADJUSTING

A. Adjust [**doors**] [**gates**] [**service windows**] to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Verify that latches and locks engage accurately and securely without forcing or binding.

3.5 PROTECTION

A. Remove and replace defective work, including doors and framing that are warped, bowed, or otherwise unacceptable.

END OF SECTION 102213

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Knocked-down athletic lockers.
2. Locker benches.

B. Related Requirements:

1. Section 105113.13 "Coin-Operated Metal Lockers" for coin-operated lockers used in public facilities for temporary storage of personal belongings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker.

B. Shop Drawings: For metal lockers.

1. Include plans, elevations, sections, and attachment details.
2. Show locker trim and accessories.
3. Include locker identification system and numbering sequence.

C. Samples: For each color specified, in manufacturer's standard size.

1.3 INFORMATIONAL SUBMITTALS

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate sizes and locations of wood bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain metal lockers , locker benches, and accessories from single source from single locker manufacturer.

1. Obtain locks from single lock manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: For lockers and locker benches indicated to be accessible, comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1 .

2.3 KNOCKED-DOWN ATHLETIC LOCKERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ASI Storage Solutions.
2. Jorgenson Companies.
3. Olympus Lockers & Storage Products, Inc.
4. Lyon, LLC.

B. Perforated Doors: One piece; fabricated from 0.075-inch nominal-thickness steel sheet with manufacturer's standard diamond perforations; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges .

1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.

C. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

1. Tops and Bottoms: 0.060-inch nominal thickness, with single bend at edges.
2. Backs: 0.048-inch nominal thickness.
3. Shelves: 0.060-inch nominal thickness, with double bend at front and single bend at sides and back.

D. Unperforated Sides: Fabricated from 0.048-inch nominal-thickness steel sheet.

E. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet or 0.097-inch nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.

1. Cross Frames for Double-Tier Lockers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.

F. Reinforced Bottoms: Structural channels, formed from 0.060-inch nominal-thickness steel sheet; welded to front and rear of side-panel frames.

G. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Hinges: Manufacturer's standard, steel, continuous or knuckle type.

H. Recessed Door Handle and Latch: Stainless steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in cylinder locks, or padlocks; positive automatic latching and prelocking.
   a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.120-inch nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
   b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

I. Locks: Combination padlocks .

J. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.

K. Coat Rods: .

L. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.

M. Finished End Panels: Fabricated from 0.024-inch nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

N. Materials:

1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
2. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with A60 zinc-iron, alloy (galvannealed) coating designation.
3. Expanded Metal: ASTM F1267, Type II (flattened), Class I (uncoated), 3/4-inch steel mesh, with at least 70 percent open area.

O. Finish: Baked enamel or powder coat.

1. Color: Match Architect's sample As selected by Architect from manufacturer's full range .

2.4 WELDED, OPEN-FRONT ATHLETIC LOCKERS <**Insert designation>**

A. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.

2.5 LOCKS

A. Combination Padlock: Provided by Owner.

2.6 LOCKER BENCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ASI Storage Solutions.
2. Jorgenson Companies.
3. Penco Products, Inc.

B. Provide bench units with overall assembly height of 17-1/2 inches .

C. Bench Tops: Manufacturer's standard one-piece units, with rounded corners and edges.

1. Size: Minimum 20-24 inches wide by 1-1/4 inches thick.
2. Laminated clear hardwood with one coat of clear sealer on all surfaces and one coat of clear lacquer on top and sides.

D. Fixed-Bench Pedestals: Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors, and as follows:

1. Tubular Steel:
   a. 1-1/2-inch- diameter steel tubing threaded on both ends, with standard pipe flange at top and bell-shaped cast-iron base; with baked-enamel or powder-coat finish; anchored with exposed fasteners.
   b. Color: As selected by Architect from manufacturer's full range.

E. Materials:

1. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304.
2. Plastic Laminate: NEMA LD 3, Grade HGP.
3. Extruded Aluminum: ASTM B221, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.
4. Steel Tube: ASTM A500/A500M, cold rolled.
5. Particleboard: ANSI A208.1, Grade M-2.

2.7 FABRICATION

A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

C. Equipment: Provide each locker with an identification plate and the following equipment:

1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
3. Triple-Tier Units: One double-prong ceiling hook.
4. Open-Front Athletic Lockers: Two single-prong wall hooks bolted to locker back and coat rod.

D. Knocked-Down Construction: Fabricate metal lockers by assembling at Project site , using manufacturer's nuts, bolts, screws, or rivets.

E. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.

F. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.
2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

G. Continuous Zee Base: Fabricated in lengths as long as practical to enclose base and base ends; finished to match lockers.

H. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.

1. Sloping-top corner fillers, mitered.

I. Individual Sloping Tops: Fabricated in width to fit one locker frame in lieu of flat locker tops; with integral back; finished to match lockers. Provide wedge-shaped divider panels between lockers.

J. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.

K. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.

L. Boxed End Panels: Fabricated with 1-inch- wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

M. Finished End Panels: Fabricated to conceal unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

1. Provide one-piece panels for double-row (back-to-back) locker ends.

N. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.8 ACCESSORIES

A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

B. Anchors: Material, type, and size required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lockers level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
2. Anchor single rows of metal lockers to walls near top and bottom of lockers .
3. Anchor back-to-back metal lockers to floor.

B. Knocked-Down Lockers: Assemble with manufacturer's standard fasteners, with no exposed fasteners on door faces or face frames.

C. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.

D. Equipment:

1. Attach hooks with at least two fasteners.
2. Attach door locks on doors using security-type fasteners.
3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
   a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
   b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.

E. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach recess trim to recessed metal lockers with concealed clips.
2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
3. Attach sloping-top units to metal lockers, with closures at exposed ends.
4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

F. Fixed Benches: Provide no fewer than two pedestals for each bench, uniformly spaced not more than 72 inches apart. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

G. Movable Benches: Place benches in locations indicated on Drawings.

3.3 ADJUSTING

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

3.4 PROTECTION

A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 105113

SECTION 230923 - DIRECT DIGITAL CONTROL (DDC) SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Scope:

1. The Temperature Control Contractor (TCC) shall install, furnish, program, and turn over to client a complete operating DDC system for monitoring and controlling of MEP systems as shown in the Contract Documents.

B. Section Includes:

1. DDC system for monitoring and controlling of MEP systems.
2. Delivery of selected control devices to equipment and systems manufacturers for factory installation and to HVAC systems installers for field installation.

C. Scope not included in 230923:

1. Electrical Contractor (EC) to provide all wiring to all motor starters, variable frequency drives, and motor control centers.
2. EC to provide 120 V/60 Hz power to all direct digital controllers (DDC) that require 120 V power.
3. Sheet Metal Contractor shall install all motorized dampers, duct mounted airflow measuring stations, thermowells (for temperature & pressure sensors), flow meters, control valves, and other accessories that are furnaced by the TCC.
4. Mechanical Contractor shall install all temperature and pressure sensing wells and control valves furnished by the Temperature Control Contactor.

1.2 DEFINITIONS

A. Algorithm: A logical procedure for solving a recurrent mathematical problem. A prescribed set of well-defined rules or processes for solving a problem in a finite number of steps.

B. Analog: A continuously varying signal value, such as current, flow, pressure, or temperature.

C. BACnet Specific Definitions:

1. BACnet: Building Automation Control Network Protocol, ASHRAE 135. A communications protocol allowing devices to communicate data over and services over a network.
2. BACnet Interoperability Building Blocks (BIBBs): BIBB defines a small portion of BACnet functionality that is needed to perform a particular task. BIBBs are combined to build the BACnet functional requirements for a device.
3. BACnet/IP: Defines and allows using a reserved UDP socket to transmit BACnet messages over IP networks. A BACnet/IP network is a collection of one or more IP subnetworks that share the same BACnet network number.
4. BACnet Testing Laboratories (BTL): Organization responsible for testing products for compliance with ASHRAE 135, operated under direction of BACnet International.

5. PICS (Protocol Implementation Conformance Statement): Written document that identifies the particular options specified by BACnet that are implemented in a device.

D. Binary: Two-state signal where a high signal level represents ON" or "OPEN" condition and a low signal level represents "OFF" or "CLOSED" condition. "Digital" is sometimes used interchangeably with "Binary" to indicate a two-state signal.

E. Controller: Generic term for any standalone, microprocessor-based, digital controller residing on a network, used for local or global control. Three types of controllers are indicated: Network Controller, Programmable Application Controller, and Application-Specific Controller.

F. Control System Integrator: An entity that assists in expansion of existing enterprise system and support of additional operator interfaces to I/O being added to existing enterprise system.

G. COV: Changes of value.

H. DDC System Provider: Authorized representative of, and trained by, DDC system manufacturer and responsible for execution of DDC system Work indicated.

I. Distributed Control: Processing of system data is decentralized and control decisions are made at subsystem level. System operational programs and information are provided to remote subsystems and status is reported back. On loss of communication, subsystems shall be capable of operating in a standalone mode using the last best available data.

J. DOCSIS: Data-Over Cable Service Interface Specifications.

K. Gateway: Bidirectional protocol translator that connects control systems that use different communication protocols.

L. HLC: Heavy load conditions.

M. I/O: System through which information is received and transmitted. I/O refers to analog input (AI), binary input (BI), analog output (AO) and binary output (BO). Analog signals are continuous and represent control influences such as flow, level, moisture, pressure, and temperature. Binary signals convert electronic signals to digital pulses (values) and generally represent two-position operating and alarm status. "Digital," (DI and (DO), is sometimes used interchangeably with "Binary," (BI) and (BO), respectively.

N. LAN: Local area network.

O. LNS: LonWorks Network Services.

P. LON Specific Definitions:

1. FTT-10: Echelon Transmitter-Free Topology Transceiver.
2. LonMark: Association comprising suppliers and installers of LonTalk products. Association provides guidelines for implementing LonTalk protocol to ensure interoperability through a standard or consistent implementation.
3. LonTalk: An open standard protocol developed by the Echelon Corporation that uses a "Neuron Chip" for communication. LonTalk is a register trademark of Echelon.
4. LonWorks: Network technology developed by Echelon.
5. Node: Device that communicates using CEA-709.1-C protocol and that is connected to a CEA-709.1-C network.
6. Node Address: The logical address of a node on the network, consisting of a Domain number, Subnet number, and Node number. "Node number" portion of an address is a

number assigned to device during installation, is unique within a subnet, and is not a factory-set unique Node ID.

7. Node ID: A unique 48-bit identifier assigned at factory to each CEA-709.1-C device. Sometimes called a "Neuron ID."
8. Program ID: An identifier (number) stored in a device (usually EEPROM) that identifies node manufacturer, functionality of device (application and sequence), transceiver used, and intended device usage.
9. Standard Configuration Property Type (SCPT): Pronounced "skip-it." A standard format type maintained by LonMark International for configuration properties.
10. Standard Network Variable Type (SNVT): Pronounced "snivet." A standard format type maintained by LonMark used to define data information transmitted and received by individual nodes. "SNVT" is used in two ways. It is an acronym for "Standard Network Variable Type" and is often used to indicate a network variable itself (i.e., it can mean "a network variable of a standard network variable type").
11. Subnet: Consists of a logical grouping of up to 127 nodes, where logical grouping is defined by node addressing. Each subnet is assigned a number, which is unique within a Domain. See "Node Address."
12. TP/FT-10: Free Topology Twisted Pair network defined by CEA-709.3 and is most common media type for a CEA-709.1-C control network.
13. TP/XF-1250: High-speed, 1.25-Mbps, twisted-pair, doubly terminated bus network defined by "LonMark Interoperability Guidelines" typically used only to connect multiple TP/FT-10 networks.
14. User-Defined Configuration Property Type (UCPT): Pronounced "U-Keep-It." A Configuration Property format type that is defined by device manufacturer.
15. User-Defined Network Variable Type (UNVT): Network variable format defined by device manufacturer. UNVTs create non-standard communications that other vendors' devices may not correctly interpret and may negatively impact system operation. UNVTs are not allowed.

Q. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

R. Modbus TCP/IP: An open protocol for exchange of process data.

S. MS/TP: Master-slave/token-passing, IEE 8802-3. Datalink protocol LAN option that uses twisted-pair wire for low-speed communication.

T. Network Controller: Digital controller, which supports a family of programmable application controllers and application-specific controllers, that communicates on peer-to-peer network for transmission of global data.

U. Network Repeater: Device that receives data packet from one network and rebroadcasts it to another network. No routing information is added to protocol.

V. PDA: Personal digital assistant.

W. Peer to Peer: Networking architecture that treats all network stations as equal partners.

X. RAM: Random access memory.

Y. RF: Radio frequency.

Z. Router: Device connecting two or more networks at network layer.

AA. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.

BB. UPS: Uninterruptible power supply.

CC. USB: Universal Serial Bus.

DD. User Datagram Protocol (UDP): This protocol assumes that the IP is used as the underlying protocol.

EE. VAV: Variable air volume.

FF. WLED: White light emitting diode.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product include the following:

1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Operating characteristics, electrical characteristics, and furnished accessories indicating process operating range, accuracy over range, control signal over range, default control signal with loss of power, calibration data specific to each unique application, electrical power requirements, and limitations of ambient operating environment, including temperature and humidity.
3. Product description with complete technical data, performance curves, and product specification sheets.
4. Installation, operation and maintenance instructions including factors effecting performance.
5. Bill of materials of indicating quantity, manufacturer, and extended model number for each unique product.

6. When manufacturer's product datasheets apply to a product series rather than a specific product model, clearly indicate and highlight only applicable information.
7. Each submitted piece of product literature shall clearly cross reference specification and drawings that submittal is to cover.

B. Shop Drawings:

1. Include plans, elevations, sections, and mounting details where applicable.
2. Include details of product assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Detail means of vibration isolation and show attachments to rotating equipment.
4. Plan Drawings indicating the following:

a. Screened backgrounds of walls, structural grid lines, HVAC equipment, ductwork and piping.
b. Room names and numbers with coordinated placement to avoid interference with control products indicated.
c. Each desktop operator workstation, server, gateway, router, DDC controller, control panel instrument connecting to DDC controller, and damper and valve connecting to DDC controller, if included in Project.
d. Exact placement of products in rooms, ducts, and piping to reflect proposed installed condition.
e. Network communication cable and raceway routing.

f. Proposed routing of wiring, cabling, conduit, and tubing, coordinated with building services for review before installation.

5. Schematic drawings for each controlled HVAC system indicating the following:

a. I/O points labeled with point names shown. Indicate instrument range, normal operating set points, and alarm set points. Indicate fail position of each damper and valve, if included in Project.
b. I/O listed in table format showing point name, type of device, manufacturer, model number, and cross-reference to product data sheet number.
c. A graphic showing location of control I/O in proper relationship to HVAC system.
d. Wiring diagram with each I/O point having a unique identification and indicating labels for all wiring terminals.
e. Unique identification of each I/O that shall be consistently used between different drawings showing same point.
f. Elementary wiring diagrams of controls for HVAC equipment motor circuits including interlocks, switches, relays and interface to DDC controllers.
g. Narrative sequence of operation.
h. Graphic sequence of operation, showing all inputs and output logical blocks.

6. Control panel drawings indicating the following:

a. Panel dimensions, materials, size, and location of field cable, raceways, and tubing connections.
b. Interior subpanel layout, drawn to scale and showing all internal components, cabling and wiring raceways, nameplates and allocated spare space.
c. Front, rear, and side elevations and nameplate legend.
d. Unique drawing for each panel.

7. DDC system network riser diagram indicating the following:

a. Each device connected to network with unique identification for each.
b. Interconnection of each different network in DDC system.
c. For each network, indicate communication protocol, speed and physical means of interconnecting network devices, such as copper cable type, or fiber-optic cable type. Indicate raceway type and size for each.
d. Each network port for connection of an operator workstation or other type of operator interface with unique identification for each.

8. DDC system electrical power riser diagram indicating the following:

a. Each point of connection to field power with requirements (volts/phase//hertz/amperes/connection type) listed for each.
b. Each control power supply including, as applicable, transformers, power-line conditioners, transient voltage suppression and high filter noise units, DC power supplies, and UPS units with unique identification for each.
c. Each product requiring power with requirements (volts/phase//hertz/amperes/connection type) listed for each.
d. Power wiring type and size, race type, and size for each.

9. Monitoring and control signal diagrams indicating the following:

a. Control signal cable and wiring between controllers and I/O.
b. Point-to-point schematic wiring diagrams for each product.
c. Control signal tubing to sensors, switches and transmitters.

d. Process signal tubing to sensors, switches and transmitters.

C. System Description:

1. Full description of DDC system architecture, network configuration, operator interfaces and peripherals, servers, controller types and applications, gateways, routers and other network devices, and power supplies.
2. Complete listing and description of each report, log and trend for format and timing and events which initiate generation.
3. System and product operation under each potential failure condition including, but not limited to, the following:

a. Loss of power.
b. Loss of network communication signal.
c. Loss of controller signals to inputs and outpoints.
d. Operator workstation failure.
e. Gateway failure.
f. Network failure
g. Controller failure.
h. Instrument failure.
i. Control damper and valve actuator failure.

4. Complete bibliography of documentation and media to be delivered to Owner.
5. Description of testing plans and procedures.
6. Description of Owner training.

D. Samples:

1. For each exposed product, installed in finished space for approval of selection of aesthetic characteristics.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plan drawings, reflected ceiling plan(s), and other details, drawn to scale and coordinated with each other, using input from installers of the items involved.

B. Qualification Data:

1. Systems Provider Qualification Data:

a. Resume of project manager assigned to Project.
b. Resumes of application engineering staff assigned to Project.
c. Resumes of installation and programming technicians assigned to Project.
d. Resumes of service technicians assigned to Project.
e. Brief description of past project including physical address, floor area, number of floors, building system cooling and heating capacity and building's primary function.
f. Description of past project DDC system, noting similarities to Project scope and complexity indicated.
g. Names of staff assigned to past project that will also be assigned to execute work of this Project.
h. Owner contact information for past project including name, phone number, and e-mail address.

i. Contractor contact information for past project including name, phone number, and e-mail address.
j. Architect and Engineer contact information for past project including name, phone number, and e-mail address.

2. Manufacturer's qualification data.
3. Testing agency's qualifications data.

C. Welding certificates.

D. Product Certificates:

1. Data Communications Protocol Certificates: Certifying that each proposed DDC system component complies with ASHRAE 135.

E. Product Test Reports: For each product that requires testing to be performed by manufacturer.

F. Preconstruction Test Reports: For each separate test performed.

G. Source quality-control reports.

H. Field quality-control reports.

I. Sample Warranty: For manufacturer's warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For DDC system to include in emergency, operation and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Project Record Drawings of as-built versions of submittal Shop Drawings provided in electronic PDF format.
b. Testing and commissioning reports and checklists of completed final versions of reports, checklists, and trend logs.
c. As-built versions of submittal Product Data.
d. Names, addresses, e-mail addresses and 24-hour telephone numbers of Installer and service representatives for DDC system and products.
e. Operator's manual with procedures for operating control systems including logging on and off, handling alarms, producing point reports, trending data, overriding computer control and changing set points and variables.
f. Programming manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
g. Engineering, installation, and maintenance manuals that explain how to:

1) Design and install new points, panels, and other hardware.
2) Perform preventive maintenance and calibration.
3) Debug hardware problems.
4) Repair or replace hardware.

h. Documentation of all programs created using custom programming language including set points, tuning parameters, and object database.
i. Backup copy of graphic files, programs, and database on electronic media such as DVDs.
j. List of recommended spare parts with part numbers and suppliers.
k. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
l. Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation software, and graphics software.
m. Licenses, guarantees, and warranty documents.
n. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.
o. Owner training materials.

1.6 QUALITY ASSURANCE

A. DDC System Manufacturer Qualifications:

1. Nationally recognized manufacturer of DDC systems and products.
2. DDC systems with similar requirements to those indicated for a continuous period of 5 years within time of bid.
3. DDC systems and products that have been successfully tested and in use on at least 3 past projects.
4. Having complete published catalog literature, installation, operation and maintenance manuals for all products intended for use.
5. Having full-time in-house employees for the following:

    a. Product research and development.
    b. Product and application engineering.
    c. Product manufacturing, testing and quality control.
    d. Technical support for DDC system installation training, commissioning and troubleshooting of installations.
    e. Owner operator training.

6. TCC to provide Niagara Framework (Tridium) automation system.

7. Acceptable Control Supplier/Installer:

    a. Jackson Systems

    b. ERMCO

B. DDC System Provider Qualifications:

1. Authorized representative of, and trained by, DDC system manufacturer.
2. In-place facility located within 150 miles of Project and be capable of to respond on-site within 4 hours of notice.
3. Staffing resources of competent and experienced full-time employees that are assigned to execute work according to schedule.
4. Service and maintenance staff assigned to support Project during warranty period.
5. Product parts inventory to support on-going DDC system operation for a period of not less than 5 years after Substantial Completion.

6. DDC system manufacturer's backing to take over execution of Work if necessary to comply with requirements indicated. Include Project-specific written letter, signed by manufacturer's corporate officer, if requested.

C. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
4. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

E. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace products that fail in materials or workmanship within specified warranty period at no cost to client.

1. Failures shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner.
2. Include updates or upgrades to software and firmware if necessary to resolve deficiencies.

a. Install updates only after receiving Owner's written authorization.

3. Warranty service shall occur during normal business hours and commence within 24 hours of Owner's warranty service request.
4. Warranty Period: 2 years from date of Substantial Completion. Warranty shall cover labor, material, replacement, and repairs for work performed during warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Distech by Jackson Controls

2.2 DDC SYSTEM DESCRIPTION

A. Microprocessor-based monitoring and control including analog/digital conversion and program logic. A control loop or subsystem in which digital and analog information is received and processed by a microprocessor, and digital control signals are generated based on control algorithms and transmitted to field devices to achieve a set of predefined conditions.

1. DDC system shall consist of a high-speed, peer-to-peer network of distributed DDC controllers, other network devices, operator interfaces, and software.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional to design DDC system to satisfy requirements indicated.

1. System Performance Objectives:

   a. DDC system shall manage HVAC systems.
   b. DDC system control shall operate HVAC systems to achieve optimum operating costs while using least possible energy and maintaining specified performance.
   c. DDC system shall respond to power failures, HVAC equipment failures, and adverse and emergency conditions encountered through connected I/O points.
   d. DDC system shall operate while unattended by an operator and through operator interaction.
   e. DDC system shall record & store trends and transaction of events and produce report information such as performance, energy, occupancies, and equipment operation.

B. Surface-Burning Characteristics: Products installed in ducts, equipment, and return-air paths shall comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

C. DDC System Data Storage:

1. Include server(s) with disk drive data storage to archive not less than 24 consecutive months of historical data for all I/O points connected to system, including alarms, event histories, transaction logs, trends and other information indicated.
2. When logged onto a server, operator shall be able to also interact with any DDC controller connected to DDC system as required for functional operation of DDC system.
3. Server(s) shall be used for application configuration; for archiving, reporting and trending of data; for operator transaction archiving and reporting; for network information management; for alarm annunciation; and for operator interface tasks and controls application management.
4. Server(s) shall use IT industry-standard database platforms such as Microsoft SQL Server and Microsoft Data Engine (MSDE).

D. Future Expandability:

1. DDC system size shall be expandable to an ultimate capacity of at least 125% times total I/O points indicated.
2. Additional DDC controllers, I/O and associated wiring shall be all that is needed to achieve ultimate capacity. Initial network infrastructure shall be designed and installed to support ultimate capacity.
3. Operator interfaces installed initially shall not require hardware and software additions and revisions for ultimate capacity.

E. Environmental Conditions for Controllers, Gateways, and Routers:

1. Products shall operate without performance degradation under ambient environmental temperature, pressure and humidity conditions encountered for installed location.

    a. If product alone cannot comply with requirement, install product in a protective enclosure that is isolated and protected from conditions impacting performance. Enclosure shall be internally insulated, electrically heated, cooled and ventilated as required by product and application.

2. Products shall be protected with enclosures satisfying the following minimum requirements unless more stringent requirements are indicated. Products not available with integral enclosures complying with requirements indicated shall be housed in protective secondary enclosures. Installed location shall dictate the following NEMA 250 enclosure requirements:

    a. Outdoors, Protected: Type 4.
    b. Outdoors, Unprotected: Type 4.
    c. Indoors, Heated with Filtered Ventilation: Type 2.
    d. Indoors, Heated with Non-Filtered Ventilation: Type 2.
    e. Indoors, Heated and Air Conditioned: Type 2.
    f. Mechanical Equipment Rooms:

        1) Chiller and Boiler Rooms: Type 4.
        2) Air-Moving Equipment Rooms: Type 4.

    g. Localized Areas Exposed to Washdown: Type 4.
    h. Within Duct Systems and Air-Moving Equipment Not Exposed to Possible Condensation: Type 3.
    i. Within Duct Systems and Air-Moving Equipment Exposed to Possible Condensation: Type 4.
    j. Hazardous Locations: Explosion-proof rating for condition.

F. Environmental Conditions for Instruments and Actuators:

1. Instruments and actuators shall operate without performance degradation under the ambient environmental temperature, pressure, humidity, and vibration conditions specified and encountered for installed location.

    a. If instruments and actuators alone cannot comply with requirement, install instruments and actuators in protective enclosures that are isolated and protected from conditions impacting performance. Enclosure shall be internally insulated, electrically heated and ventilated as required by instrument and application.

2. Instruments, actuators and accessories shall be protected with enclosures satisfying the following minimum requirements unless more stringent requirements are indicated. Instruments and actuators not available with integral enclosures complying with requirements indicated shall be housed in protective secondary enclosures. Installed location shall dictate the following NEMA 250 enclosure requirements:

    a. Outdoors, Protected: Type 4.
    b. Outdoors, Unprotected: Type 4.
    c. Indoors, Heated with Filtered Ventilation: Type 2.
    d. Indoors, Heated with Non-Filtered Ventilation: Type 2.
    e. Indoors, Heated and Air Conditioned: Type 2.
    f. Mechanical Equipment Rooms:

1) Chiller and Boiler Rooms: Type 4.
2) Air-Moving Equipment Rooms: Type 4.

g. Localized Areas Exposed to Washdown: Type 4.
h. Within Duct Systems and Air-Moving Equipment Not Exposed to Possible Condensation: Type 3.
i. Within Duct Systems and Air-Moving Equipment Exposed to Possible Condensation: Type 4.
j. Hazardous Locations: Explosion-proof rating for condition.

G. Electric Power Quality:

1. Power-Line Surges:

a. Protect DDC system products connected to ac power circuits from power-line surges to comply with requirements of IEEE C62.41.
b. Do not use fuses for surge protection.
c. Test protection in the normal mode and in the common mode, using the following two waveforms:

1) 10-by-1000-mic.sec. waveform with a peak voltage of 1500 V and a peak current of 60 A.
2) 8-by-20-mic.sec. waveform with a peak voltage of 1000 V and a peak current of 500 A.

2. Power Conditioning:

a. Protect DDC system products connected to ac power circuits from irregularities and noise rejection. Characteristics of power-line conditioner shall be as follows:

1) At 85 percent load, output voltage shall not deviate by more than plus or minus 1 percent of nominal when input voltage fluctuates between minus 20 percent to plus 10 percent of nominal.
2) During load changes from zero to full load, output voltage shall not deviate by more than plus or minus 3 percent of nominal.
3) Accomplish full correction of load switching disturbances within five cycles, and 95 percent correction within two cycles of onset of disturbance.
4) Total harmonic distortion shall not exceed 3-1/2 percent at full load.

3. Ground Fault: Protect products from ground fault by providing suitable grounding. Products shall not fail due to ground fault condition.

H. Backup Power Source:

1. HVAC systems and equipment served by a backup power source shall have associated DDC system products that control such systems and equipment also served from a backup power source.

I. UPS:

1. DDC system products powered by UPS units shall include the following:

a. Desktop operator workstations.
b. Printers.
c. Servers.

d. Gateways.
e. DDC controllers.

2. DDC system instruments and actuators powered by UPS units shall be defined in the documents.

J. Continuity of Operation after Electric Power Interruption:

1. Equipment and associated factory-installed controls, field-installed controls, electrical equipment, and power supply connected to building normal and backup power systems shall automatically return equipment and associated controls to operating state occurring immediately before loss of normal power, without need for manual intervention by operator when power is restored either through backup power source or through normal power if restored before backup power is brought online.

2.4 SYSTEM ARCHITECTURE

A. System architecture shall consist of no more than 3 levels of LANs.

1. Level one LAN shall connect network controllers and operator workstations.
2. Level two LAN shall connect programmable application controllers to other programmable application controllers, and to network controllers.
3. Level three LAN shall connect application-specific controllers to programmable application controllers and network controllers.
4. Level three LAN shall connect application-specific controllers to application-specific controllers.

B. DDC system shall consist of dedicated and/or separated LANs that are not shared with other building systems and tenant data and communication networks.

C. System architecture shall be modular and have inherent ability to expand to not less than 3 times system size indicated with no impact to performance indicated.

D. System architecture shall perform modifications without having to remove and replace existing network equipment.

E. Number of LANs and associated communication shall be transparent to operator. All I/O points residing on any LAN shall be capable of global sharing between all system LANs.

F. System design shall eliminate dependence on any single device for system alarm reporting and control execution. Each controller shall operate independently by performing its' own control, alarm management and historical data collection.

G. Special Network Architecture Requirements:

1. Air-Handling Systems: For control applications of an air-handling system that consists of air-handling unit(s) and VAV terminal units, include a dedicated LAN of application-specific controllers serving VAV terminal units connected directly to controller that is controlling air-handling system air-handling unit(s). Basically, create a DDC system LAN that aligns with air-handling system being controlled.

2.5 DDC SYSTEM OPERATOR INTERFACES

A. Operator Means of System Access: Operator shall be able to access entire DDC system through any of multiple means, including, but not limited to, the following:

1. Desktop and portable operator workstation with hardwired connection through LAN port.
2. Portable operator terminal with hardwired connection through LAN port.
3. Portable operator workstation with wireless connection through LAN router.
4. Remote connection using outside of system personal computer or through Web access.
5. Remote connection using portable operator workstation and internet connection.
6. Mobile device.

B. Access to system, regardless of operator means used, shall be transparent to operator.

C. Desktop Workstations:

1. Connect to DDC system Level one LAN through a communications port directly on LAN or through a communications port on a DDC controller.
2. Able to communicate with any device located on any DDC system LAN.
3. Able to communicate, with modems, remotely with any device connected to any DDC system LAN.
4. Communication via a modem shall not interfere with LAN activity and LAN activity shall not prevent workstation from handling incoming calls.

D. Critical Alarm Reporting:

1. Operator-selected critical alarms shall be sent by DDC system to notify operator of critical alarms that require immediate attention.
2. DDC system shall send alarm notification to multiple recipients that are assigned for each alarm.
3. DDC system shall notify recipients by any or all means, including e-mail, text message, and prerecorded phone message to mobile and landline phone numbers.

E. Simultaneous Operator Use: Capable of accommodating up to 10 simultaneous operators that are accessing DDC system through any one of operator interfaces indicated.

2.6 NETWORK COMMUNICATION PROTOCOL

A. Network communication protocol(s) used throughout entire DDC system shall be open to public and available to other companies for use in making future modifications to DDC system.

B. ASHRAE 135 Protocol:

1. ASHRAE 135 communication protocol shall be sole and native protocol used throughout entire DDC system.
2. DDC system shall not require use of gateways except to integrate HVAC equipment and other building systems and equipment, not required to use ASHRAE 135 communication protocol.
3. If used, gateways shall connect to DDC system using ASHRAE 135 communication protocol and Project object properties and read/write services indicated by interoperability schedule.
4. Operator workstations, controllers and other network devices shall be tested and listed by BACnet Testing Laboratories.

2.7 DESKTOP OPERATOR WORKSTATIONS

A. Performance Requirements:

1. Performance requirements may dictate equipment exceeding minimum requirements indicated.
2. Energy Star compliant.

B. Computer Workstation:

1. Shall include computer, monitor(s), mouse, and keyboard.

a. Computer shall support all building automation operations, email, include all Microsoft Office suit programs, and pdf viewer and edit program.

1) Shall be a minimum i5 processor with 16 GB RAM and 3.6 GHz processor.
2) 64-bit.
3) Capable of expanding ram to 32 GB.
4) 1 TB hard drive.
5) 4 USB ports, no optical drive required.
6) Graphics card suitable for BAS requirements.
7) Sound card.
8) Network card and built in wireless.
9) Windows 10 or newer.

2.8 ASHRAE 135 GATEWAYS

A. Include BACnet communication ports, whenever available as an equipment OEM standard option, for integration via a single communication cable. BACnet-controlled plant equipment includes, but is not limited to, boilers, chillers, and variable-speed drives.

B. Include gateways to connect BACnet to legacy systems, existing non-BACnet devices, and existing non-BACnet DDC-controlled equipment, only when specifically requested and approved by Owner.

C. Include with each gateway an interoperability schedule showing each point or event on legacy side that BACnet "client" will read, and each parameter that BACnet network will write to. Describe this interoperability of BACnet services, or BIBBs, defined in ASHRAE 135, Annex K.

D. Gateway Minimum Requirements:

1. Read and view all readable object properties on non-BACnet network to BACnet network and vice versa where applicable.
2. Write to all writeable object properties on non-BACnet network from BACnet network and vice versa where applicable.
3. Include single-pass (only one protocol to BACnet without intermediary protocols) translation from non-BACnet protocol to BACnet and vice versa.
4. Comply with requirements of Data Sharing Read Property, Data Sharing Write Property, Device Management Dynamic Device Binding-B, and Device Management Communication Control BIBBs according to ASHRAE 135.
5. Hardware, software, software licenses, and configuration tools for operator-to-gateway communications.
6. Backup programming and parameters on CD media and the ability to modify, download, backup, and restore gateway configuration.

2.9 DDC CONTROLLERS

A. DDC system shall consist of a combination of network controllers, programmable application controllers and application-specific controllers to satisfy performance requirements indicated.

B. DDC controllers shall perform monitoring, control, energy optimization and other requirements indicated.

C. DDC controllers shall use a multitasking, multiuser, real-time digital control microprocessor with a distributed network database and intelligence.

D. Each DDC controller shall be capable of full and complete operation as a completely independent unit and as a part of a DDC system wide distributed network.

E. Environment Requirements:

1. Controller hardware shall be suitable for the anticipated ambient conditions.
2. Controllers located in conditioned space shall be rated for operation at 32 to 120 deg F.
3. Controllers located outdoors shall be rated for operation at 40 to 150 deg F.

F. Power and Noise Immunity:

1. Controller shall operate at 90 to 110 percent of nominal voltage rating and shall perform an orderly shutdown below 80 percent of nominal voltage.
2. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios with up to 5 W of power located within 36 inches of enclosure.

G. DDC Controller Spare Processing Capacity:

1. Include spare processing memory for each controller. RAM, PROM, or EEPROM will implement requirements indicated with the following spare memory:

    a. Network Controllers: 50 percent.
    b. Programmable Application Controllers: Not less than 60 percent.
    c. Application-Specific Controllers: Not less than 70 percent.

2. Memory shall support DDC controller's operating system and database and shall include the following:

    a. Monitoring and control.
    b. Energy management, operation and optimization applications.
    c. Alarm management.
    d. Historical trend data of all connected I/O points.
    e. Maintenance applications.
    f. Operator interfaces.
    g. Monitoring of manual overrides.

H. Maintenance and Support: Include the following features to facilitate maintenance and support:

1. Mount microprocessor components on circuit cards for ease of removal and replacement.
2. Means to quickly and easily disconnect controller from network.
3. Means to quickly and easily access connect to field test equipment.
4. Visual indication that controller electric power is on, of communication fault or trouble, and that controller is receiving and sending signals to network.

I. Input and Output Point Interface:

1. Hardwired input and output points shall connect to network, programmable application and application-specific controllers.
2. Input and output points shall be protected so shorting of point to itself, to another point, or to ground will not damage controller.
3. Input and output points shall be protected from voltage up to 24 V of any duration so that contact will not damage controller.
4. AIs:

    a. AIs shall include monitoring of low-voltage (zero- to 10-V dc), current (4 to 20 mA) and resistance signals from thermistor and RTD sensors.
    b. AIs shall be compatible with, and field configurable to, sensor and transmitters installed.
    c. Controller AIs shall perform analog-to-digital (A-to-D) conversion with a minimum resolution of 12 bits or better to comply with accuracy requirements indicated.
    d. Signal conditioning including transient rejection shall be provided for each AI.
    e. Capable of being individually calibrated for zero and span.
    f. Incorporate common-mode noise rejection of at least 50 dB from zero to 100 Hz for differential inputs, and normal-mode noise rejection of at least 20 dB at 60 Hz from a source impedance of 10000 ohms.

5. AOs:

    a. Controller AOs shall perform analog-to-digital (A-to-D) conversion with a minimum resolution of 12 bits or better to comply with accuracy requirements indicated.
    b. Output signals shall have a range of 4 to 20 mA dc or zero- to 10-V dc as required to include proper control of output device.
    c. Capable of being individually calibrated for zero and span.
    d. AOs shall not exhibit a drift of greater than 0.4 percent of range per year.

6. BIs:

    a. Controller BIs shall accept contact closures and shall ignore transients of less than 5-ms duration.
    b. Isolation and protection against an applied steady-state voltage of up to 180-V ac peak.
    c. BIs shall include a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against effects of contact bounce and noise.
    d. BIs shall sense "dry contact" closure without external power (other than that provided by the controller) being applied.
    e. Pulse accumulation input points shall comply with all requirements of BIs and accept up to 10 pulses per second for pulse accumulation. Buffer shall be provided to totalize pulses. Pulse accumulator shall accept rates of at least 20 pulses per second. The totalized value shall be reset to zero on operator's command.

7. BOs:

    a. Controller BOs shall include relay contact closures or triac outputs for momentary and maintained operation of output devices.

        1) Relay contact closures shall have a minimum duration of 0.1 second. Relays shall include at least 180 V of isolation. Electromagnetic interference

suppression shall be provided on all output lines to limit transients to non-damaging levels. Minimum contact rating shall be 1 A at 24-V ac.

2) Triac outputs shall include at least 180 V of isolation. Minimum contact rating shall be 1 A at 24-V ac.

b. BOs shall include for two-state operation or a pulsed low-voltage signal for pulse-width modulation control.
c. BOs shall be selectable for either normally open or normally closed operation.
d. Include tristate outputs (two coordinated BOs) for control of three-point floating-type electronic actuators without feedback.
e. Limit use of three-point floating devices to VAV terminal unit control applications, and other applications indicated on Drawings, Control algorithms shall operate actuator to one end of its stroke once every 24 hours for verification of operator tracking.

2.10 NETWORK CONTROLLERS

A. General Network Controller Requirements:

1. Include adequate number of controllers to achieve performance indicated.
2. System shall consist of one or more independent, standalone, microprocessor-based network controllers to manage global strategies indicated.
3. Controller shall have enough memory to support its operating system, database, and programming requirements.
4. Data shall be shared between networked controllers and other network devices.
5. Operating system of controller shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and allow for central monitoring and alarms.
6. Controllers that perform scheduling shall have a real-time clock.
7. Controller shall continually check status of its processor and memory circuits. If an abnormal operation is detected, controller shall assume a predetermined failure mode and generate an alarm notification.
8. Controllers shall be fully programmable.

B. Communication:

1. Network controllers shall communicate with other devices on DDC system network.
2. Network controller also shall perform routing if connected to a network of programmable application and application-specific controllers.

C. Operator Interface:

1. Controller shall be equipped with a service communications port for connection to a portable operator's workstation.
2. Local Keypad and Display:

a. Equip controller with local keypad and digital display for interrogating and editing data.
b. Use of keypad and display shall require security password.

D. Serviceability:

1. Controller shall be equipped with diagnostic LEDs or other form of local visual indication of power, communication, and processor.

2. Wiring and cable connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
3. Controller shall maintain BIOS and programming information in event of a power loss for at least 72 hours.

2.11 PROGRAMMABLE APPLICATION CONTROLLERS

A. General Programmable Application Controller Requirements:

1. Include adequate number of controllers to achieve performance indicated.
2. Controller shall have enough memory to support its operating system, database, and programming requirements.
3. Data shall be shared between networked controllers and other network devices.
4. Operating system of controller shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and allow for central monitoring and alarms.
5. Controllers that perform scheduling shall have a real-time clock.
6. Controller shall continually check status of its processor and memory circuits. If an abnormal operation is detected, controller shall assume a predetermined failure mode and generate an alarm notification.
7. Controllers shall be fully programmable.

B. Communication:

1. Programmable application controllers shall communicate with other devices on network.

C. Operator Interface:

1. Controller shall be equipped with a service communications port for connection to a portable operator's workstation.
2. Local Keypad and Display:

    a. Equip controller with local keypad and digital display for interrogating and editing data.
    b. Use of keypad and display shall require security password.

D. Serviceability:

1. Controller shall be equipped with diagnostic LEDs or other form of local visual indication of power, communication, and processor.
2. Wiring and cable connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
3. Controller shall maintain BIOS and programming information in event of a power loss for at least 72 hours.

2.12 APPLICATION-SPECIFIC CONTROLLERS

A. Description: Microprocessor-based controllers, which through hardware or firmware design are dedicated to control a specific piece of equipment. Controllers are not fully user-programmable but are configurable and customizable for operation of equipment they are designed to control.

1. Capable of standalone operation and shall continue to include control functions without being connected to network.

2. Data shall be shared between networked controllers and other network devices.

B. Communication: Application-specific controllers shall communicate with other application-specific controller and devices on network, and to programmable application and network controllers.

C. Operator Interface: Controller shall be equipped with a service communications port for connection to a portable operator's workstation. Connection shall extend to port on space temperature sensor that is connected to controller.

D. Serviceability:

1. Controller shall be equipped with diagnostic LEDs or other form of local visual indication of power, communication, and processor.
2. Wiring and cable connections shall be made to field-removable, modular terminal strips or to a termination card connected by a ribbon cable.
3. Controller shall use nonvolatile memory and maintain all BIOS and programming information in event of power loss.

2.13 CONTROLLER SOFTWARE

A. General Controller Software Requirements:

1. Software applications shall reside and operate in controllers. Editing of applications shall occur at operator workstations.
2. I/O points shall be identified by a character point name. Same names shall be used at operator workstations.
3. Control functions shall be executed within controllers using DDC algorithms.
4. Controllers shall be configured to use stored default values to ensure fail-safe operation. Default values shall be used when there is a failure of a connected input instrument or loss of communication of a global point value.

B. Security:

1. Operator access shall be secured using individual security passwords and user names.
2. Passwords shall restrict operator to points, applications, and system functions as assigned by system manager.
3. Operator log-on and log-off attempts shall be recorded.
4. System shall protect itself from unauthorized use by automatically logging off after last keystroke. The delay time shall be operator-definable.

C. Scheduling: Include capability to schedule each point or group of points in system. Each schedule shall consist of the following:

1. Weekly Schedule:

a. Include separate schedules for each day of week.
b. Each schedule should include the capability for start, stop, optimal start, optimal stop, and night economizer.
c. Each schedule may consist of up to 10 events.
d. When a group of objects are scheduled together, include capability to adjust start and stop times for each member.

2. Exception Schedules:

a. Include ability for operator to designate any day of the year as an exception schedule.
b. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed, it will be discarded and replaced by regular schedule for that day of week.

3. Holiday Schedules:

a. Include capability for operator to define up to 99 special or holiday schedules.
b. Schedules may be placed on scheduling calendar and will be repeated each year.
c. Operator shall be able to define length of each holiday period.

D. System Coordination:

1. Include standard application for proper coordination of equipment.
2. Application shall include operator with a method of grouping together equipment based on function and location.
3. Group may then be used for scheduling and other applications.

E. Binary Alarms:

1. Each binary point shall be set to alarm based on operator-specified state.
2. Include capability to automatically and manually disable alarming.

F. Analog Alarms:

1. Each analog object shall have both high and low alarm limits.
2. Alarming shall be able to be automatically and manually disabled.

G. Alarm Reporting:

1. Operator shall be able to determine action to be taken in event of an alarm.
2. Alarms shall be routed to appropriate operator workstations based on time and other conditions.
3. Alarm shall be able to start programs, print, be logged in event log, generate custom messages, and display graphics.

H. Remote Communication:

1. System shall have ability to dial out in the event of an alarm.

I. Electric Power Demand Limiting:

1. Demand-limiting program shall monitor building or other operator-defined electric power consumption from signals connected to electric power meter or from a watt transducer or current transformer.
2. Demand-limiting program shall predict probable power demand such that action can be taken to prevent exceeding demand limit. When demand prediction exceeds demand limit, action will be taken to reduce loads in a predetermined manner. When demand prediction indicates demand limit will not be exceeded, action will be taken to restore loads in a predetermined manner.
3. Demand reduction shall be accomplished by the following means:

a. Reset air-handling unit supply temperature set points.
b. Reset space temperature set points.

c. De-energize equipment based on priority.

4. Demand-limiting parameters, frequency of calculations, time intervals, and other relevant variables shall be based on the means by which electric power service provider computes demand charges.
5. Include demand-limiting prediction and control for any individual meter monitored by system or for total of any combination of meters.
6. Include means operator to make the following changes online:

   a. Addition and deletion of loads controlled.
   b. Changes in demand intervals.
   c. Changes in demand limit for meter(s).
   d. Maximum shutoff time for equipment.
   e. Minimum shutoff time for equipment.
   f. Select rotational or sequential shedding and restoring.
   g. Shed and restore priority.

7. Include the following information and reports, to be available on an hourly, daily, weekly, monthly and annual basis:

   a. Total electric consumption.
   b. Peak demand.
   c. Date and time of peak demand.
   d. Daily peak demand.

J. Maintenance Management: System shall monitor equipment status and generate maintenance messages based on operator-designated run-time, starts, and calendar date limits.

K. Sequencing: Include application software based on sequences of operation indicated to properly sequence chillers, boilers, and other applicable HVAC equipment.

L. Control Loops:

1. Support any of the following control loops, as applicable to control required:

   a. Two-position (on/off, open/close, slow/fast) control.
   b. Proportional control.
   c. Proportional plus integral (PI) control.
   d. Proportional plus integral plus derivative (PID) control.

      1) Include PID algorithms with direct or reverse action and anti-windup.
      2) Algorithm shall calculate a time-varying analog value used to position an output or stage a series of outputs.
      3) Controlled variable, set point, and PID gains shall be operator-selectable.

   e. Adaptive (automatic tuning).

M. Staggered Start: Application shall prevent all controlled equipment from simultaneously restarting after a power outage. Order which equipment (or groups of equipment) is started, along with the time delay between starts, shall be operator-selectable.

N. Energy Calculations:

1. Include software to allow instantaneous power or flow rates to be accumulated and converted to energy usage data.

2. Include an algorithm that calculates a sliding-window average (rolling average). Algorithm shall be flexible to allow window intervals to be operator specified (such as 15, 30, or 60 minutes).
3. Include an algorithm that calculates a fixed-window average. A digital input signal shall define start of window period (such as signal from utility meter) to synchronize fixed-window average with that used by utility.

O. Anti-Short Cycling:

1. BO points shall be protected from short cycling.
2. Feature shall allow minimum on-time and off-time to be selected.

P. On and Off Control with Differential:

1. Include an algorithm that allows a BO to be cycled based on a controlled variable and set point.
2. Algorithm shall be direct- or reverse-acting and incorporate an adjustable differential.

Q. Run-Time Totalization:

1. Include software to totalize run-times for all BI and BO points.
2. A high run-time alarm shall be assigned, if required, by operator.

2.14 ENCLOSURES

A. General Enclosure Requirements:

1. House each controller and associated control accessories in a enclosure. Enclosure shall serve as central tie-in point for control devices such as switches, transmitters, transducers, power supplies and transformers.
2. Do not house more than one controller in a single enclosure.
3. Include enclosure door with key locking mechanism. Key locks alike for all enclosures and include one pair of keys per enclosure.
4. Equip doors of enclosures housing controllers and components with analog or digital displays with windows to allow visual observation of displays without opening enclosure door.
5. Individual wall-mounted single-door enclosures shall not exceed 36 inches wide and 48 inches high.
6. Individual wall-mounted double-door enclosures shall not exceed 60 inches wide and 36 inches high.
7. Include wall-mounted enclosures with brackets suitable for mounting enclosures to wall or freestanding support stand as indicated.
8. Supply each enclosure with a complete set of as-built schematics, tubing, and wiring diagrams and product literature located in a pocket on inside of door.

B. Internal Arrangement:

1. Internal layout of enclosure shall group and protect pneumatic, electric, and electronic components associated with a controller, but not an integral part of controller.
2. Arrange layout to group similar products together.
3. Include a barrier between line-voltage and low-voltage electrical and electronic products.
4. Factory or shop install products, tubing, cabling and wiring complying with requirements and standards indicated.
5. Terminate field cable and wire using heavy-duty terminal blocks.

6. Include spare terminals, equal to not less than 25 percent of used terminals.
7. Include spade lugs for stranded cable and wire.
8. Install a maximum of two wires on each side of a terminal.
9. Include enclosure field power supply with a toggle-type switch located at entrance inside enclosure to disconnect power.
10. Include enclosure with a line-voltage nominal 20-A GFCI duplex receptacle for service and testing tools. Wire receptacle on hot side of enclosure disconnect switch and include with a 5-A circuit breaker.
11. Mount products within enclosure on removable internal panel(s).
12. Include products mounted in enclosures with engraved, laminated phenolic nameplates (black letters on a white background). The nameplates shall have at least 1/4-inch-high lettering.
13. Route tubing cable and wire located inside enclosure within a raceway with a continuous removable cover.
14. Label each end of cable, wire and tubing in enclosure following an approved identification system that extends from field I/O connection and all intermediate connections throughout length to controller connection.
15. Size enclosure internal panel to include at least 25 percent spare area on face of panel.

C. Environmental Requirements:

1. Evaluate temperature and humidity requirements of each product to be installed within each enclosure.
2. Calculate enclosure internal operating temperature considering heat dissipation of all products installed within enclosure and ambient effects (solar, conduction and wind) on enclosure.
3. Where required by application, include temperature-controlled electrical heat to maintain inside of enclosure above minimum operating temperature of product with most stringent requirement.
4. Where required by application, include temperature-controlled ventilation fans with filtered louver(s) to maintain inside of enclosure below maximum operating temperature of product with most stringent requirement.

D. Wall-Mounted, NEMA 250, Type 1:

1. Enclosure shall be NRTL listed according to UL 50 or UL 50E.
2. Construct enclosure of steel.
3. Finish enclosure inside and out with polyester powder coating that is electrostatically applied and then baked to bond to substrate.

    a. Exterior color shall be NSF/ANSI 61 gray or manufacturer's standard.
    b. Interior color shall be NSF/ANSI 61 gray or manufacturer's standard.

4. Hinged door full size of front face of enclosure and supported using:

    a. Enclosures sizes less than 36 in. tall: Multiple butt hinges.
    b. Enclosures sizes 36 in. tall and larger: Continuous piano hinges.

5. Removable internal panel with a white polyester powder coating that is electrostatically applied and then baked to bond to substrate.
6. Internal panel mounting hardware, grounding hardware and sealing washers.
7. Grounding stud on enclosure body.
8. Thermoplastic pocket on inside of door for record Drawings and Product Data.

E. Wall Mounted NEMA 250, Types 4 and 12:

1. Enclosure shall be NRTL listed according to UL 508A.
2. Seam and joints are continuously welded and ground smooth.
3. Where recessed enclosures are indicated, include enclosures with face flange for flush mounting.
4. Externally formed body flange around perimeter of enclosure face for continuous perimeter seamless gasket door seal.
5. Single-door enclosure sizes up to 60 inches tall by 36 inches wide.
6. Double-door enclosure sizes up to 36 inches tall by 60 inches wide.
7. Construct enclosure of steel.
8. Finish enclosure with polyester powder coating that is electrostatically applied and then baked to bond to substrate.

    a. Exterior color shall be NSF/ANSI 61 gray or manufacturer's standard.
    b. Interior color shall be NSF/ANSI 61 gray or manufacturer's standard.

9. Corner-formed door, full size of enclosure face, supported using multiple concealed hinges with easily removable hinge pins.

    a. Sizes through 24 Inches Tall: Two hinges.
    b. Sizes between 24 Inches through 48 Inches Tall: Three hinges.
    c. Sizes Larger 48 Inches Tall: Four hinges.

10. Double-door enclosures with overlapping door design to include unobstructed full-width access.

    a. Single-door enclosures 48 inches and taller, and all double-door enclosures, with three-point (top, middle and bottom) latch system.

11. Removable internal panel with a white polyester powder coating that is electrostatically applied and then baked to bond to substrate.
12. Internal panel mounting studs with hardware, grounding hardware, and sealing washers.
13. Grounding stud on enclosure body.
14. Thermoplastic pocket on inside of door for record Drawings and Product Data.

F. Accessories:

1. Electric Heater:

    a. Aluminum housing with brushed finish.
    b. Thermostatic control with adjustable set point from zero to 100 deg F.
    c. Capacity: 100, 200, 400, and 800 W as required by application.
    d. Fan draws cool air from bottom of enclosure and passes air across thermostat and heating elements before being released into enclosure cavity. Heated air is discharged through the top of heater.

2. Ventilation Fans, Filtered Intake and Exhaust Grilles:

    a. Number and size of fans, filters and grilles as required by application.
    b. Compact cooling fans engineered for 50,000 hours of continuous operation without lubrication or service.
    c. Fans capable of being installed on any surface and in any position within enclosure for spot cooling or air circulation.
    d. Thermostatic control with adjustable set point from 32 to 140 deg F.
    e. Airflow Capacity at Zero Pressure:

1) 4-Inch Fan: 100 cfm.
2) 6-Inch Fan: 240 cfm.
3) 10-Inch Fan: 560 cfm.

f. Maximum operating temperature of 158 deg F.
g. 4-inch fan thermally protected and provided with permanently lubricated ball-bearings.
h. 6- and 10-inch fans with ball-bearing construction and split capacitor motors thermally protected to avoid premature failure.
i. Dynamically balanced impellers molded from polycarbonate material.
j. Fan furnished with power cord and polarized plug for power connection.
k. Fan brackets, finger guards and mounting hardware provided with fans to complete installation.
l. Removable Intake and Exhaust Grilles: Stainless steel of size to match fan size and suitable for NEMA 250, Types 1 and 12 enclosures.
m. Filters for NEMA 250, Type 1 Enclosures: Washable aluminum, of a size to match intake grille.
n. Filters for NEMA 250, Type 12 Enclosures: Disposable, of a size to match intake grille.

3. Bar handle with keyed cylinder lock set.

2.15 RELAYS

A. General-Purpose Relays:

1. Relays shall be heavy duty and rated for at least 10 A at 250-V ac and 60 Hz.
2. Relays shall be either double pole double throw (DPDT) or three-pole double throw, depending on the control application.
3. Use a plug-in-style relay with an eight-pin octal plug for DPDT relays and an 11-pin octal plug for three-pole double-throw relays.
4. Construct the contacts of either silver cadmium oxide or gold.
5. Enclose the relay in a clear transparent polycarbonate dust-tight cover.
6. Relays shall have LED indication and a manual reset and push-to-test button.
7. Equip relays with coil transient suppression to limit transients to non-damaging levels.
8. Plug each relay into an industry-standard, 35-mm DIN rail socket. Plug all relays located in control panels into sockets that are mounted on a DIN rail.
9. Relay socket shall have screw terminals. Mold into the socket the coincident screw terminal numbers and associated octal pin numbers.

B. Multifunction Time-Delay Relays:

1. Relays shall be continuous duty and rated for at least 10 A at 240-V ac and 60 Hz.
2. Relays shall be DPDT relay with up to eight programmable functions to provide on/off delay, interval and recycle timing functions.
3. Use a plug-in-style relay with either an 8- or 11-pin octal plug.
4. Construct the contacts of either silver cadmium oxide or gold.
5. Enclose the relay in a dust-tight cover.
6. Include knob and dial scale for setting delay time.
7. Equip relays with coil transient suppression to limit transients to non-damaging levels.
8. Plug each relay into an industry-standard, 35-mm DIN rail socket. Plug all relays located in control panels into sockets that are mounted on a DIN rail.
9. Relay socket shall have screw terminals. Mold into the socket the coincident screw terminal numbers and associated octal pin numbers.

C. Latching Relays:

1. Relays shall be continuous duty and rated for at least 10 A at 250-V ac and 60 Hz.
2. Relays shall be either DPDT or three-pole double throw, depending on the control application.
3. Use a plug-in-style relay with a multibladed plug.
4. Construct the contacts of either silver cadmium oxide or gold.
5. Enclose the relay in a clear transparent polycarbonate dust-tight cover.
6. Equip relays with coil transient suppression to limit transients to non-damaging levels.
7. Plug each relay into an industry-standard, 35-mm DIN rail socket. Plug all relays located in control panels into sockets that are mounted on a DIN rail.
8. Relay socket shall have screw terminals. Mold into the socket the coincident screw terminal numbers and associated octal pin numbers.

D. Current Sensing Relay:

1. Monitors ac current.
2. Independent adjustable controls for pickup and dropout current.
3. Energized when supply voltage is present and current is above pickup setting.
4. De-energizes when monitored current is below dropout current.
5. Dropout current is adjustable from 50 to 95 percent of pickup current.
6. Include a current transformer, if required for application.
7. House current sensing relay and current transformer in its own enclosure. Use NEMA 250, Type 12 enclosure for indoors and NEMA 250, Type 4 for outdoors.

E. Combination On-Off Status Sensor and On-Off Relay:

1. Description:

   a. On-off control and status indication in a single device.
   b. LED status indication of activated relay and current trigger.
   c. Closed-Open-Auto override switch located on the load side of the relay.

2. Performance:

   a. Ambient Temperature: Minus 30 to 140 deg F.
   b. Voltage Rating: Single-phase loads rated for 300-V ac. Three-phase loads rated for 600-V ac.

3. Status Indication:

   a. Current Sensor: Integral sensing for single-phase loads up to 20 A and external solid or split sensing ring for three-phase loads up to 150 A.
   b. Current Sensor Range: As required by application.
   c. Current Set Point: Fixed or adjustable as required by application.
   d. Current Sensor Output:

      1) Solid-state, single-pole double-throw contact rated for 30-V ac and dc and for 0.4 A.
      2) Solid-state, single-pole double-throw contact rated for 120-V ac and 1.0 A.
      3) Analog, zero- to 5- or 10-V dc.
      4) Analog, 4 to 20 mA, loop powered.

4. Relay: Single-pole double-throw, continuous-duty coil; rated for 10-million mechanical cycles.

5. Enclosure: NEMA 250, Type 1 enclosure.

2.16 ELECTRICAL POWER DEVICES

A. Transformers:

1. Transformer shall be sized for the total connected load, plus an additional 25 percent of connected load.
2. Transformer shall be at least 100 VA.
3. Transformer shall have both primary and secondary fuses.

B. DC Power Supply:

1. Plug-in style suitable for mating with a standard eight-pin octal socket. Include the power supply with a mating mounting socket.
2. Enclose circuitry in a housing.
3. Include both line and load regulation to ensure a stable output. To protect both the power supply and the load, power supply shall have an automatic current limiting circuit.
4. Performance:

    a. Output voltage nominally 25-V dc within 5 percent.
    b. Output current up to 100 mA.
    c. Input voltage nominally 120-V ac, 60 Hz.
    d. Load regulation within 0.5 percent from zero- to 100-mA load.
    e. Line regulation within 0.5 percent at a 100-mA load for a 10 percent line change.
    f. Stability within 0.1 percent of rated volts for 24 hours after a 20-minute warmup.

2.17 UNINTERRUPTABLE POWER SUPPLY (UPS) UNITS

A. 250 through 1000 VA:

1. UPS units shall provide continuous, regulated output power without using their batteries during brown-out, surge, and spike conditions.
2. Load served shall not exceed 75 percent of UPS rated capacity, including power factor of connected loads.

    a. Larger-capacity units shall be provided for systems with larger connected loads.
    b. UPS shall provide 5 minutes of battery power.

3. Performance:

    a. Input Voltage: Single phase, 120- or 230-V ac, compatible with field power source.
    b. Load Power Factor Range (Crest Factor): 0.65 to 1.0.
    c. Output Voltage: 101- to 132-V ac, while input voltage varies between 89 and 152-V ac.
    d. On Battery Output Voltage: Sine wave.
    e. Inverter overload capacity shall be minimum 150 percent for 30 seconds.
    f. Recharge time shall be a maximum of six hours to 90 percent capacity after full discharge to cutoff.
    g. Transfer Time: 6 ms.
    h. Surge Voltage Withstand Capacity: IEEE C62.41, Categories A and B; 6 kV/200 and 500 A; 100-kHz ringwave.

4. UPS shall be automatic during fault or overload conditions.
5. Unit with integral line-interactive, power condition topology to eliminate all power contaminants.
6. Include front panel with power switch and visual indication of power, battery, fault and temperature.
7. Unit shall include an audible alarm of faults and front panel silence feature.
8. Unit with four NEMA WD 1, NEMA WD 6 Configuration 5-15R receptacles.
9. UPS shall include dry contacts (digital output points) for low battery condition and battery-on (primary utility power failure) and connect the points to the DDC system.
10. Batteries shall be sealed lead-acid type and be maintenance free. Battery replacement shall be front accessible by user without dropping load.
11. Include tower models installed in ventilated cabinets to the particular installation location.

B. 1000 through 3000 VA:

1. UPS units shall provide continuous, regulated output power without using their batteries during brown-out, surge, and spike conditions.
2. Load served shall not exceed 75 percent of UPS rated capacity, including power factor of connected loads.

    a. Larger-capacity units, or multiple units, shall be provided for systems with larger connected loads.
    b. UPS shall provide 5 minutes of battery power.

3. Performance:

    a. Input Voltage: Single phase, 120-V ac, plus 20 to minus 30 percent.
    b. Power Factor: Minimum 0.97 at full load.
    c. Output Voltage: Single phase, 120-V ac, within 3 percent, steady state with rated output current of 10.0 A, 30.0-A peak.
    d. Inverter overload capacity shall be minimum 150 percent for 30 seconds.
    e. Recharge time shall be a maximum of eight hours to 90 percent capacity.

4. UPS bypass shall be automatic during fault or overload conditions.
5. UPS shall include dry contacts (digital output points) for low battery condition and battery-on (primary utility power failure) and connect the points to the DDC system.
6. Batteries shall be sealed lead-acid type and be maintenance free.
7. Include tower models installed in ventilated cabinets or rack models installed on matching racks, as applicable to the particular installation location and space availability/configuration.

2.18 PIPING AND TUBING

A. Pneumatic, and Pressure Instrument Signal Air, Tubing and Piping:

1. Products in this paragraph are intended for use with the following:

    a. Main air and signal air to pneumatically controlled instruments, actuators and other control devices and accessories.
    b. Signal air between pressure instruments, such as sensors, switches, transmitters, controllers, and accessories.

2. Polyethylene Tubing:

a. Fire-resistant black virgin polyethylene according to ASTM D 1248, Type 1, Class C and Grade 5.
b. Tubing shall comply with stress crack test according to ASTM D 1693.
c. Diameter, as required by application, of not less than nominal 0.25 inch.

3. Polyethylene Tubing Connectors and Fittings:

a. Brass, barbered fittings and compression type.

2.19 CONTROL WIRE AND CABLE

A. Wire: Single conductor control wiring above 24 V.

1. Wire size shall be at least No. 14 AWG or sized per length of run.
2. Conductor shall be 7/24 soft annealed copper strand with 2- to 2.5-inch lay.
3. Conductor insulation shall be 600 V, Type THWN or Type THHN, and 90 deg C according to UL 83.
4. Conductor colors shall be black (hot), white (neutral), and green (ground).
5. Furnish wire on spools.

B. Single Twisted Shielded Instrumentation Cable above 24 V:

1. Wire size shall be a minimum No. 18 AWG or sized per length of run.
2. Conductors shall be a twisted, 7/24 soft annealed copper strand with a 2- to 2.5-inch lay.
3. Conductor insulation shall have a Type THHN/THWN or Type TFN rating.
4. Shielding shall be 100 percent type, 0.35/0.5-mil aluminum/Mylar tape, helically applied with 25 percent overlap, and aluminum side in with tinned copper drain wire.
5. Outer jacket insulation shall have a 600-V, 90-deg C rating and shall be Type TC cable.
6. For twisted pair, conductor colors shall be black and white. For twisted triad, conductor colors shall be black, red and white.
7. Furnish wire on spools.

C. Single Twisted Shielded Instrumentation Cable 24 V and Less:

1. Wire size shall be a minimum No. 18 AWG or sized per length of run.
2. Conductors shall be a twisted, 7/24 soft annealed copper stranding with a 2- to 2.5-inch lay.
3. Conductor insulation shall have a nominal 15-mil thickness, constructed from flame-retardant PVC.
4. Shielding shall be 100 percent type, 1.35-mil aluminum/polymer tape, helically applied with 25 percent overlap, and aluminum side in with tinned copper drain wire.
5. Outer jacket insulation shall have a 300-V, 105-deg C rating and shall be Type PLTC cable.
6. For twisted pair, conductor colors shall be black and white. For twisted triad, conductor colors shall be black, red and white.
7. Furnish wire on spools.

D. LAN and Communication Cable: Comply with DDC system manufacturer requirements for network being installed.

1. Cable shall be plenum rated.
2. Cable shall comply with NFPA 70.
3. Cable shall have a unique color that is different from other cables used on Project.
4. Copper Cable for Ethernet Network:

a. 100BASE-TX, 1000BASE-T, or 1000BASE-TX.
b. TIA/EIA 586, Category 6A**.**
c. Minimum No. 22 AWG solid or sized per length of run.
d. Shielded Twisted Pair (STP).
e. Thermoplastic insulated conductors, enclosed in a thermoplastic outer jacket, Class CMP as plenum rated.

2.20 RACEWAYS FOR CONTROL WIRING, CABLING, AND TUBING

A. Metal Conduits, Tubing, and Fittings:

1. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. EMT: Comply with NEMA ANSI C80.3 and UL 797.

3. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.21 CONTROL POWER WIRING AND RACEWAYS

A. Installation minimum requirements:

1. Mechanical spaces, services spaces, and areas without ceiling: All wiring including cables in EMT.
2. Space sensors and alarms: All wiring cables in EMT within wall construction.
3. Ducted ceiling return: Approved non-plenum cable.
4. Non-ducted return ceiling plenum: Approved plenum rated cable.
5. Non-accessible ceilings: EMT or code compliant equal solid conduit.
6. Inside air handling units: All wiring including cables in EMT or code compliant solid conduit.
7. Note the use of cable is limited to low voltage service with less than 24 volt only.
8. Do not lay cables on ceiling grids.
9. Conduit junctions and terminations shall utilize compression fittings.

B. All control wiring that is stated to be routed in EMT shall be separate from any power wiring.

2.22 FIELD EQUIPMENT

A. Space Sensors:

1. All space sensors to have digital display of setpoint and actual space temperature.
2. Set-point adjustment to be a maximum plus and minus 5 degrees from the null setpoint programmed through the DDC system.
3. Space sensors may be (RTD) 1,000 Ohm platinum with an accuracy of ±0.5 deg F or 10,000 OHM thermistor with accuracy of ±0.5 deg. F for all spaces.
4. Space sensor shall be manufacture’s standard color.
5. Provide insulating bases for all sensors located on exterior walls and on exterior column wraps. Foam seal cavity and junction box prior to installing insulating base.
6. Space sensors with occupant set-point adjustment shall be adjustable from the operator’s workstation as to the deadband of adjustability allowed to the occupants.

B. Temperature Sensors:

1. Duct sensors for critical spaces shall utilize averaging elements, 1000 OHM platinum Resistance Temperature Detectors (RTD) having an accuracy of ±0.5 deg F.
2. Duct sensors for non-critical spaces may utilize 10,000 OHM or 20,000 OHM thermistor having an accuracy of ±1.0 deg F. 1000 OHM RTDs are also acceptable for non-critical applications.
3. Immersion sensors to be furnished with companion wells separable stainless steel. Well pressure rating shall be consistent with and extend the system pressure it will be immersed in. Wells shall withstand pipe design flow velocities.

C. Low limit thermostats:

1. Low limit safety thermostats shall be manually reset, line voltage with maximum 23'-0" flexible sensing elements responsible to lowest temperature along entire length. Furnish minimum two (2) wired in series on the discharge side of the first hydronic coils (i.e., a 4-section coil requires eight low limit thermostats wired in series). Contractor to note that the operating head of such instruments shall be shielded from conditions whereby it could be activated by low temperature.
2. All flexible averaging sensors shall be attached by wire ties to a suspended wire or insulated cable to prevent sensor contact with metal or other unit components.
3. Install flexible sensors across all coils at a maximum of 6” from the bottom of the bottom coil and a minimum of 7” diameter to turn the sensor. Install the detector with a maximum free distance of 12” between each pass.
4. Staggered coils (if applicable) shall utilize multiple sensors. Each sensor shall cover one section of the staggered coil. Sensing elements shall be a minimum of 17’ long.
5. All flexible sensors shall be protected at point of penetration of unit via a section of poly tubing to prevent contact of the sensor and the unit.
6. Mount detector within 6” of the face of the coil unless noted otherwise. For staggered coil banks, this requirement applies for each half of the bank
7. TCC to note that when any low limit controls are above an elevation 7'-0" above floor level or otherwise inaccessible, they shall employ automatic reset and shall be wired to an auxiliary control panel of a 5'-0" elevation. The control panel with piano hinged door shall utilize a latching reset relay for each individual low limit control which ensures that the fan is de-energized even as the low limit resets automatically. The panel face shall utilize a red alarm pilot light that remains lit until the 10 second time delay reset relay momentary contact switch is activated. An LED inside the panel shall indicate which of low limits has signaled the alarm.

D. Electronic Actuators:

1. Manufactured, brand labeled or distributed by Belimo or Johnson Controls, Inc. or Siemens.
2. Size for torque required for damper seal at load conditions.
3. Coupling: V-bolt dual nut clamp with a V-shaped, toothed cradle.
4. Mounting: Actuators shall be direct shaft mount type. Actuators shall be capable of being mechanically and electrically paralleled to increase torque if required.
5. Overload protected electronically throughout rotation.
6. Fail safe operation: Mechanical, spring return mechanism.
7. Power requirements (spring return): 24 VAC.
8. Proportional actuators shall be fully programmable through an EEPROM without the use of actuator mounted switches.
9. Temperature rating: -22 deg. F to +122 deg. F.
10. Housing: Minimum requirement NEMA Type 2/IP54 mounted in any orientation. NEMA 4/4X (IP67) required for outdoor applications.
11. Agency listings: ISO 9001 or UL.

12. The manufacturer shall warrant all components for a period of 5 years from the date of production with the first two years unconditional.
13. All damper actuators used on equipment introducing outdoor air shall be furnished with mechanical spring return mechanism as indicated in “fail safe operation” above.
14. All actuators shall have external adjustable stops to limit the travel in either direction and a gear release to allow manual positioning.
15. Actuators shall be provided with position feedback signal (2-10 VDC or 4-20 mA) where indicated on control drawings. Feedback signal shall be independent of the input signal and shall provide true position indication.

E. Dampers:

1. All automatic dampers furnished by this Contractor for modulating control shall be of the proportioning type with opposed or parallel blades depending on the application or as shown on the drawings. Dampers for two position action shall be of the opposed blade type for all applications except those located immediately at the inlet of fans and as noted otherwise on the drawings. Dampers for generator radiator fan exhaust shall be opposed blade type.
2. All dampers for outdoor air service and exhaust air service to be equivalent to TAMCO Series 9000 aluminum and have the following features:

    a. Frames shall be 4” deep X 1” and no less than .080” in thickness, mill finish extruded aluminum 6063-T5 with mounting flanges on both sides of the frame. Frame to be assembled using plated steel mounting fasteners.
    b. Entire frame shall be thermally broken by means of two polyurethane resin pockets complete with thermal cuts.
    c. Blades shall be extruded aluminum 6063-T5, mill finish air foil profiles, internally insulated with expanded polyurethane foam and shall be thermally broken.
    d. Blade and frame seals shall be of extruded silicone and shall be secured in an integral slot within the aluminum extrusions. Blade and frame seals are to be mechanically fastened to eliminate shrinkage and movement over the life of the damper. Adhesive or clip on type blade seals shall not be approved. Jamb seals shall be silicone.
    e. Maintenance free bearings are to be composed of an inner bearing fixed to a 7/16” aluminum hexagon blade pivot pin, rotating within a polycarbonate outer bearing inserted into the frame. There shall be no metal-to-metal or metal-to-plastic contact.
    f. Adjustable 7/16” hexagonal drive rod, U-bolt fastener and hexagonal retaining nuts shall be corrosion resistant, zinc plated steel to provide positive connection to blades and linkage.
    g. Linkage hardware shall be installed in the frame side. All linkage crank arm and rod hardware parts shall be constructed of mill finished aluminum, complete with corrosion resistant, zinc plated trunnions and cup point trunnion screws for a slip-proof grip.
    h. Dampers are to be designed for operation in temperatures ranging between -40 deg. F (-40 deg. C) and 212 deg. F (100 deg. C).
    i. Dampers shall be rated Leakage Class 1A at 1 in. w.g. (0.25 kPa) static pressure differential. Standard air leakage data shall be certified under the AMCA Certified Ratings Program.
    j. Dampers shall be made to size required without blanking off free area.
    k. Dampers shall be available as “flanged to duct” mounting type.
    l. Installation of dampers must be in accordance with manufacturer’s installation guidelines provided with each damper shipment.
    m. Intermediate or tubular steel structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width. (See manufacturer’s installation guidelines).

3. Dampers for all other applications to be equal to TAMCO Series 1500 Ultra Low Leakage Air Foil Aluminum and have the following features:

    a. Frames shall be 4” deep X 1” and no less than .080” in thickness, mill finish extruded aluminum 6063-T5 with mounting flanges on both sides of the frame. Frame to be assembled using plated steel mounting fasteners.
    b. Entire frame shall be thermally broken by means of two polyurethane resin pockets complete with thermal cuts.
    c. Blades shall be extruded aluminum 6063-T5, mill finish air foil profiles, internally insulated with expanded polyurethane foam and shall be thermally broken.
    d. Blade and frame seals shall be of extruded silicone and shall be secured in an integral slot within the aluminum extrusions. Blade and frame seals are to be mechanically fastened to eliminate shrinkage and movement over the life of the damper. Adhesive or clip on type blade seals shall not be approved.
    e. Maintenance free bearings are to be composed of an inner bearing fixed to a 7/16” aluminum hexagon blade pivot pin, rotating within a polycarbonate outer bearing inserted into the frame. There shall be no metal-to-metal or metal-to-plastic contact.
    f. Adjustable 7/16” hexagonal drive rod, U-bolt fastener and hexagonal retaining nuts shall be corrosion resistant, zinc plated steel to provide positive connection to blades and linkage.
    g. Linkage hardware shall be installed in the frame side. All linkage crank arm and rod hardware parts shall be constructed of mill finished aluminum, complete with corrosion resistant, zinc plated trunnions and cup point trunnion screws for a slip-proof grip.
    h. Dampers are to be designed for operation in temperatures ranging between -40 deg. F (-40 deg. C) and 212 deg. F (100 deg. C).
    i. Dampers shall be rated Leakage Class 1A at 1 in. w.g. (0.25 kPa) static pressure differential. Standard air leakage data shall be certified under the AMCA Certified Ratings Program.
    j. Dampers shall be made to size required without blanking off free area.
    k. Dampers shall be available with either opposed blade action or parallel blade action.
    l. Dampers shall be available as “flanged to duct” mounting type.
    m. Installation of dampers must be in accordance with manufacturer’s installation guidelines provided with each damper shipment.
    n. Intermediate or tubular steel structural support is required to resist applied pressure loads for dampers that consist of two or more sections in both height and width. (See manufacturer’s installation guidelines).

4. Automatic dampers (modulating) shall be designed for face velocity that varies from 1,200 fpm to 2,000 fpm in most cases as approved by the design engineer. Dampers to be selected by the supplier with blade shaft lengths that prevent torsion that will create a leakage of more than 2 percent of the rated leakage capacity. Beyond that point, the dampers shall be broken into multiple sections. Field supplied mullions are required on large dampers exceeding 200 square feet.
5. Individual damper section actuators are preferred unless access to actuators is difficult and then jack shafting is acceptable. TCC to note that drive shafts between dampers of different air paths (i.e., outdoor air and return air or return air and exhaust air) is not acceptable. Jack shafting between sections is permitted when such shafting is designed to accommodate and eliminate the effects of torsion.
6. TCC to note that free access to all actuators is the responsibility of the TCC.
7. Each damper shall be equipped with an individual damper operator of the size and style required for the service intended.
8. Actuators to be designed for modulating control with spring return to the fail "safe" position. Actuators to be low voltage with 100% surplus torque (submittals to incorporate

calculations to prove 100 percent closure under 4.0" wg status pressure differential for modulating service and 2.0" wg for two position application).

9. Terminal box/AFCV damper actuators to be low voltage, non-spring return and incremental control with 200 percent torque. All control actuators to utilize auto zero program to insure total accuracy of damper actuator. The feature to be activated during periods of low or no occupancy.

F. Insertion Turbine Flow Meters for Closed Loop Condenser Water:

1. Provide dual turbine flow meter complete with all installation hardware necessary to enable insertion and removal of the meter without system shutdown. The flow meter shall be hand insertable up to 400 psi. The flow meter shall have two contra-rotating axial turbines, with electronic impedance-based sensing and an averaging circuit to reduce measurement errors due to swirl and flow profile distortion.
2. The flow meter shall be installed in accordance with the manufacturer's installation guide including meter orientation and straight pipe recommendations.
3. Wetted metal components shall be nickel-plated brass for applications operating below 250 degrees F, 316L SS construction for DW applications, HTHW applications operating over 250 degrees F, and for any application in non-metallic pipe. The maximum operating temperature shall be 280 degrees F, 300 F peak.
4. Each flow meter shall be individually wet-calibrated against a primary volumetric standard that is accurate to within 0.1% and traceable to NIST. The manufacturer's certificate of calibration shall be provided with each flow meter.
5. Accuracy shall be within ± 0.5% of rate at the calibrated velocity, within ± 1% of rate over a 10:1 turndown (3.0 to 30 ft/s) and within ± 2% of rate over a 50:1 turndown (from 0.4 to 20 ft/s).
6. The flow meter shall include integral analog output(s), 4-20 mA, 0-10V, or 0-5V, and a high resolution frequency output for use with peripheral devices (remote display or BTU Meter). FB-1210 for Bi-directional applications shall include an isolated contact closure output for direction.
7. The flow meter shall be covered by the manufacturer's two-year warranty.
8. Turbine meter shall be ONICON Incorporated Model F-1210 Dual Turbine, or equivalent as approved by the Engineer.

G. Energy BTU Measurement System:

1. The entire energy BTU measurement system shall be built and calibrated by a single manufacturer and shall consist of a flow meter, two temperature sensors, a BTU meter, temperature thermowells, and all required mechanical installation hardware. The BTU meter and associated sensors and flow meter shall be installed in accordance with the manufacturer's installation guide.
2. The BTU meter shall provide the following points both at the integral LCD and as outputs to the building control system: Energy total, Energy rate, flow rate, supply temperature and return temperature. Output signals shall be either serial network (protocol conforming to BACnet® MS/TP, JCI-N2, MODBUS RTU, MODBUS TCP, or Siemens-P1) and/or via individual analog and pulse outputs.
3. Each BTU meter shall be factory programmed and tagged for its specific application, and shall be re-programmable using the front panel keypad (no special interface device or computer required).
4. Temperature sensors shall be loop-powered current based (mA) sensors and shall be bath-calibrated and matched (NIST traceable) for the specific temperature range for each application. The calculated differential temperature used in the energy calculation shall be accurate to within $\pm$0.15°F (including the error from individual temperature sensors, sensor matching, input offsets, and calculations).
5. A certificate of NIST traceable calibration shall be provided with each system.

6. Flow meter shall be in accordance with paragraph A, B, C, or D, refer to meter schedule for specific flow meter type.
7. All equipment shall be covered by the manufacturer's two-year warranty.
8. Energy BTU measurement system shall be ONICON Incorporated System-10 BTU Meter, or equivalent as approved by the Engineer.

H. Differential Pressure Transmitter:

1. Liquid: Furnish field mounted differential pressure transmitters as indicated on plans for measuring differential pressure and transmitting an isolated 4 to 20 mA DC output linear differential pressure signal.

   a. The unit shall be accurate to ±0.20% of calibrated span. It shall withstand static pressures of 1000 psig with negligible change in output. The flanges shall be made of stainless steel with stainless steel wetted sensing components, wetted parts all stainless steel and a silicone fill fluid. A brass or stainless 3 valve bypass manifold and bracket mounting kit shall be utilized for easier on-site equalization and calibration. Unit shall be protected against radio frequency interference and shall have a water-tight (NEMA Type 4) electrical enclosure with 1/2" NPT conduit connection. An LCD display is not required.

      1) The Type A transmitter shall be a standard process grade loop powered transmitter as manufactured by:

         a) Rosemount Model 3051C.
         b) Foxboro Model IDP10.
         c) Yokogawa Model EJA110A.

2. Air: Furnish field mounted differential pressure transmitters using a 4-20 mA (or 0-10 VDC) output linear with measured differential pressure. Accuracy shall be ±0.8% of calibrated span. Response time shall be 250 milliseconds. Transmitter shall be in a standard grade transmitter manufactured by Ashcroft or Setra.

I. Airflow Measuring Stations:

1. All air flow measuring stations to be furnished under this contract as shown on control schematics and as scheduled.

   a. Approved manufacturers are Tek-Air Systems, Air Monitor, Paragon, Ebtron, Farr, and Airflow Wing.

2. Duct-mounted stations shall be installed by the Sheet Metal Contractor while fan inlet station installation responsibility shall be by this Contractor.
3. Sizing and physical location of stations shall be the responsibility of this Contractor. TCC to ensure that sufficient distance is available both upstream and downstream such that turbulence is not a factor in the velocity pressure measurement. Sizing shall insure that the minimum velocity across the station affords accuracy of measurement and the design engineer shall be notified within 30 days of contract award if any modifications are required to the field ductwork.
4. TCC to ensure that a proper access door upstream of the station is provided in the ductwork such that the inlet face of the unit may be cleaned as necessary.
5. Duct-mounted air flow measuring stations:

   a. Furnish and install air flow measuring stations constructed of 16 gage sheet metal casing and a copper velocity pressure traverse section.

b. The velocity pressure traverse section shall consist of air straightening tubes, total pressure sensors and static pressure sensors, all interconnected to form a traverse by copper manifolds which shall equalize and integrate each type sensor measurement into one (1) total pressure and one (1) static pressure metering port. There shall be one static pressure sensor for each total pressure sensor.
c. A minimum of one static and one total pressure sensor shall be used for every 16 square feet in cross section. For larger ducts, a minimum of one static and one total pressure sensor shall be used for every 36" of duct cross sectional area up to a maximum as recommended by ASHRAE guide for traverse measurement.
d. Identification: Each air flow measuring station shall have a nameplate with the following information:

1) Unit size.
2) Unit designation.
3) Design air quantity.
4) Direction of air flow.
5) Design air velocity.

6. Fan inlet air flow sensing (non-intrusive piezometer type):

a. Accuracy: Within 2% throughout the velocity range of 600 fpm and over, when installed in accordance with published recommendations
b. Temperature: 350 deg F continuous operation; 400 deg F intermittent operation
c. Humidity: 0-100% continuous operation
d. Corrosion resistance: Good salt air and mild acid resistance, excellent solvent and aromatic hydrocarbon resistance
e. Material: 6063-T5 anodized aluminum, galvanized mounting brackets

J. Thermal Dispersion Air Flow Measurement:

1. Air volume measurement system to consist of multiple sensors designed to average velocity using thermal dispersion principles. System to be designed to be totally independent of temperature, density, and humidity. Tek-Air or Ebtron.
2. The quantity of sensing tubes shall conform to manufacturer’s requirements for spacing based on the specified accuracy and the actual inlet and outlet conditions.
3. Unit to be accurate to 1.5% between 50 fpm and 6000 fpm. Output to be 4-20 mA.

K. VAV/CAV Terminal Unit Control Components (DDC Control):

Component	Furnished By	Installed By	Wired By
Disconnect Switch	Manufacturer	Manufacturer	Manufacturer
Transformer	TCC	Manufacturer	Manufacturer
Damper Actuator	TCC	Manufacturer	Manufacturer
Flow Controller	TCC	Manufacturer	Manufacturer
Flow Sensing	Manufacturer	Manufacturer	Manufacturer
Misc Accessories	TCC	TCC	TCC

L. Gas Instruments:

1. Carbon Monoxide (CO) Sensor and Controller.
a. Comply with UL 61010-1.
b. Wall mounted.
c. 24 VAC power.
d. BACnet MS/TP protocol.
e. Programmable fan and alarm relays.

f. Integrated display with LED indicators for status and adjustable parameters for warning and alarm setpoints.
g. Audible alarm.
h. 2 analog outputs.
i. Field replaceable sensing elements with a 7-year minimum life expectancy on each element.
j. Standard water/dust tight, corrosion resistant drip proof enclosure.
k. Carbon Monoxide accuracy to be plus or minus 5% between 0-100 ppm and cover up to 7500 SF.
l. Include standard 7-year warranty on sensor electronics and 2-year warranty on replaceable elements.
m. Similar or equivalent to Senva TG Series.
n. Application

1) Locate in any mechanical room with condensing boilers.

M. Control Valves:

1. Source Limitations: Obtain valves from single manufacturer.
2. Selection Criteria:

a. Control valves shall be suitable for operation at following conditions:

1) Refer to specification section 232113 – Hydronic Piping for system pressures.

b. Fail positions unless otherwise indicated:

1) Condenser Water: Open.

c. In water systems, select modulating control valves for a design Cv based on a pressure drop of:

1) 1 psig for two-position unless otherwise indicated.
2) 5 psig for two way modulating unless otherwise indicated.
3) 5 psig for three way modulating unless otherwise indicated.

d. Actuators:

1) Actuators for Steam Control Valves: Shutoff against 1.5 times design pressure.

2.23 BALL-STYLE CONTROL VALVES

A. Ball Valves with Single Port and Characterized Disk:

1. Pressure Rating for NPS 1 and Smaller: Nominal 600 WOG.
2. Pressure Rating for NPS 1-1/2 through NPS 2: Nominal 400 WOG.
3. Close-off Pressure: 200 psig.
4. Process Temperature Range: Zero to 212 deg F.
5. Body and Tail Piece: Cast bronze ASTM B 61, ASTM B 62, ASTM B 584, or forged brass with nickel plating.
6. End Connections: Threaded (NPT) ends.

7. Ball: 300 series stainless steel.
8. Stem and Stem Extension:

    a. Material to match ball.
    b. Blowout-proof design.
    c. Sleeve or other approved means to allow valve to be opened and closed without damaging the insulation or the vapor barrier seal.

9. Ball Seats: Reinforced PTFE.
10. Stem Seal: Reinforced PTFE packing ring with a threaded packing ring follower to retain the packing ring under design pressure with the linkage removed. Alternative means, such as EPDM O-rings, are acceptable if an equivalent cycle endurance can be demonstrated by testing.
11. Flow Characteristic: Equal percentage.

B. Ball Valves with Two Ports and Characterized Disk:

1. Pressure Rating for NPS 1 and Smaller: Nominal 600 WOG.
2. Pressure Rating for NPS 1-1/2 through NPS 2: Nominal 400 WOG.
3. Close-off Pressure: 200 psig.
4. Process Temperature Range: Zero to 212 deg F.
5. Body and Tail Piece: Cast bronze ASTM B 61, ASTM B 62, ASTM B 584, or forged brass with nickel plating.
6. End Connections: Threaded (NPT) ends.
7. Ball: 300 series stainless steel.
8. Stem and Stem Extension:

    a. Material to match ball.
    b. Blowout-proof design.
    c. Sleeve or other approved means to allow valve to be opened and closed without damaging the insulation or the vapor barrier seal.

9. Ball Seats: Reinforced PTFE.
10. Stem Seal: Reinforced PTFE packing ring with a threaded packing ring follower to retain the packing ring under design pressure with the linkage removed. Alternative means, such as EPDM O-rings, are acceptable if an equivalent cycle endurance can be demonstrated by testing.
11. Flow Characteristics for A-Port: Equal percentage.
12. Flow Characteristics for B-Port: Modified for constant common port flow.

2.24 GLOBE-STYLE CONTROL VALVES

A. General Globe-Style Valve Requirements:

1. Globe-style control valve body dimensions shall comply with ISA 75.08.01.
2. Construct the valves to be serviceable from the top.
3. For cage guided valves, trim shall be field interchangeable for different valve flow characteristics, such as equal percentage, linear, and quick opening.
4. Reduced trim for one nominal size smaller shall be available for industrial valves NPS 1 and larger.
5. Replaceable seats and plugs.
6. Furnish each control valve with a corrosion-resistant nameplate indicating the following:

    a. Manufacturer's name, model number, and serial number.

b. Body and trim size.
c. Arrow indicating direction of flow.

B. Two-Way Globe Valves NPS 2 and Smaller:

1. Globe Style: Single port.
2. Body: Cast bronze or forged brass with ASME B16.5, Class 250 rating.
3. End Connections: Threaded.
4. Bonnet: Screwed.
5. Packing: PTFE V-ring.
6. Plug: Top guided.
7. Plug, Seat, and Stem: stainless steel.
8. Process Temperature Range: 35 to 248 deg F.
9. Ambient Operating Temperature: 35 to 150 deg F.
10. Leakage: FCI 70-2, Class IV.
11. Rangeability: 25 to 1.
12. Equal percentage flow characteristic.

C. Three-Way Globe Valves NPS 2 and Smaller:

1. Globe Style: Mix flow pattern.
2. Body: Cast bronze or forged brass with ASME B16.5, Class 250 rating.
3. End Connections: Threaded.
4. Bonnet: Screwed.
5. Packing: PTFE V-ring.
6. Plug: Top guided.
7. Plug, Seat, and Stem: stainless steel.
8. Process Temperature Range: 35 to 248 deg F.
9. Ambient Operating Temperature: 35 to 150 deg F.
10. Leakage: FCI 70-2, Class IV.
11. Rangeability: 25 to 1.
12. Linear flow characteristic.

D. Two-Way Globe Valves NPS 2-1/2 to NPS 6:

1. Globe Style: Single port.
2. Body: Cast iron complying with ASME B61.1, Class 125.
3. End Connections: Flanged, suitable for mating to ASME B16.5, Class 150 flanges.
4. Bonnet: Bolted.
5. Packing: PTFE cone-ring.
6. Plug: Top or bottom guided.
7. Plug, Seat, and Stem: Brass or stainless steel.
8. Process Temperature Rating: 35 to 281 deg F.
9. Leakage: 0.1 percent of maximum flow.
10. Rangeability: Varies with valve size between 6 and 10 to 1.
11. Modified linear flow characteristic.

2.25 ACCESSORIES

A. Damper Blade Limit Switches:

1. Sense positive open and/or closed position of the damper blades.
2. NEMA 250, Type 13, oil-tight construction.
3. Arrange for the mounting application.

4. Additional waterproof enclosure when required by its environment.
5. Arrange to prevent "over-center" operation.

2.26 IDENTIFICATION

A. Instrument Air Pipe and Tubing:

1. Engraved tag shall bear the following information:

a. Service (Example): "Instrument Air."
b. Pressure Range (Example): 0 to 30 psig.

2. Letter size shall be a minimum of [**0.25 inch**] <**Insert dimension**> high.
3. Tag shall consist of white lettering on blue background.
4. Tag shall be engraved phenolic consisting of three layers of rigid laminate. Top and bottom layers are color-coded blue with contrasting white center exposed by engraving through outer layer.
5. Include tag with a brass grommet, chain and S-hook.

B. Control Equipment, Instruments, and Control Devices:

1. Engraved tag bearing unique identification.

a. Include instruments with unique identification identified by equipment being controlled or monitored, followed by point identification.

2. Letter size shall be as follows:

a. Operator Workstations: Minimum of 0.5 inch high.
b. Printers: Minimum of 0.5 inch high.
c. DDC Controllers: Minimum of 0.5 inch high.
d. Gateways: Minimum of 0.5 inch high.
e. Repeaters: Minimum of 0.5 inch high.
f. Enclosures: Minimum of 0.5 inch high.
g. Electrical Power Devices: Minimum of 0.25 inch high.
h. UPS units: Minimum of 0.5 inch high.
i. Accessories: Minimum of 0.25 inch high.
j. Instruments: Minimum of 0.25 inch high.
k. Control Damper and Valve Actuators: Minimum of 0.25 inch high.

3. Tag shall consist of white lettering on black background.
4. Tag shall be engraved phenolic consisting of three layers of rigid laminate. Top and bottom layers are color-coded black with contrasting white center exposed by engraving through outer layer.
5. Tag shall be fastened with drive pins.
6. Instruments, control devices and actuators with Project-specific identification tags having unique identification numbers following requirements indicated and provided by original manufacturer do not require an additional tag.

C. Valve Tags:

1. Brass tags and brass chains attached to valve.
2. Tags shall be at least 1.5 inches in diameter.

3. Include tag with unique valve identification indicating control influence such as flow, level, pressure, or temperature; followed by location of valve, and followed by three-digit sequential number. For example: TV-1.001.
4. Valves with Project-specific identification tags having unique identification numbers following requirements indicated and provided by original manufacturer do not require an additional tag.

D. Raceway and Boxes:

1. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
2. Paint cover plates on junction boxes and conduit same color as the tape banding for conduits. After painting, label cover plate "HVAC Controls," using an engraved phenolic tag.
3. For raceways housing pneumatic tubing, add a phenolic tag labeled "HVAC Instrument Air Tubing."
4. For raceways housing air signal tubing, add a phenolic tag labeled "HVAC Air Signal Tubing."

E. Equipment Warning Labels:

1. Acrylic label with pressure-sensitive adhesive back and peel-off protective jacket.
2. Lettering size shall be at least 14-point type with white lettering on red background.
3. Warning label shall read "CAUTION-Equipment operated under remote automatic control and may start or stop at any time without warning. Switch electric power disconnecting means to OFF position before servicing."
4. Lettering shall be enclosed in a white line border. Edge of label shall extend at least 0.25 inch beyond white border.

2.27 SOURCE QUALITY CONTROL

A. Product(s) and material(s) will be considered defective if they do not pass tests and inspections.

B. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify compatibility with and suitability of substrates.

B. Examine roughing-in for products to verify actual locations of connections before installation.

1. Examine roughing-in for instruments installed in piping to verify actual locations of connections before installation.
2. Examine roughing-in for instruments installed in duct systems to verify actual locations of connections before installation.

C. Examine walls, floors, roofs, and ceilings for suitable conditions where product will be installed.

D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 DDC SYSTEM INTERFACE WITH OTHER SYSTEMS AND EQUIPMENT

A. Communication Interface to Equipment with Integral Controls:

1. DDC system shall have communication interface with equipment having integral controls and having a communication interface for remote monitoring or control.
2. Equipment to Be Connected:

a. Air-terminal units specified in Section 233600 "Air Terminal Units."
b. Boilers specified in Section 235216 "Condensing Boilers."
c. Chillers specified in Section 236423.21 "Air-Cooled, Scroll Water Chillers."
d. Air-handling units specified in Section 237313 "Modular Indoor Central-Station Air-Handling Units."
e. Dedicated outdoor-air units specified in Section 237433 "Dedicated Outdoor-Air Units."
f. Fan-coil units specified in Section 238219 "Fan Coil Units."
g. Switchboards specified in Section 262300 "Low-Voltage Switchgear."
h. Variable-frequency controllers specified in Section 262923 "Variable-Frequency Motor Controllers."
i. UPS specified in Section 263353 "Static Uninterruptible Power Supply."
j. Refrigerant monitoring.

B. Communication Interface to Other Building Systems:

1. DDC system shall have a communication interface with systems having a communication interface.
2. Systems to Be Connected:

a. Power monitoring specified in Section 260913 "Electrical Power Monitoring and Control."
b. Natural gas monitoring
c. Domestic water monitoring
d. Monitoring of domestic hot water thermostatic mixing valve

3.3 CONTROL DEVICES FOR INSTALLATION BY INSTALLERS

A. Deliver selected control devices, specified in indicated HVAC instrumentation and control device Sections, to identified equipment and systems manufacturers for factory installation and to identified installers for field installation.

B. Deliver the following to duct fabricator and Installer for installation in ductwork. Include installation instructions to Installer and supervise installation for compliance with requirements.

1. DDC control dampers.
2. Airflow sensors and switches.

C. Deliver the following to plumbing and HVAC piping installers for installation in piping. Include installation instructions to Installer and supervise installation for compliance with requirements.

1. DDC control valves.
2. Pipe-mounted flow meters.
3. Pipe-mounted sensors, switches and transmitters.
4. Pipe- and tank-mounted thermowells.

3.4 CONTROL DEVICES FOR EQUIPMENT MANUFACTURER FACTORY INSTALLATION

A. Deliver the following to air-handling unit manufacturer for factory installation. Include installation instructions to air-handling unit manufacturer.

1. Programmable application or application-specific controller.
2. Unit-mounted DDC control dampers and actuators.
3. Unit-mounted airflow sensors, switches and transmitters.
4. Unit-mounted gas sensors and transmitters.
5. Unit-mounted leak-detection switches.
6. Unit-mounted speed sensors, switches and transmitters.
7. Unit-mounted pressure sensors.
8. Unit-mounted temperature sensors, switches and transmitters.
9. Relays.

B. Deliver the following to terminal unit manufacturer for factory installation. Include installation instructions to terminal unit manufacturer.

1. Programmable application or application-specific controller.
2. Electric damper actuator.
3. Unit-mounted flow and pressure sensors, transmitters and transducers.
4. Unit-mounted temperature sensors.
5. Relays.

C. Deliver the following to fan-coil unit manufacturer for factory installation. Include installation instructions to fan-coil unit manufacturer.

1. Programmable application or application-specific controller.
2. Unit-mounted temperature sensors.
3. Flow and pressure switches.
4. Leak-detection switches.
5. Relays.

3.5 GENERAL INSTALLATION REQUIREMENTS

A. Install products to satisfy more stringent of all requirements indicated.

B. Install products level, plumb, parallel, and perpendicular with building construction.

C. Support products, tubing, piping wiring and raceways. Brace products to prevent lateral movement and sway or a break in attachment when subjected to a force.

D. If codes and referenced standards are more stringent than requirements indicated, comply with requirements in codes and referenced standards.

E. Fabricate openings and install sleeves in ceilings, floors, roof, and walls required by installation of products. Before proceeding with drilling, punching, and cutting, check for concealed work to avoid damage. Patch, flash, grout, seal, and refinish openings to match adjacent condition.

F. Firestop penetrations made in fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

G. Seal penetrations made in acoustically rated assemblies. Comply with requirements in Section 079200 "Joint Sealants."

H. Welding Requirements:

1. Restrict welding and burning to supports and bracing.
2. No equipment shall be cut or welded without approval. Welding or cutting will not be approved if there is risk of damage to adjacent Work.
3. Welding, where approved, shall be by inert-gas electric arc process and shall be performed by qualified welders according to applicable welding codes.
4. If requested on-site, show satisfactory evidence of welder certificates indicating ability to perform welding work intended.

I. Fastening Hardware:

1. Stillson wrenches, pliers, and other tools that damage surfaces of rods, nuts, and other parts are prohibited for work of assembling and tightening fasteners.
2. Tighten bolts and nuts firmly and uniformly. Do not overstress threads by excessive force or by oversized wrenches.
3. Lubricate threads of bolts, nuts and screws with graphite and oil before assembly.

J. If product locations are not indicated, install products in locations that are accessible and that will permit service and maintenance from floor, equipment platforms, or catwalks without removal of permanently installed furniture and equipment.

K. Corrosive Environments:

1. Avoid or limit use of materials in corrosive airstreams and environments, including, but not limited to, the following:

   a. Laboratory exhaust-air streams.
   b. Process exhaust-air streams.

2. When conduit is in contact with a corrosive airstream and environment, use Type 316 stainless-steel conduit and fittings or conduit and fittings that are coated with a corrosive-resistant coating that is suitable for environment. Comply with requirements for installation of raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
3. Where instruments are located in a corrosive airstream and are not corrosive resistant from manufacturer, field install products in NEMA 250, Type 4X enclosure constructed of Type 316L stainless steel.

3.6 OPERATOR WORKSTATION INSTALLATION

A. Desktop Operator Workstations Installation:

1. Install operator workstation(s) at location(s) directed by Owner.
2. Install multiple-receptacle power strip with cord for use in connecting multiple workstation components to a single duplex electrical power receptacle.
3. Install software on workstation(s) and verify software functions properly.
4. Develop Project-specific graphics, trends, reports, logs and historical database.

5. Power workstation through a dedicated UPS unit. Locate UPS adjacent to workstation.

B. Portable Operator Workstations Installation:

1. Turn over portable operator workstations to Owner at Substantial Completion.
2. Install software on workstation(s) and verify software functions properly.

C. Color Graphics Application:

1. Use system schematics indicated as starting point to create graphics.
2. Develop Project-specific library of symbols for representing system equipment and products.
3. Incorporate digital images of Project-completed installation into graphics where beneficial to enhance effect.
4. Submit sketch of graphic layout with description of all text for each graphic for Owner's and Architect's review before creating graphic using graphics software.
5. Seek Owner input in graphics development once using graphics software.
6. Final editing shall be done on-site with Owner's and Architect's review and feedback.
7. Refine graphics as necessary for Owner acceptance.
8. On receiving Owner acceptance, print a hard copy for inclusion in operation and maintenance manual. Prepare a scanned copy PDF file of each graphic and include with softcopy of DDC system operation and maintenance manual.

3.7 GATEWAY INSTALLATION

A. Install gateways if required for DDC system communication interface requirements indicated.

1. Install gateway(s) required to suit indicated requirements.

B. Test gateway to verify that communication interface functions properly.

3.8 ROUTER INSTALLATION

A. Install routers if required for DDC system communication interface requirements indicated.

1. Install router(s) required to suit indicated requirements.

B. Test router to verify that communication interface functions properly.

3.9 CONTROLLER INSTALLATION

A. Install controllers in enclosures to comply with indicated requirements.

B. Connect controllers to field power supply and to UPS units where indicated.

C. Install controller with latest version of applicable software and configure to execute requirements indicated.

D. Test and adjust controllers to verify operation of connected I/O to achieve performance indicated requirements while executing sequences of operation.

E. Installation of Network Controllers:

1. Quantity and location of network controllers shall be determined by DDC system manufacturer to satisfy requirements indicated.
2. Install controllers in a protected location that is easily accessible by operators.

F. Installation of Programmable Application Controllers:

1. Quantity and location of programmable application controllers shall be determined by DDC system manufacturer to satisfy requirements indicated.
2. Install controllers in a protected location that is easily accessible by operators.

G. Application-Specific Controllers:

1. Quantity and location of application-specific controllers shall be determined by DDC system manufacturer to satisfy requirements indicated.
2. For controllers not mounted directly on equipment being controlled, install controllers in a protected location that is easily accessible by operators.

3.10 ENCLOSURES INSTALLATION

A. Install the following items in enclosures, to comply with indicated requirements:

1. Gateways.
2. Routers.
3. Controllers.
4. Electrical power devices.
5. UPS units.
6. Relays.
7. Accessories.
8. Instruments.
9. Actuators

B. Attach wall-mounted enclosures to wall using the following types of steel struts:

1. For NEMA 250, [**Type 1**] <**Insert type**> Enclosures: Use [**painted steel**] [**galvanized-steel**] [**corrosion-resistant-coated steel**] strut and hardware.
2. For NEMA 250, [**Type 4**] [**Type 4X**] <**Insert type**> Enclosures and Enclosures Located Outdoors: Use stainless-steel strut and hardware.
3. Install plastic caps on exposed cut edges of strut.

C. Align top of adjacent enclosures of like size.

D. Install floor-mounted enclosures located in mechanical equipment rooms on concrete housekeeping pads. Attach enclosure legs using galvanized steel anchors.

E. Install continuous and fully accessible wireways to connect conduit, wire, and cable to multiple adjacent enclosures. Wireway used for application shall have protection equal to NEMA 250 rating of connected enclosures.

3.11 ELECTRIC POWER CONNECTIONS

A. Connect electrical power to DDC system products requiring electrical power connections.

B. Design of electrical power to products not indicated with electric power is delegated to DDC system provider and installing trade. Work shall comply with NFPA 70 and other requirements indicated.

C. Comply with requirements in Section 262816 "Enclosed Switches and Circuit Breakers" for electrical power circuit breakers.

D. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical power conductors and cables.

E. Comply with requirements in Section 260533 "Raceways and Boxes for Electrical Systems" for electrical power raceways and boxes.

3.12 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements in Section 260553 "Identification for Electrical Systems" for identification products and installation.

B. Install engraved phenolic nameplate with unique identification on face for each of the following:

1. Operator workstation.
2. Printer.
3. Gateway.
4. Router.
5. DDC controller.
6. Enclosure.
7. Electrical power device.
8. UPS unit.
9. Accessory.

C. Install engraved phenolic nameplate with unique instrument identification on face of each instrument connected to a DDC controller.

D. Install engraved phenolic nameplate with identification on face of each control damper and valve actuator connected to a DDC controller.

E. Where product is installed above accessible tile ceiling, also install matching engraved phenolic nameplate with identification on face of ceiling grid located directly below.

F. Where product is installed above an inaccessible ceiling, also install engraved phenolic nameplate with identification on face of access door directly below.

G. Warning Labels:

1. Shall be permanently attached to equipment that can be automatically started by DDC control system.
2. Shall be located in highly visible location near power service entry points.

3.13 NETWORK INSTALLATION

A. Install copper cable when connecting between the following network devices located in same building:

1. Operator workstations.
2. Operator workstations and network controllers.
3. Network controllers.

B. Install copper cable when connecting between the following:

1. Gateways.
2. Gateways and network controllers or programmable application controllers.
3. Routers.
4. Routers and network controllers or programmable application controllers.
5. Network controllers and programmable application controllers.
6. Programmable application controllers.
7. Programmable application controllers and application-specific controllers.
8. Application-specific controllers.

C. Install network cable in continuous raceway.

1. Where indicated on Drawings, cable trays may be used for copper cable in lieu of conduit.

3.14 NETWORK NAMING AND NUMBERING

A. Coordinate with Owner and provide unique naming and addressing for networks and devices.

B. ASHRAE 135 Networks:

1. MAC Address:

a. Every network device shall have an assigned and documented MAC address unique to its network.
b. Ethernet Networks: Document MAC address assigned at its creation.
c. ARCNET or MS/TP networks: Assign from 00 to 64.

2. Network Numbering:

a. Assign unique numbers to each new network.
b. Provide ability for changing network number through device switches or operator interface.
c. DDC system, with all possible connected LANs, can contain up to 65,534 unique networks.

3. Device Object Identifier Property Number:

a. Assign unique device object identifier property numbers or device instances for each device network.
b. Provide for future modification of device instance number by device switches or operator interface.
c. LAN shall support up to 4,194,302 unique devices.

4. Device Object Name Property Text:

a. Device object name property field shall support 32 minimum printable characters.
b. Assign unique device "Object Name" property names with plain-English descriptive names for each device.

1) Example 1: Device object name for device controlling boiler plant at Building 1000 would be "HW System B1000."
2) Example 2: Device object name for a VAV terminal unit controller could be "VAV unit 102".

5. Object Name Property Text for Other Than Device Objects:

a. Object name property field shall support 32 minimum printable characters.
b. Assign object name properties with plain-English names descriptive of application.

1) Example 1: "Zone 1 Temperature."
2) Example 2 "Fan Start and Stop."

6. Object Identifier Property Number for Other Than Device Objects:

a. Assign object identifier property numbers according to Drawings or tables indicated.
b. If not indicated, object identifier property numbers may be assigned at Installer's discretion but must be approved by Owner in advance, be documented and be unique for like object types within device.

3.15 PIPING AND TUBING INSTALLATION

A. Above-Grade Pneumatic and Air Signal Piping and Tubing Installation:

1. Material Application:

a. Install copper tubing, except as follows:

1) Tubing Exposed to View: Polyethylene tubing installed in raceways may be used in lieu of copper tubing.
2) Concealed Tubing: Polyethylene tubing may be used in lieu of copper tubing when concealed behind accessible ceilings and concealed in walls and connecting wall-mounted instruments with recessed connections.

b. Install copper tubing, unless other accessible materials are indicated, for air signals to instruments including, but not limited to, the following:

1) Sensors.
2) Switches.
3) Transmitters.

c. Install drawn-temper copper tubing, except within 36 inches of device terminations tubing shall be annealed-tempered copper tubing.
d. Install compression fittings to connect copper tubing to instruments, control devices, and accessories.
e. Install barbed or compression fittings to connect polyethylene tubing to instruments, control devices, and accessories.

2. Routing:

a. Do not expose tubing in finished spaces, such as spaces with ceilings; occupied spaces, offices, and conference rooms, unless expressly approved in writing by Architect. Tubing may be exposed in areas without ceilings.

b. Where tubing is installed in finished occupied spaces, install the tubing in surface metal raceway with appropriate fittings only where not feasible to conceal in wall, above ceiling or behind architectural enclosures or covers.
c. Install piping and tubing plumb and parallel to and at right angles with building construction.
d. Install multiple runs of tubing or piping in equally spaced parallel lines.
e. Piping and tubing shall not interfere with access to valves, equipment, duct and equipment access doors, or obstruct personnel access and passageways of any kind.
f. Coordinate with other trades before installation to prevent proposed piping and tubing from interfering with pipe, duct, terminal equipment, light fixtures, conduit and cable tray space. If changes to Shop Drawings are necessary due to field coordination, document changes on record Drawings.
g. Install vibration loops in copper tubing when connecting to instrument and actuators that vibrate.

3. Support:

a. According to MSS SP-69, Table 3, except support spacing shall not exceed 60 inches.
b. Support copper tubing with copper hangers, clips, and tube trays.
c. Do not use tape for support or dielectric isolation.
d. Install supports at each change in direction and at each branch take off.
e. Attached supports to building structure independent of work of other trades. Support from ducts, pipes, cable trays, and conduits is prohibited.
f. Attached support from building structure with threaded rods, structural shapes, or channel strut.
g. Install and brace supports to carry static load plus a safety margin, which will allow tubing to be serviced.
h. Brace supports to prevent lateral movement.
i. Paint steel support members that are not galvanized or zinc coated.
j. Support polyethylene tubing same as copper tubing.

4. Do not attach piping and tubing to equipment that may be removed frequently for maintenance or that may impart vibration and expansion from temperature change.
5. Protect exposed tubing in mechanical equipment rooms from mechanical damage. Use aluminum channel reversed and secured over tubing to protect tubing from damage.
6. Joining and Makeup:

a. Where joining and mating dissimilar metals where galvanic action could occur, install dielectric isolation.
b. Install a dirt leg with an isolation valve and threaded plug at each main air, connection to a panel, pneumatic pilot positioner and PRV station.
c. Make threaded joints for connecting to instrument equipment with connectors with a compression tubing connector on one end and threaded connection on other end.
d. Make tubing bends with a tube-bending tool. Hard bends, wrinkled or flattened bends are unacceptable.
e. Install tube fittings according to manufacturer's written instructions.
f. Do not make tubing connections to a fitting before completing makeup of the connection.
g. Align tubing with the fitting. Avoid springing tube into position, as this may result in excessive stress on both tubing and fitting with possible resulting leaks.
h. Do not install fittings close to a bend. A length of straight tubing, not deformed by bending, is required for a proper connection.
i. Check tubing for correct diameter and wall thickness.

j. Tube ends shall be cut square and deburred. Exercise care during cutting to keep tubing round.
k. Thread pipe on a threading machine. Ream inner edges of pipe ends, file and grind to remove burrs.
l. Wrap pipe threads of fittings on pneumatic lines with a single wrap of PTFE tape.
m. Protect piping and tubing from entrance of foreign matter.

7. Conduit in which nonmetallic tubing is installed shall not exceed 50 percent fill. Support conduit according to NFPA 70 unless otherwise indicated.

B. Identify piping and tubing as follows:

1. Every 50 feet of straight run.
2. At least once for each branch within 36 inches of main tee.
3. At each change in direction.
4. Within 36 inches of each ceiling, floor, roof and wall penetration.
5. Where exposed to and where concealed from view, including above ceiling plenums, shafts, and chases.
6. At each valve.
7. Mark each instrument tube connection with a number-coded identification. Each unique tube shall have same unique number at instrument connection and termination at opposite end of tube.

C. Isolation Valves Installation:

1. Install valves full size of piping and tubing.
2. Install at the following locations:

a. At each branch.
b. Before and after each PRV.
c. Before and after each air dryer.
d. At each control device.

3. Valves shall be located to be readily accessible from floor.

D. Process Tubing Installation:

1. Install process tubing for signal to instruments in liquid and steam systems. Instruments include, but are not limited to, the following:

a. Meters.
b. Sensors.
c. Switches.
d. Transmitters.

2. Support tubing according to MSS SP-69, Table 3, but at intervals no less than 60 inches.
3. Install NPS 1/2 process tubing for industrial-grade sensors, transmitters, and switches. Install stainless-steel bushings where required.
4. Make tubing bends with a bending tool. Flattened or wrinkled bends are unacceptable.
5. Support tubing independent of other trades.
6. Route tubing parallel to and at right angles to building construction.
7. Install tubing concealed in areas with ceilings.
8. Install a dirt leg with an isolation valve and threaded plug in drain valve at each connection to a transmitter and switch.

9. Insulate process piping connected to hot water and steam systems for personnel protection if the surface temperature exceeds 120 deg F. Only insulate piping within maintenance personnel reach from floor, platform, or catwalk.
10. Wrap pipe threads of fitting in process tubing with service temperatures below 350 deg F with a single wrap of PTFE tape.
11. Coat pipe threads of fittings on process tubing in services with temperatures exceeding 350 deg F with pipe compound before being made up to reduce the possibility of galling.
12. Do not make tubing connections to a fitting before completing makeup of the connection.
13. Check tubing for correct diameter and wall thickness. Cut the tube ends square and deburred. Exercise care during cutting to keep tubing round.
14. Do not install fittings close to a bend. A length of straight tubing, not deformed by bending, is required for a proper connection.
15. Align tubing with fitting when installed. Avoid springing tube into position.
16. Install tubing with extreme care exercised to keep foreign matter out of system. Open tubing ends shall be kept plugged to keep out dust, dirt and moisture.
17. Do not attach tubing to equipment that may be removed frequently for maintenance or may impart vibration and expansion from temperature change.
18. Protect exposed tubing in mechanical equipment rooms from inadvertent mechanical damage. Use aluminum channel reversed and secured over tubing to protect tubing from damage.

E. Isolation Valves Installation:

1. Install valves full size of piping and tubing.
2. Install isolation valves at the following locations:

    a. Process connection.
    b. Inlet to each instrument including, sensors, transmitters, switches, gages, and other control devices.

3. Locate valves to be readily accessible from floor.

3.16 CONTROL WIRE, CABLE AND RACEWAYS INSTALLATION

A. Comply with NECA 1.

B. Comply with TIA 568-C.1.

C. Wiring Method: Install cables in raceways and cable trays except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.

D. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

E. Field Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

F. Conduit Installation:

1. Install conduit expansion joints where conduit runs exceed 200 feet, and conduit crosses building expansion joints.
2. Coordinate conduit routing with other trades to avoid conflicts with ducts, pipes and equipment and service clearance.
3. Maintain at least 3-inch separation where conduits run axially above or below ducts and pipes.
4. Limit above-grade conduit runs to 100 feet without pull or junction box.
5. Do not install raceways or electrical items on any "explosion-relief" walls, or rotating equipment.
6. Do not fasten conduits onto the bottom side of a metal deck roof.
7. Flexible conduit is permitted only where flexibility and vibration control is required.
8. Limit flexible conduit to 3 feet long.
9. Conduit shall be continuous from outlet to outlet, from outlet to enclosures, pull and junction boxes, and shall be secured to boxes in such manner that each system shall be electrically continuous throughout.
10. Direct bury conduits underground or install in concrete-encased duct bank where indicated.

    a. Use rigid, nonmetallic, Schedule 80 PVC.
    b. Provide a burial depth according to NFPA 70, but not less than 24 inches.

11. Secure threaded conduit entering an instrument enclosure, cabinet, box, and trough, with a locknut on outside and inside, such that conduit system is electrically continuous throughout. Provide a metal bushing on inside with insulated throats. Locknuts shall be the type designed to bite into the metal or, on inside of enclosure, shall have a grounding wedge lug under locknut.
12. Conduit box-type connectors for conduit entering enclosures shall have an insulated throat.
13. Connect conduit entering enclosures in wet locations with box-type connectors or with watertight sealing locknuts or other fittings.
14. Offset conduits where entering surface-mounted equipment.
15. Seal conduit runs used by sealing fittings to prevent the circulation of air for the following:

    a. Conduit extending from interior to exterior of building.
    b. Conduit extending into pressurized duct and equipment.
    c. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
    d. <**Insert requirement**>.

G. Wire and Cable Installation:

1. Cables serving a common system may be grouped in a common raceway. Install control wiring and cable in separate raceway from power wiring. Do not group conductors from different systems or different voltages.
2. Install cables with protective sheathing that is waterproof and capable of withstanding continuous temperatures of 90 deg C with no measurable effect on physical and electrical properties of cable.

    a. Provide shielding to prevent interference and distortion from adjacent cables and equipment.

3. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
4. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.

5. UTP Cable Installation:

    a. Comply with TIA 568-C.2.
    b. Do not untwist UTP cables more than 1/2 inch from the point of termination, to maintain cable geometry.

6. Identify each wire on each end and at each terminal with a number-coded identification tag. Each wire shall have a unique tag.
7. Provide strain relief.
8. Terminate wiring in a junction box.

    a. Clamp cable over jacket in junction box.
    b. Individual conductors in the stripped section of the cable shall be slack between the clamping point and terminal block.

9. Terminate field wiring and cable not directly connected to instruments and control devices having integral wiring terminals using terminal blocks.
10. Install signal transmission components according to IEEE C2, REA Form 511a, NFPA 70, and as indicated.
11. Keep runs short. Allow extra length for connecting to terminal boards. Do not bend flexible coaxial cables in a radius less than 10 times the cable OD. Use sleeves or grommets to protect cables from vibration at points where they pass around sharp corners and through penetrations.
12. Ground wire shall be copper and grounding methods shall comply with IEEE C2. Demonstrate ground resistance.
13. Wire and cable shall be continuous from terminal to terminal without splices.
14. Use insulated spade lugs for wire and cable connection to screw terminals.
15. Use shielded cable to transmitters.
16. Use shielded cable to temperature sensors.
17. Perform continuity and meager testing on wire and cable after installation.
18. Do not install bruised, kinked, scored, deformed, or abraded wire and cable. Remove and discard wire and cable if damaged during installation, and replace it with new cable.
19. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
20. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
21. Protection from Electro-Magnetic Interference (EMI): Provide installation free of (EMI). As a minimum, comply with the following requirements:

    a. Comply with BICSI TDMM and TIA 569-C for separating unshielded cable from potential EMI sources, including electrical power lines and equipment.
    b. Separation between open cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

        1) Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
        2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
        3) Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.

    c. Separation between cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

        1) Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
        2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
        3) Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.

d. Separation between cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

1) Electrical Equipment Rating Less Than 2 kVA: No requirement.
2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
3) Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.

e. Separation between Cables and Electrical Motors and Transformers, 5 kVA or 5 HP and Larger: A minimum of 48 inches.
f. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.17 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and installations, including connections.

C. Perform the following tests and inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Testing of Pneumatic and Air-Signal Tubing:

a. Test for leaks and obstructions.
b. Disconnect each pipe and tubing line before a test is performed, and blowout dust, dirt, trash, condensate and other foreign materials with compressed air. Use commercially pure compressed air or nitrogen as distributed in gas cylinders. Air from an oil-free compressor with an air dryer is an acceptable alternative for the test.
c. After foreign matter is expelled and line is free from obstructions, plug far end of tubing run.
d. Connect a pressure source to near end of run with a needle valve between air supply and tubing run.
e. Connect a pressure gage accurate to within 0.5 percent of test between the shutoff needle valve and tubing run under test.
f. For system pressures above 30 psig, apply a pressure of 1.5 times operating pressure. Record pressure in tubing run every 10 minutes for one hour. Allowable drop in pressure in one-hour period shall not exceed 1 psig.
g. For system pressures 30 psig and below, apply a pressure of 2.0 times operating pressure to piping and tubing run. Record pressure in tubing run every 5 minutes for one hour. Allowable drop in pressure in one-hour period shall not exceed 0.5 psig.

D. Testing:

1. Perform preinstallation, in-progress, and final tests, supplemented by additional tests, as necessary.
2. Preinstallation Cable Verification: Verify integrity and serviceability for new cable lengths before installation. This assurance may be provided by using vendor verification

documents, testing, or other methods. As a minimum, furnish evidence of verification for cable attenuation and bandwidth parameters.

3. In-Progress Testing: Perform standard tests for correct pair identification and termination during installation to ensure proper installation and cable placement. Perform tests in addition to those specified if there is any reason to question condition of material furnished and installed. Testing accomplished is to be documented by agency conducting tests. Submit test results for Project record.
4. Final Testing: Perform final test of installed system to demonstrate acceptability as installed. Testing shall be performed according to a test plan supplied by DDC system manufacturer. Defective Work or material shall be corrected and retested. As a minimum, final testing for cable system, including spare cable, shall verify conformance of attenuation, length, and bandwidth parameters with performance indicated.
5. Test Equipment: Use a fiber-optic time domain reflectometer for testing of length and optical connectivity.
6. Test Results: Record test results and submit copy of test results for Project record.

3.18 DDC SYSTEM I/O CHECKOUT PROCEDURES

A. Check installed products before continuity tests, leak tests and calibration.

B. Check instruments for proper location and accessibility.

C. Check instruments for proper installation on direction of flow, elevation, orientation, insertion depth, or other applicable considerations that will impact performance.

D. Check instrument tubing for proper isolation, fittings, slope, dirt legs, drains, material and support.

E. For pneumatic products, verify that air supply for each product is properly installed.

F. Control Damper Checkout:

1. Verify that control dampers are installed correctly for flow direction.
2. Verify that proper blade alignment, either parallel or opposed, has been provided.
3. Verify that damper frame attachment is properly secured and sealed.
4. Verify that damper actuator and linkage attachment is secure.
5. Verify that actuator wiring is complete, enclosed and connected to correct power source.
6. Verify that damper blade travel is unobstructed.

G. Control Valve Checkout:

1. For pneumatic valves, verify that pressure gages are provided in each air line to valve actuator and positioner.
2. Verify that control valves are installed correctly for flow direction.
3. Verify that valve body attachment is properly secured and sealed.
4. Verify that valve actuator and linkage attachment is secure.
5. Verify that actuator wiring is complete, enclosed and connected to correct power source.
6. Verify that valve ball, disc or plug travel is unobstructed.
7. After piping systems have been tested and put into service, but before insulating and balancing, inspect each valve for leaks. Adjust or replace packing to stop leaks. Replace the valve if leaks persist.

H. Instrument Checkout:

1. Verify that instrument is correctly installed for location, orientation, direction and operating clearances.
2. Verify that attachment is properly secured and sealed.
3. Verify that conduit connections are properly secured and sealed.
4. Verify that wiring is properly labeled with unique identification, correct type and size and is securely attached to proper terminals.
5. Inspect instrument tag against approved submittal.
6. For instruments with tubing connections, verify that tubing attachment is secure and isolation valves have been provided.
7. For flow instruments, verify that recommended upstream and downstream distances have been maintained.
8. For temperature instruments:

    a. Verify sensing element type and proper material.
    b. Verify length and insertion.

3.19 DDC SYSTEM I/O ADJUSTMENT, CALIBRATION AND TESTING:

A. Calibrate each instrument installed that is not factory calibrated and provided with calibration documentation.

B. Provide a written description of proposed field procedures and equipment for calibrating each type of instrument. Submit procedures before calibration and adjustment.

C. For each analog instrument, make a three-point test of calibration for both linearity and accuracy.

D. Equipment and procedures used for calibration shall comply with instrument manufacturer's written instructions.

E. Provide diagnostic and test equipment for calibration and adjustment.

F. Field instruments and equipment used to test and calibrate installed instruments shall have accuracy at least twice the instrument accuracy being calibrated. An installed instrument with an accuracy of 1 percent shall be checked by an instrument with an accuracy of 0.5 percent.

G. Calibrate each instrument according to instrument instruction manual supplied by manufacturer.

H. If after calibration indicated performance cannot be achieved, replace out-of-tolerance instruments.

I. Comply with field testing requirements and procedures indicated by ASHRAE's Guideline 11, "Field Testing of HVAC Control Components," in the absence of specific requirements, and to supplement requirements indicated.

J. Analog Signals:

1. Check analog voltage signals using a precision voltage meter at zero, 50, and 100 percent.
2. Check analog current signals using a precision current meter at zero, 50, and 100 percent.
3. Check resistance signals for temperature sensors at zero, 50, and 100 percent of operating span using a precision-resistant source.

K. Digital Signals:

1. Check digital signals using a jumper wire.
2. Check digital signals using an ohmmeter to test for contact making or breaking.

L. Control Dampers:

1. Stroke and adjust control dampers following manufacturer's recommended procedure, from 100 percent open to 100 percent closed and back to 100 percent open.
2. Stroke control dampers with pilot positioners. Adjust damper and positioner following manufacturer's recommended procedure, so damper is 100 percent closed, 50 percent closed and 100 percent open at proper air pressure.
3. Check and document open and close cycle times for applications with a cycle time less than 30 seconds.
4. For control dampers equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

M. Control Valves:

1. Stroke and adjust control valves following manufacturer's recommended procedure, from 100 percent open to 100 percent closed and back to 100 percent open.
2. Stroke control valves with pilot positioners. Adjust valve and positioner following manufacturer's recommended procedure, so valve is 100 percent closed, 50 percent closed and 100 percent open at proper air pressures.
3. Check and document open and close cycle times for applications with a cycle time less than 30 seconds.
4. For control valves equipped with positive position indication, check feedback signal at multiple positions to confirm proper position indication.

N. Meters: Check sensors at zero, 50, and 100 percent of Project design values.

O. Sensors: Check sensors at zero, 50, and 100 percent of Project design values.

P. Switches: Calibrate switches to make or break contact at set points indicated.

Q. Transmitters:

1. Check and calibrate transmitters at zero, 50, and 100 percent of Project design values.
2. Calibrate resistance temperature transmitters at zero, 50, and 100 percent of span using a precision-resistant source.

3.20 DDC SYSTEM CONTROLLER CHECKOUT

A. Verify power supply.

1. Verify voltage, phase and hertz.
2. Verify that protection from power surges is installed and functioning.
3. Verify that ground fault protection is installed.
4. If applicable, verify if connected to UPS unit.
5. If applicable, verify if connected to a backup power source.
6. If applicable, verify that power conditioning units, transient voltage suppression and high-frequency noise filter units are installed.

B. Verify that wire and cabling is properly secured to terminals and labeled with unique identification.

C. Verify that spare I/O capacity is provided.

3.21 DDC CONTROLLER I/O CONTROL LOOP TESTS

A. Testing:

1. Test every I/O point connected to DDC controller to verify that safety and operating control set points are as indicated and as required to operate controlled system safely and at optimum performance.
2. Test every I/O point throughout its full operating range.
3. Test every control loop to verify operation is stable and accurate.
4. Adjust control loop proportional, integral and derivative settings to achieve optimum performance while complying with performance requirements indicated. Document testing of each control loop's precision and stability via trend logs.
5. Test and adjust every control loop for proper operation according to sequence of operation.
6. Test software and hardware interlocks for proper operation. Correct deficiencies.
7. Operate each analog point at the following:

    a. Upper quarter of range.
    b. Lower quarter of range.
    c. At midpoint of range.

8. Exercise each binary point.
9. For every I/O point in DDC system, read and record each value at operator workstation, at DDC controller and at field instrument simultaneously. Value displayed at operator workstation, at DDC controller and at field instrument shall match.
10. Prepare and submit a report documenting results for each I/O point in DDC system and include in each I/O point a description of corrective measures and adjustments made to achieve desire results.

3.22 DDC SYSTEM VALIDATION TESTS

A. Perform validation tests before requesting final review of system. Before beginning testing, first submit Pretest Checklist and Test Plan.

B. After approval of Test Plan, execute all tests and procedures indicated in plan.

C. After testing is complete, submit completed test checklist.

D. Pretest Checklist: Submit the following list with items checked off once verified:

1. Detailed explanation for any items that are not completed or verified.
2. Required mechanical installation work is successfully completed and HVAC equipment is working correctly.
3. HVAC equipment motors operate below full-load amperage ratings.
4. Required DDC system components, wiring, and accessories are installed.
5. Installed DDC system architecture matches approved Drawings.
6. Control electric power circuits operate at proper voltage and are free from faults.
7. Required surge protection is installed.

8. DDC system network communications function properly, including uploading and downloading programming changes.
9. Using BACnet protocol analyzer, verify that communications are error free.
10. Each controller's programming is backed up.
11. Equipment, products, tubing, wiring cable and conduits are properly labeled.
12. All I/O points are programmed into controllers.
13. Testing, adjusting and balancing work affecting controls is complete.
14. Dampers and actuators zero and span adjustments are set properly.
15. Each control damper and actuator goes to failed position on loss of power.
16. Valves and actuators zero and span adjustments are set properly.
17. Each control valve and actuator goes to failed position on loss of power.
18. Meter, sensor and transmitter readings are accurate and calibrated.
19. Control loops are tuned for smooth and stable operation.
20. View trend data where applicable.
21. Each controller works properly in standalone mode.
22. Safety controls and devices function properly.
23. Interfaces with fire-alarm system function properly.
24. Electrical interlocks function properly.
25. Operator workstations and other interfaces are delivered, all system and database software is installed, and graphic are created.
26. Record Drawings are completed.

E. Test Plan:

1. Prepare and submit a validation test plan including test procedures for performance validation tests.
2. Test plan shall address all specified functions of DDC system and sequences of operation.
3. Explain detailed actions and expected results to demonstrate compliance with requirements indicated.
4. Explain method for simulating necessary conditions of operation used to demonstrate performance.
5. Include a test checklist to be used to check and initial that each test has been successfully completed.
6. Submit test plan documentation 10 business days before start of tests.

F. Validation Test:

1. Verify operating performance of each I/O point in DDC system.

    a. Verify analog I/O points at operating value.
    b. Make adjustments to out-of-tolerance I/O points.

        1) Identify I/O points for future reference.
        2) Simulate abnormal conditions to demonstrate proper function of safety devices.
        3) Replace instruments and controllers that cannot maintain performance indicated after adjustments.

2. Simulate conditions to demonstrate proper sequence of control.
3. Readjust settings to design values and observe ability of DDC system to establish desired conditions.
4. After 24 Hours following Initial Validation Test:

    a. Re-check I/O points that required corrections during initial test.

b. Identify I/O points that still require additional correction and make corrections necessary to achieve desired results.

5. After 24 Hours of Second Validation Test:

a. Re-check I/O points that required corrections during second test.
b. Continue validation testing until I/O point is normal on two consecutive tests.

6. Completely check out, calibrate, and test all connected hardware and software to ensure that DDC system performs according to requirements indicated.
7. After validation testing is complete, prepare and submit a report indicating all I/O points that required correction and how many validation re-tests it took to pass. Identify adjustments made for each test and indicate instruments that were replaced.

G. DDC System Network Bandwidth Test:

1. Test network bandwidth usage on all DDC system networks to demonstrate bandwidth usage under DDC system normal operating conditions.
2. To pass, none of DDC system networks shall use more than 70 percent of available bandwidth under normal operation.

3.23 FINAL REVIEW

A. Submit written request to Architect and Construction Manager when DDC system is ready for final review. Written request shall state the following:

1. DDC system has been thoroughly inspected for compliance with contract documents and found to be in full compliance.
2. DDC system has been calibrated, adjusted and tested and found to comply with requirements of operational stability, accuracy, speed and other performance requirements indicated.
3. DDC system monitoring and control of HVAC systems results in operation according to sequences of operation indicated.
4. DDC system is complete and ready for final review.

B. Review by Architect and Construction Manager shall be made after receipt of written request. A field report shall be issued to document observations and deficiencies.

C. Take prompt action to remedy deficiencies indicated in field report and submit a second written request when all deficiencies have been corrected. Repeat process until no deficiencies are reported.

D. Should more than two reviews be required, DDC system manufacturer and Installer shall compensate entity performing review for total costs, labor and expenses, associated with third and subsequent reviews. Estimated cost of each review shall be submitted and approved by DDC system manufacturer and Installer before making the review.

E. Prepare and submit closeout submittals when no deficiencies are reported.

F. A part of DDC system final review shall include a demonstration to parties participating in final review.

1. Provide staff familiar with DDC system installed to demonstrate operation of DDC system during final review.

2. Provide testing equipment to demonstrate accuracy and other performance requirements of DDC system that is requested by reviewers during final review.
3. Demonstration shall include, but not be limited to, the following:

    a. Accuracy and calibration of 20 I/O points randomly selected by reviewers. If review finds that some I/O points are not properly calibrated and not satisfying performance requirements indicated, additional I/O points may be selected by reviewers until total I/O points being reviewed that satisfy requirements equals quantity indicated.
    b. HVAC equipment and system hardwired and software safeties and life-safety functions are operating according to sequence of operation. Up to 20 I/O points shall be randomly selected by reviewers. Additional I/O points may be selected by reviewers to discover problems with operation.
    c. Correct sequence of operation after electrical power interruption and resumption after electrical power is restored for randomly selected HVAC systems.
    d. Operation of randomly selected dampers and valves in normal-on, normal-off and failed positions.
    e. Reporting of alarm conditions for randomly selected alarms, including different classes of alarms, to ensure that alarms are properly received by operators and operator workstations.
    f. Trends, summaries, logs and reports set-up for Project.
    g. For up to three HVAC systems randomly selected by reviewers, use graph trends to show that sequence of operation is executed in correct manner and that HVAC systems operate properly through complete sequence of operation including different modes of operations indicated. Show that control loops are stable and operating at set points and respond to changes in set point of 20 percent or more.
    h. Software's ability to communicate with controllers, operator workstations, uploading and downloading of control programs.
    i. Software's ability to edit control programs off-line.
    j. Data entry to show Project-specific customizing capability including parameter changes.
    k. Step through penetration tree, display all graphics, demonstrate dynamic update, and direct access to graphics.
    l. Execution of digital and analog commands in graphic mode.
    m. Spreadsheet and curve plot software and its integration with database.
    n. Online user guide and help functions.
    o. Multitasking by showing different operations occurring simultaneously on four quadrants of split screen.
    p. System speed of response compared to requirements indicated.
    q. For Each Network and Programmable Application Controller:

        1) Memory: Programmed data, parameters, trend and alarm history collected during normal operation is not lost during power failure.
        2) Operator Interface: Ability to connect directly to each type of digital controller with a portable operator workstation and PDA. Show that maintenance personnel interface tools perform as indicated in manufacturer's technical literature.
        3) Standalone Ability: Demonstrate that controllers provide stable and reliable standalone operation using default values or other method for values normally read over network.
        4) Electric Power: Ability to disconnect any controller safely from its power source.
        5) Wiring Labels: Match control drawings.
        6) Network Communication: Ability to locate a controller's location on network and communication architecture matches Shop Drawings.

7) Nameplates and Tags: Accurate and permanently attached to control panel doors, instrument, actuators and devices.

r. For Each Operator Workstation:

1) I/O points lists agree with naming conventions.
2) Graphics are complete.
3) UPS unit, if applicable, operates.

s. Communications and Interoperability: Demonstrate proper interoperability of data sharing, alarm and event management, trending, scheduling, and device and network management. Use ASHRAE 135 protocol analyzer to help identify devices, view network traffic, and verify interoperability**.** Requirements must be met even if only one manufacturer's equipment is installed.

1) Data Presentation: On each operator workstation, demonstrate graphic display capabilities.
2) Reading of Any Property: Demonstrate ability to read and display any used readable object property of any device on network.
3) Set Point and Parameter Modifications: Show ability to modify set points and tuning parameters indicated. Modifications are made with messages and write services initiated by an operator using workstation graphics, or by completing a field in a menu with instructional text.
4) Peer-to-Peer Data Exchange: Network devices are installed and configured to perform without need for operator intervention to implement Project sequence of operation and to share global data.
5) Alarm and Event Management: Alarms and events are installed and prioritized according to Owner. Demonstrate that time delays and other logic are set up to avoid nuisance tripping. Show that operators with sufficient privileges are permitted.
6) Schedule Lists: Schedules are configured for start and stop, mode change, occupant overrides, and night setback as defined in sequence of operations.
7) Schedule Display and Modification: Ability to display any schedule with start and stop times for calendar year. Show that all calendar entries and schedules are modifiable from any connected operator workstation by an operator with sufficient privilege.
8) Archival Storage of Data: Data archiving is handled by operator workstation and server and local trend archiving and display is accomplished.
9) Modification of Trend Log Object Parameters: Operator with sufficient privilege can change logged data points, sampling rate, and trend duration.
10) Device and Network Management:

a) Display of network device status.
b) Display of BACnet Object Information.
c) Silencing devices transmitting erroneous data.
d) Time synchronization.
e) Remote device re-initialization.
f) Backup and restore network device programming and master database(s).
g) Configuration management of routers.

3.24 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.25 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by DDC system manufacturer's authorized service representative. Include quarterly preventive maintenance, repair or replacement of worn or defective components, cleaning, calibration and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.26 SOFTWARE SERVICE AGREEMENT

A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two year(s).

B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two year(s) from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30 days to allow Owner to schedule and access system and to upgrade computer equipment if necessary.

3.27 DEMONSTRATION

A. Engage a factory-authorized service representative with complete knowledge of Project-specific system installed to train Owner's maintenance personnel to adjust, operate, and maintain DDC system.

B. Extent of Training:

1. Base extent of training on scope and complexity of DDC system indicated and training requirements indicated. Provide extent of training required to satisfy requirements indicated even if more than minimum training requirements are indicated.
2. Inform Owner of anticipated training requirements if more than minimum training requirements are indicated.
3. Minimum Training Requirements:

a. Provide not less than 20 hours of training, broken down into 3 sessions.
b. Training hours may be used (at the owner’s discretion) for any combination of general system training or programming adjustments.

C. Training Schedule:

1. Schedule training to provide Owner with at least 10 business days of notice in advance of training.

2. Training shall occur within normal business hours at a mutually agreed on time. Unless otherwise agreed to, training shall occur Monday through Friday, except on U.S. Federal holidays.
3. Provide staggered training schedule as requested by Owner.

D. Training Attendee List and Sign-in Sheet:

1. Request from Owner in advance of training a proposed attendee list with name, phone number and e-mail address.
2. Provide a preprinted sign-in sheet for each training session with proposed attendees listed and no fewer than six blank spaces to add additional attendees.
3. Preprinted sign-in sheet shall include training session number, date and time, instructor name, phone number and e-mail address, and brief description of content to be covered during session. List attendees with columns for name, phone number, e-mail address and a column for attendee signature or initials.
4. Circulate sign-in sheet at beginning of each session and solicit attendees to sign or initial in applicable location.
5. At end of each training day, send Owner an e-mail with an attachment of scanned copy (PDF) of circulated sign-in sheet for each session.

E. Training Attendee Headcount:

1. Plan in advance of training for up to five attendees.
2. Headcount may vary depending on training content covered in session. Attendee access may be restricted to some training content for purposes of maintaining system security.

F. Attendee Training Manuals:

1. Provide each attendee with a color hard copy of all training materials and visual presentations.
2. Hard-copy materials shall be organized in a three-ring binder with table of contents and individual divider tabs marked for each logical grouping of subject matter. Organize material to provide space for attendees to take handwritten notes within training manuals.
3. In addition to hard-copy materials included in training manual, provide each binder with a sleeve or pocket that includes a DVD or flash drive with PDF copy of all hard-copy materials.

G. Instructor Requirements:

1. One or multiple qualified instructors, as required, to provide training.
2. Instructors shall have not less than five years of providing instructional training on not less than five past projects with similar DDC system scope and complexity to DDC system installed.

H. Organization of Training Sessions:

1. Organize training sessions into logical groupings of technical content and to reflect different levels of operators having access to system. Plan training sessions to accommodate the following three levels of operators:

    a. Daily operators.
    b. Advanced operators.
    c. System managers and administrators.

2. Plan and organize training sessions to group training content to protect DDC system security. Some attendees may be restricted to some training sessions that cover restricted content for purposes of maintaining DDC system security.

I. On-Site Training:

1. Instructor shall provide training materials, projector and other audiovisual equipment used in training.
2. Provide as much of training located on-site as deemed feasible and practical by Owner.
3. On-site training shall include regular walk-through tours, as required, to observe each unique product type installed with hands-on review of operation, calibration and service requirements.
4. Operator workstation provided with DDC system shall be used in training.

J. Training Content for Daily Operators:

1. Basic operation of system.
2. Understanding DDC system architecture and configuration.
3. Understanding each unique product type installed including performance and service requirements for each.
4. Understanding operation of each system and equipment controlled by DDC system including sequences of operation, each unique control algorithm and each unique optimization routine.
5. Operating operator workstations, printers and other peripherals.
6. Logging on and off system.
7. Accessing graphics, reports and alarms.
8. Adjusting and changing set points and time schedules.
9. Recognizing DDC system malfunctions.
10. Understanding content of operation and maintenance manuals including control drawings.
11. Understanding physical location and placement of DDC controllers and I/O hardware.
12. Accessing data from DDC controllers.
13. Operating portable operator workstations.
14. Review of DDC testing results to establish basic understanding of DDC system operating performance and HVAC system limitations as of Substantial Completion.
15. Running each specified report and log.
16. Displaying and demonstrating each data entry to show Project-specific customizing capability. Demonstrating parameter changes.
17. Stepping through graphics penetration tree, displaying all graphics, demonstrating dynamic updating, and direct access to graphics.
18. Executing digital and analog commands in graphic mode.
19. Demonstrating control loop precision and stability via trend logs of I/O for not less than 10 percent of I/O installed.
20. Demonstrating DDC system performance through trend logs and command tracing.
21. Demonstrating scan, update, and alarm responsiveness.
22. Demonstrating spreadsheet and curve plot software, and its integration with database.
23. Demonstrating on-line user guide, and help function and mail facility.
24. Demonstrating multitasking by showing dynamic curve plot, and graphic construction operating simultaneously via split screen.
25. Demonstrating the following for HVAC systems and equipment controlled by DDC system:

    a. Operation of HVAC equipment in normal-off, -on and failed conditions while observing individual equipment, dampers and valves for correct position under each condition.

b. For HVAC equipment with factory-installed software, show that integration into DDC system is able to communicate with DDC controllers or gateways, as applicable.
c. Using graphed trends, show that sequence of operation is executed in correct manner, and HVAC systems operate properly through complete sequence of operation including seasonal change, occupied and unoccupied modes, warm-up and cool-down cycles and other modes of operation indicated.
d. Hardware interlocks and safeties function properly and DDC system performs correct sequence of operation after electrical power interruption and resumption after power is restored.
e. Reporting of alarm conditions for each alarm, and confirm that alarms are received at assigned locations, including operator workstations.
f. Each control loop responds to set point adjustment and stabilizes within time period indicated.
g. Sharing of previously graphed trends of all control loops to demonstrate that each control loop is stable and set points are being maintained.

K. Training Content for Advanced Operators:

1. Making and changing workstation graphics.
2. Creating, deleting and modifying alarms including annunciation and routing.
3. Creating, deleting and modifying point trend logs including graphing and printing on an ad-hoc basis and operator-defined time intervals.
4. Creating, deleting and modifying reports.
5. Creating, deleting and modifying points.
6. Creating, deleting and modifying programming including ability to edit control programs off-line.
7. Creating, deleting and modifying system graphics and other types of displays.
8. Adding DDC controllers and other network communication devices such as gateways and routers.
9. Adding operator workstations.
10. Performing DDC system checkout and diagnostic procedures.
11. Performing DDC controllers operation and maintenance procedures.
12. Performing operator workstation operation and maintenance procedures.
13. Configuring DDC system hardware including controllers, workstations, communication devices and I/O points.
14. Maintaining, calibrating, troubleshooting, diagnosing and repairing hardware.
15. Adjusting, calibrating and replacing DDC system components.

L. Training Content for System Managers and Administrators:

1. DDC system software maintenance and backups.
2. Uploading, downloading and off-line archiving of all DDC system software and databases.
3. Interface with Project-specific, third-party operator software.
4. Understanding password and security procedures.
5. Adding new operators and making modifications to existing operators.
6. Operator password assignments and modification.
7. Operator authority assignment and modification.
8. Workstation data segregation and modification.

M. Video of Training Sessions:

1. Provide a digital video and audio recording of each training session. Create a separate recording file for each session.
2. Stamp each recording file with training session number, session name and date.

3. Provide Owner with two copies of digital files on flash drives for later reference and for use in future training.
4. Owner retains right to make additional copies for intended training purposes without having to pay royalties.

END OF SECTION 230923

SECTION 271513 – COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes, but is not limited to:

1. Category 6A horizontal cabling
2. Faceplates and connectors/modular jacks
3. Horizontal cabling patch panels.
4. Patch cables.
5. Installation and termination of all horizontal cabling
6. Testing of all horizontal cabling

B. Related sections include the following:

1. Division 26 – Electrical
2. Division 27 – Communications
3. Division 28 – Electronic safety and security

1.2 DESCRIPTION OF WORK

A. The Contractor shall provide, install, and test a complete communications copper horizontal cabling system that shall provide interconnections between Main Cross Connect/Equipment Room (MC/ER) or Technology Rooms (TR's), and the telecommunications outlet. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, patch panels, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.

1. Bridged taps and splices shall not be installed in the horizontal cabling.

B. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.3 QUALITY ASSURANCE

A. The Communications Copper Horizontal Cabling System components and equipment shall be listed by Underwriters Laboratories, Inc., and the components shall bear the UL label.

B. The Communications Copper Horizontal Cabling System shall be installed in accordance with all requirements set by all applicable standards, codes, and regulations including but not limited to the standards referenced in Section 270500 – Common Work Results for Communications.

C. All equipment and installation practices shall comply with the latest BICSI (TDMM) standards.

D. Installer shall employ or have a contract with a Registered Communications Distribution Designer (RCDD) registered with the Building Industries Consulting Services International (BICSI).

E. Installer must have personnel certified by BICSI on staff.

1. Installation Supervision: Installation shall be under the direct supervision of ITS Technician
2. Field Inspector: Currently registered by BICSI as an RCDD to perform the on-site inspection.

1.4 SUBMITTALS

A. Refer to Section 270500 – Common Work Results for Communications for more information.

B. The contractor must submit a labeling scheme to the Engineer for approval as part of the submittal documentation. The labeling scheme shall include the cable, faceplate, and patch panel identification. Labeling installed without the Engineers approval will be subject to removal.

C. Submittals shall be submitted in electronic format (PDF).

1.5 CLOSEOUT DOCUMENTATION

A. Refer to Section 270500 – Common Work Results for Communications for more information.

B. Closeout documentation shall be submitted in electronic format (PDF).

1.6 WARRANTY

A. All components, parts, and assemblies of the Communications Copper Horizontal Cabling System supplied by the installer shall be guaranteed against defects in materials and workmanship for a period of 20 years by the manufacturer and installer.

B. Warranties shall include all labor, material, travel expenses, test equipment, equipment rental and any other expense required to troubleshoot, remove, repair or replace equipment or components to bring the system up to the original performance criteria and operation.

C. Warranty services shall be provided by an installer certified by the equipment manufacturer during normal business hours.

D. Provide warranty certificate as part of the closeout documentation.

1.7 TRAINING

A. Refer to Section 270500 – Common Work Results for Communications for more information.

B. Provide four (4) training hours for the Communications Copper Horizontal Cabling System.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Communications copper horizontal cabling system cabling and connectivity component manufacturers shall work in agreement to provide a complete channel solution. The solution shall be warranted as indicated herein.

2.2 NOT USED

2.3 NOT USED

2.4 NOT USED

2.5 NOT USED

2.6 CATEGORY 6A COPPER HORIZONTAL CABLING

A. The copper horizontal cable shall be four unshielded twisted pair (UTP), 23 AWG, solid bare CU, FEP insulation for all 4 pairs.

B. Cable shall be certified to meet transmission characteristics of Category 6A cable at frequencies up to 500 MHz.

C. Standard: Comply with ANSI/TIA-568.2-D for Category 6a cables.

D. Conductors: 100-ohm, 23 AWG solid copper.

E. Shielding/Screening: Unshielded twisted pairs (UTP).

F. Cable Rating: Plenum.

G. Pair twisting shall be maintained to meet the cable performance but, maximum category cable untwisting allowed is one half (1/2) inch, cable diameter .2-inch.

H. Approved manufacturers:

1. Belden – 10GXS
2. General – GenSPEED 10 - 7141819
3. Superior Essex - 6A-272-xB, x = color
4. Leviton RDT
5. Hubbell – C6ASPDSx x = color

2.7 NOT USED

2.8 MODULAR DATA JACK

A. The modular data jack shall be a flush mounted RJ-45 jack to fit into a modular faceplate installed in a one or two gang junction box, surface mounted raceway, or floorboxes.

B. General Requirements for Twisted Pair Cable Hardware:

1. Comply with the performance requirements of Category 6a.
2. Comply with ANSI/TIA-568.2-D, IDC type, with modules designed for punch-down caps or lacing tools.
3. Cables shall be terminated with connecting hardware of same category or higher.

C. Approved manufacturers:

	Panduit	Leviton	Belden	Ortronics	Hubbell
Category 6A	NK6X88Mxx	6110G-R*6	RVAMJKUxx	KT2J6A-xx	NSJU6Axx

2.9 MODULAR FACEPLATE

A. The modular faceplate shall be a single or double gang flush mounted faceplate as indicated on the drawings.

B. Modular faceplate shall fit standard NEMA openings.

C. Provide blank inserts for all unused openings in the modular faceplates.

D. Color of the modular faceplate shall be Office White or as selected by the Engineer. Confirm color in submittals prior to purchasing.

E. Approved manufacturers:

1. Panduit – CBE series
2. Leviton – Multimedia Outlet System (MOS) series
3. Belden – MediaFlex
4. Ortronics – KSFPx series
5. Hubbell – iStation series

2.10 MODULAR PATCH PANELS

A. Provide 24 or 48 modular port flat patch panels for termination of the UTP cabling as indicated on the drawings.

B. Provide 24 modular data jacks for each 24 port patch panels and 48 modular jacks for each 48 port patch panel.

C. General Requirements for Modular Patch Panels:
1. Comply with the performance requirements of Category 6.
2. Comply with ANSI/TIA-568.2-D, IDC type, with modules designed for punch-down caps or tools.
3. Cables shall be terminated with connecting hardware of same category or higher.

D. Approved manufacturers:

	Panduit	Leviton	Belden	Ortronics	Hubbell
24 port	NKPP24FMY	49255-H24	AX103114	SPKFU24	NSPJ24
48 port	NKPP48FMY	49255-H48	AX103115	SPKFU48	NSPJ48

2.11 PATCH CABLES

A. Provide factory made, four-pair patch cables terminated with an eight-position modular plug at each end for each horizontal cable run indicated on the drawings.

1. Provide 10 foot patch cable for each horizontal cable run at each telecommunications outlet end.
2. Provide 50% 3 foot patch cables, 30% 5 foot patch cables, and 20% 7 foot patch cables for each horizontal cable run at the patch panel end.

B. Patch cable shall be the same category of the horizontal cabling run.

C. Approved manufacturers:

1. Panduit
2. Leviton
3. Belden
4. Ortronics
5. Hubbell

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide all components for the communications copper horizontal cabling system as specified herein and as shown on the drawings.

B. The communications copper horizontal cabling system shall be installed in accordance with TIA standards-based recommendations, the manufacturer's recommendations/installation guides, and industry best practices.

C. The communications copper horizontal cabling system shall be installed using a star topology, extending from the TR or MC/ER to individual telecommunications outlets.

D. The installer shall install the communications copper horizontal cabling so that the maximum cable length is 295 feet. It is the installers responsibility to ensure that each cable run falls within the required parameters.

E. Refer to Section 270500 – Common Work Results for Communications for more information on colors of modular data jacks, cabling, and patch panels.

F. Terminate the modular data jacks per the manufacturer's recommendations. Cabling shall be terminated to the modular RJ-45 jacks in the faceplate and the patch panels as indicated in ANSI/TIA-568 wiring configuration T568B.

1. Wiring Color Scheme:

Wire Pair	Color	8-Position T568B
1 Tip	White - Blue	5
1 Ring	Blue	4
2 Tip	White - Orange	1
2 Ring	Orange	2
3 Tip	White - Green	3
3 Ring	Green	6
4 Tip	White - Brown	7
4 Ring	Brown	8

G. The pulling tension of any communications copper horizontal cable shall not exceed 25 lbf.

H. Cables shall be installed so that there are no bends smaller than 4 times the OD of the cable at any point in the run or at the termination points.

I. Cables shall be installed in continuous lengths from origin to destination.

J. Where cables are installed in an air return plenum, any non-plenum cable shall not be installed.

K. Provide a 3 foot service loop at each jack location and a 15 foot service loop for each cable in the TR or MC/ER.

L. All service loops shall be properly supported.

M. Cables shall not be attached to ceiling grid or lighting fixture wires. Do not use cable ties or hook-and-loop tape to secure cable runs to other building systems such as electrical conduit, Electric Metallic Tube (EMT), sprinkler pipes, ceiling suspension members.

N. Where support for horizontal cable is required, the installer shall install appropriate carriers to support the cabling.

O. Any cables that are damaged or exceeding the recommended installation parameters during installation shall be replaced by the installer at no cost to the owner.

P. Any cabling that is painted shall be replaced at no cost to the owner.

Q. General installation requirements for cabling:

1. Comply with TIA-568.1-D and TIA-568.2-D.
2. Install 110-style IDC termination hardware unless otherwise indicated.
3. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
4. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.

5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
7. Bundle and lace conductors to terminal points without exceeding manufacturer's limitations on bending radius, but not less than the radius specified in BICSI TDMM. Use lacing bars and distribution spools.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

R. Separation from EMI Sources:

1. Comply with recommendations from BICSI's TDMM and TIA-569-D for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in non-metallic raceways and unshielded power conductors and electrical equipment shall be as follows:

   a. Electrical Equipment Rating Less Than 2kVA: A minimum of (5”) five inches.
   b. Electrical Equipment Rating between 2 and 5kVA: A minimum of (12”) twelve inches.
   c. Electrical Equipment Rating More Than 5kVA: A minimum of (24”) twenty-four inches.

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

   a. Electrical Equipment Rating less than 2KVA: A minimum of (2-1/2”) two and one-half inches.
   b. Electrical Equipment Rating between 2 and 5KVA: A minimum of (6”) six inches.
   c. Electrical Equipment Rating More Than 5KVA: A minimum of (12”) twelve inches.

4. Separation between Communications Cables and Fluorescent Fixtures: A minimum of (5”) five inches.

3.2 LABELING

A. Identify system components, wiring, and cabling complying with ANSI/TIA-606-C and coordinate with the Engineer and Owner.

B. Cables shall be identified by a self-adhesive, wrap around label at both ends. The cable label shall be applied to the cable behind the faceplate, on a section of cable that can be accessed by removing the cover plate.

C. Provide label on the outside of each face plate in the provided space behind plastic label holder.

D. Provide label for each patch panel port in the provided space behind plastic label holder.

E. All labels shall be typed and printed. Handwritten labels will not be accepted.

F. Refer to technology drawings for more information on labeling.

G. Refer to specification section 270553 – Identification for Communications Systems for more information.

3.3 FIRESTOPPING

A. Comply with TIA-569-D, Annex A, "Firestopping."

B. Comply with "Firestopping Systems" Article in BISCI's TDMM.

3.4 TESTING

A. Perform tests and inspections for all the installed communications copper horizontal cabling system.

B. Tests and Inspections:

1. Visually inspect twisted pair cabling jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments and inspect cabling connections for compliance with ANSI/TIA-568-D series standards.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test each horizontal cable run, patch panel, and patch cable to verify the performance of the channel warranty for the horizontal cabling systems as defined in ANSI/TIA-1152-A.

    a. Each horizontal cable run shall be tested for length, continuity, insertion loss, return loss, PSNEXT, PSACR-N, and PSACR-F.
    b. All test results shall meet or exceed the latest ANSI/TIA-568-D series performance standards for the category of cabling tested.

C. Installer shall configure the tester for the cable and connectors used in the installation. Generic test parameters will not be accepted.

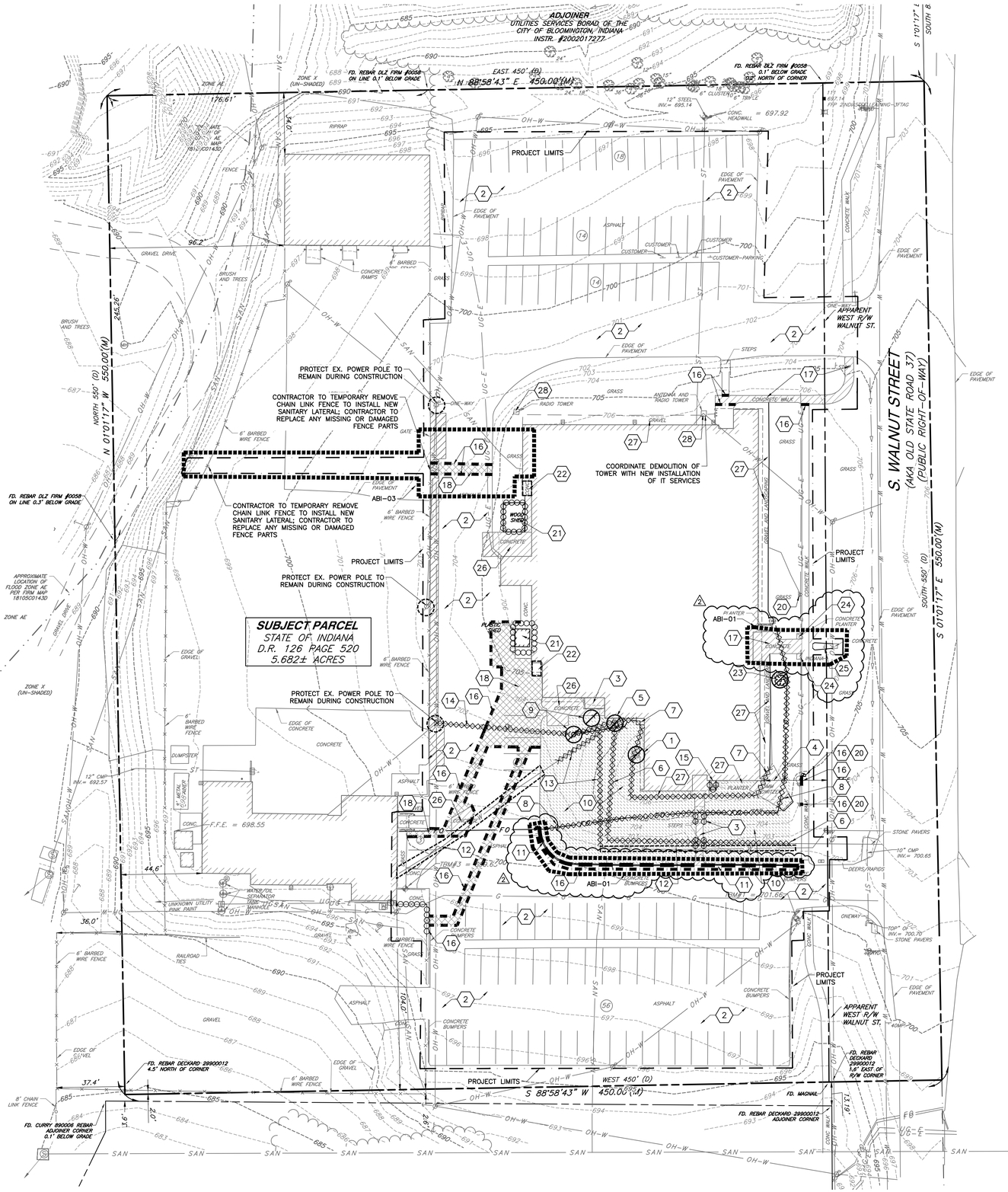
D. Installer shall confirm the tester being used has been factory calibrated within the previous 12 months and that they are using the latest factory software. This information shall be provided with the testing results.

E. Remove and replace cabling where test results indicate that they do not comply with specified requirements.

F. End-to-end cabling will be considered defective if it does not pass tests and inspections.

G. Provide final test results in PDF format. No special software shall be required to review the test results.

END OF SECTION 271513



GENERAL SITE LAYOUT NOTES:

1. THE CONTRACTOR SHALL CHECK EXISTING GRADES, DIMENSIONS, AND INVERTS IN THE FIELD AND REPORT ANY DISCREPANCIES TO THE OWNER'S REPRESENTATIVE PRIOR TO BEGINNING WORK.
2. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES, INCLUDING IRRIGATION LINES. TAKE CARE TO PROTECT UTILITIES THAT ARE TO REMAIN. RELOCATE EXISTING UTILITIES AS INDICATED, OR AS NECESSARY FOR CONSTRUCTION.
3. PROVIDE A SMOOTH TRANSITION BETWEEN EXISTING PAVEMENT AND NEW PAVEMENT. FIELD ADJUSTMENT OF FINAL GRADES MAY BE NECESSARY. INSTALL ALL UTILITIES, INCLUDING IRRIGATION SLEEVING, PRIOR TO INSTALLATION OF PAVED SURFACES.
4. SITE WORK CONCRETE WALKS AND PADS SHALL HAVE A BROOM FINISH TO ALL SURFACES. SITE WORK CONCRETE SHALL BE CLASS A (4,000 PSI @ 28 DAYS) UNLESS OTHERWISE NOTED.
5. ALL DAMAGE TO EXISTING PAVEMENT TO REMAIN WHICH RESULTS FROM THE CONTRACTOR'S OPERATIONS SHALL BE REPLACED WITH LIKE MATERIALS AT THE CONTRACTOR'S EXPENSE.
6. SITE DIMENSIONS SHOWN ARE TO THE FACE OF CURB, OR EDGE OF PAVEMENT UNLESS OTHERWISE NOTED.
7. CONTRACTOR SHALL MAINTAIN ONE SET OF AS-BUILT / RECORD DRAWINGS ON THE JOB SITE DURING CONSTRUCTION FOR DISTRIBUTION TO THE OWNER AND/OR OWNER'S REPRESENTATIVE UPON COMPLETION.
8. REFER TO THE ARCHITECTURAL DRAWINGS FOR EXACT DIMENSIONS AND LOCATIONS OF UTILITY SERVICE ENTRY LOCATIONS AND PRECISE BUILDING DIMENSIONS.
9. THIS SITE LAYOUT IS SPECIFIC TO THE APPROVALS NECESSARY FOR THE CONSTRUCTION IN ACCORDANCE WITH THE CITY OF BLOOMINGTON. NO CHANGES TO THE SITE LAYOUT ARE ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER. CHANGES MADE TO THE SITE LAYOUT WITHOUT APPROVAL IS SOLELY THE RESPONSIBILITY OF THE CONTRACTOR. CHANGES INCLUDE BUT ARE NOT LIMITED TO, INCREASED IMPERVIOUS PAVEMENT, ADDITION / DELETION OF PARKING SPACES, MOVEMENT OF CURB LINES, CHANGES TO DRAINAGE STRUCTURES AND PATTERNS, LANDSCAPING, ETC.

DEMOLITION LEGEND:

- EXISTING TREES/LANDSCAPING/LAWN TO BE REMOVED.
- CONCRETE TO BE REMOVED
- ASPHALT TO BE REMOVED
- FULL DEPTH SAW CUT
- EXISTING CONCRETE CURB TO BE REMOVED
- EXISTING UTILITY TO BE REMOVED
- MISC. ITEM TO BE REMOVED
- MISC. ITEM TO BE REMOVED
- PROTECT EXISTING ITEM

DEMOLITION ITEMS:

1. EXISTING AC UNIT AND CONCRETE BASE TO BE REMOVED COMPLETE; DISPOSE OF OFF-SITE
2. EXISTING ASPHALT TO HAVE CRACKS FILLED AND SEAL COATED. RE-STRIPE PER SHEET C200 AFTER SEALING.
3. EXISTING CONCRETE STEPS, RETAINING WALLS AND HANDRAILS TO BE REMOVED COMPLETE; DISPOSE OF OFF-SITE.
4. EXISTING CONCRETE AND BASE, LANDSCAPING AND BRICK, AND PLAQUE TO BE REMOVED; DISPOSE OF CONCRETE AND BASE, AND LANDSCAPING AND BRICK OFF-SITE. RETURN PLAQUE TO OWNER.
5. EXISTING GAS METER TO BE REMOVED. COORDINATE WITH GAS UTILITY FOR RELOCATION.
6. EXISTING UNDERGROUND GAS LINE TO BE REMOVED/RELOCATED. COORDINATE WITH MEP AND GAS UTILITY FOR RELOCATION.
7. EXISTING UNDERGROUND ELECTRIC LINE TO BE REMOVED/RELOCATED. COORDINATE WITH MEP AND ELECTRIC UTILITY.
8. EXISTING FIBER OPTIC TO BE REMOVED/RELOCATED. COORDINATE WITH MEP AND FIBER OPTIC UTILITY.
9. EXISTING POWER POLE AND GUY WIRE TO BE REMOVED; DISPOSE OF OFF-SITE. COORDINATE WITH MEP AND UTILITY PROVIDER.
10. EXISTING GRASS AND SOIL TO BE REMOVED COMPLETE; DISPOSE OF OFF-SITE. PROTECT EXISTING STRUCTURE. COORDINATE DEPTH OF SOIL EXCAVATION WITH STRUCTURAL PLANS.
11. EXISTING CONCRETE CURB TO BE REMOVED; DISPOSE OF OFF-SITE.
12. EXISTING WATER LINE TO BE PROTECTED DURING CONSTRUCTION.
13. EXISTING WATER LINE TO BE REMOVED. COORDINATE WITH MEP AND WATER UTILITY PROVIDER.
14. EXISTING OVERHEAD LINE TO BE REMOVED. COORDINATE DISCONNECT WITH MEP AND UTILITY PROVIDER.
15. EXISTING STONE WALL AND PLANTER TO BE REMOVED COMPLETE; DISPOSE OF OFF-SITE.
16. FULL DEPTH SAW CUT
17. EXISTING CONCRETE SIDEWALK AND BASE TO BE REMOVED; DISPOSE OF OFF-SITE.
18. EXISTING ASPHALT PAVEMENT AND BASE TO BE REMOVED; DISPOSE OF OFF-SITE.
19. EXISTING FLAG POLE AND BASE TO BE REMOVED; IF SALVAGEABLE, RETURN TO OWNER, IF NOT, DISPOSE OF OFF-SITE.
20. EXISTING GROUND LIGHT AND BASE TO BE REMOVED; DISPOSE OF OFF-SITE.
21. EXISTING PORTABLE SHED, CONCRETE PAD, CONCRETE PAVERS, AND BASE TO BE REMOVED; DISPOSE OF OFF-SITE.
22. EXISTING CONCRETE PAD AND BASE TO BE PROTECTED DURING CONSTRUCTION.
23. EXISTING TREE/ SHRUB TO BE REMOVED; DISPOSE OF OFF-SITE.
24. EXISTING LIMESTONE PLANTERS TO BE REMOVED; DISPOSE OF OFF-SITE.
25. EXISTING SIGN, STONE MULCH & PAVERS TO BE REMOVED; DISPOSE OF OFF-SITE.
26. EXISTING CONCRETE PAVEMENT TO BE REMOVED; DISPOSE OF OFF-SITE.
27. EXISTING SHRUBS, STONE MULCH AND STEEL EDGING TO BE REMOVED; DISPOSE OF OFF-SITE.
28. EXISTING RADIO TOWER & CONCRETE PAD TO BE REMOVED; DISPOSE OF OFF-SITE.
29. REMOVE SECTION OF CHAIN LINK FENCE TO INSTALL TRANSFORMER; DISPOSE OF OFF-SITE.

REFERENCE

1. CONTRACTOR SHALL REFER TO OTHER PLANS WITHIN THIS CONSTRUCTION SET FOR OTHER PERTINENT INFORMATION. IT IS NOT THE ENGINEER'S INTENT THAT ANY SINGLE PLAN SHEET IN THE SET OF DOCUMENTS FULLY DEPICT ALL WORK ASSOCIATED WITH THE PROJECT.
2. TOPOGRAPHIC SURVEY COMPLETE BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: 335-329, DATED: NOVEMBER 21, 2023

SCALE IN FEET
0 30' 60'

FOR BIDDING PURPOSES ONLY

Indiana 811 Know what's below. Call before you dig.

* HAND SIGNATURE ON FILE

AARON C. HURT REGISTERED NO PE10300059 STATE OF INDIANA PROFESSIONAL ENGINEER
Aaron C Hurt 05/23/2024

REVISION RECORD

NO	DATE	DESCRIPTION
1	09/06/2024	ADDENDUM #1
2	09/20/2024	ADDENDUM #2

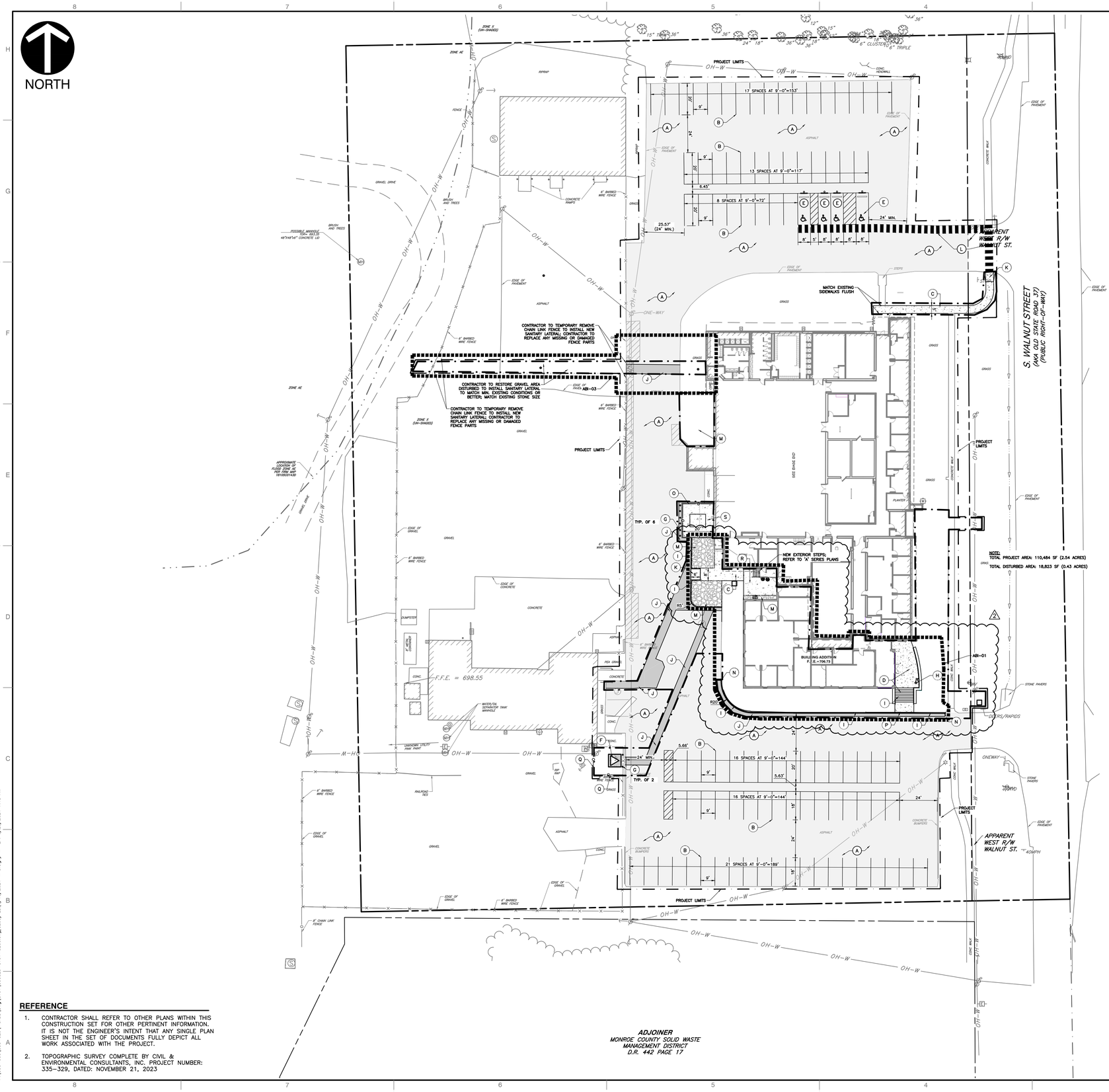
Civil & Environmental Consultants, Inc.
530 E. Ohio Street
Suite G
Indianapolis, IN 46204
Ph: 317.655.7777
www.cecinc.com

STUDIO M
ARCHITECTURE & PLANNING, LLC
BLOOMINGTON READINESS CENTER MODERNIZATION
3380 S. WALNUT STREET
BLOOMINGTON, INDIANA 47401

DEMOLITION PLAN

DATE:	MAY 23, 2024
DWG SCALE:	1" = 30'
PROJECT NO:	335-329
DRAWN BY:	JCB
CHECKED BY:	BRF
APPROVED BY:	ACH

DRAWING NO.: C101



GENERAL SITE LAYOUT NOTES:

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SITE LEGEND:

- PROPOSED CRACK FILLING, RESEALING ASPHALT PAVEMENT, AND RE-STRIPING
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE PAVEMENT
- PROPOSED ADA PARKING SYMBOL, PARKING BUMPER, SIGN, DETECTABLE WARNING STRIP
- PROPOSED LIGHT POLE BASE

SITE KEY NOTES:

(A) EXISTING ASPHALT TO HAVE CRACKS FILLED, SEAL COATED, AND RE-STRIPED.
(B) 4" WIDE PAINTED STRIPING; COLOR: WHITE. TYPICAL FOR ALL STRIPING SHOWN EXCEPT FOR ACCESSIBLE PARKING
(C) CONCRETE SIDEWALK; SEE DETAIL 207 & 208 ON SHEET C800
(D) CONCRETE WALK, AND STEPS WITH HANDRAILS; RETAINING WALL REQUIRED. SEE GRADING PLAN FOR ELEVATIONS; REFER TO ARCHITECTURAL PLANS FOR DESIGN.
(E) ACCESSIBLE PARKING SPACE WITH CONCRETE WHEEL STOP, SIGNAGE, AND PAINTED BLUE ICON AND STRIPING; SEE DETAILS 211, 212, 214-216 ON SHEET C800
(F) TRANSFORMER CONCRETE PAD PER POWER COMPANY DETAILS AND SPECIFICATIONS
(G) NEW 6"ø PIPE BOLLARD. SEE DETAIL 213 ON SHEET C800.
(H) NEW FLAG POLES. SEE DETAIL 217 ON SHEET C801.
(I) CONCRETE CURB; SEE DETAIL 205 & 206 ON SHEET C800.
(J) NEW HEAVY DUTY ASPHALT PAVEMENT; SEE DETAIL 201 ON SHEET C800.
(K) ACCESSIBLE RAMP SEE DETAIL 219 ON SHEET C801.
(L) ACCESSIBLE CROSSING ROUTE; SEE DETAIL 218 ON SHEET C801.
(M) STONE MULCH; REFER TO DETAIL ON SHEET C701.
(N) CONCRETE CURB TAPER; REFER TO DETAIL 210 ON SHEET C800.
(O) NEW CHAIN LINK FENCE ENCLOSURE W/ GATE; REFER TO DETAIL UFC-700 ON SHEET C801.
(P) COMBINED WALK AND CURB; REFER TO DETAIL 209 ON SHEET C800.
(Q) NEW CHAIN LINK FENCE W/ 3 STRAND BARBED WIRE; REFER TO DETAIL UFC-700 ON SHEET C801.
(R) 6" CONCRETE PAVEMENT SEE DETAIL 204 ON SHEET C800
(S) NEW MECHANICAL EQUIPMENT CONCRETE PAD PER POWER COMPANY DETAILS AND SPECIFICATIONS

REFERENCE

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* HAND SIGNATURE ON FILE

AARON C. HURT REGISTERED NO PE10300058 STATE OF INDIANA PROFESSIONAL ENGINEER
Aaron C Hurt 05/23/2024

REVISION RECORD

NO	DATE	DESCRIPTION
1	06/06/2024	ADDENDUM #1
2	06/20/2024	ADDENDUM #2

530 E. Ohio Street
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Indianapolis, IN 46204
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Civil & Environmental Consultants, Inc.

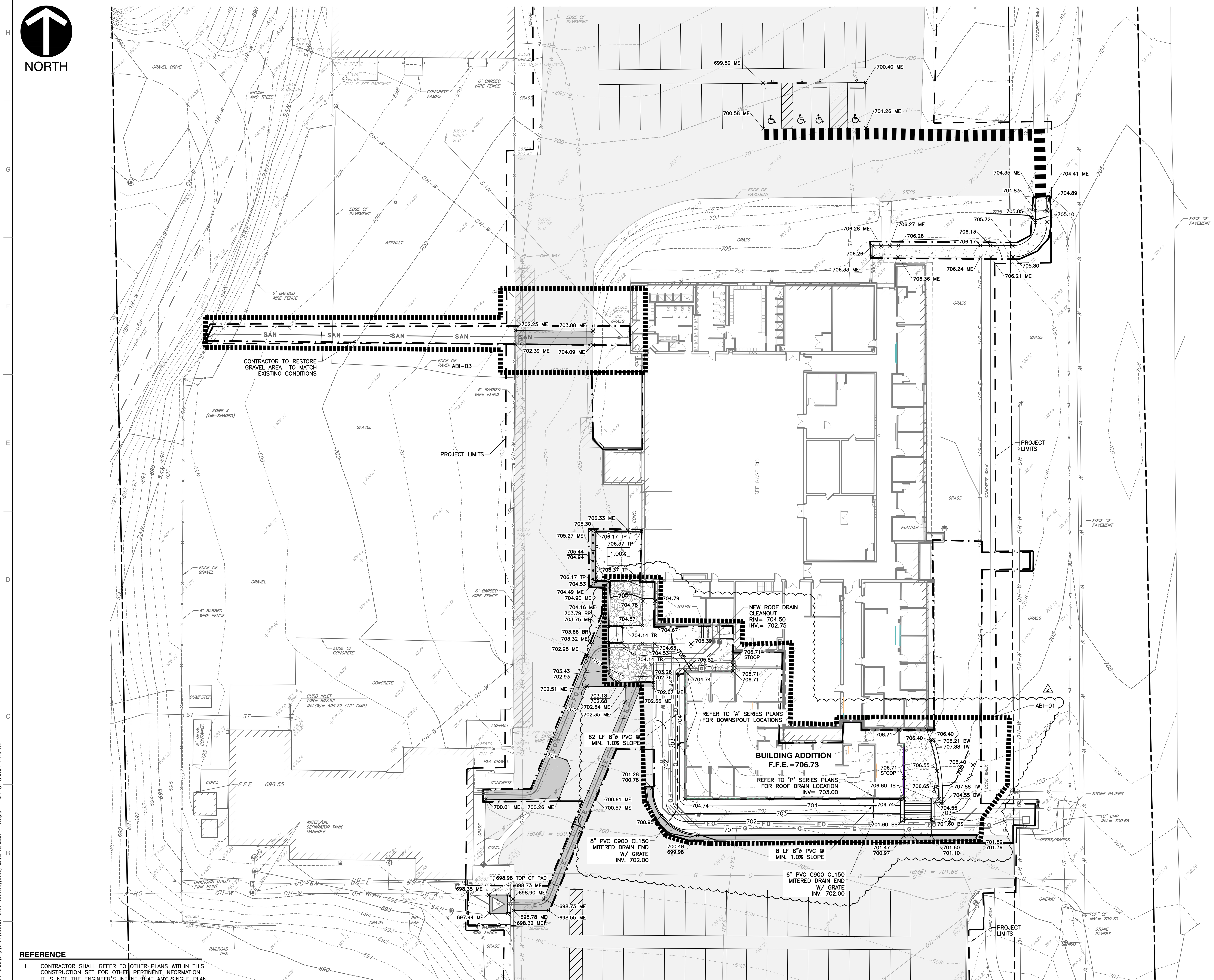
STUDIO M
ARCHITECTURE & PLANNING, LLC
BLOOMINGTON READINESS CENTER MODERNIZATION
3380 S. WALNUT STREET
BLOOMINGTON, INDIANA 47401

SITE LAYOUT PLAN

DRAWN BY:	JCB
CHECKED BY:	BRF
PROJECT NO:	335-329
APPROVED BY:	ACH
DATE:	MAY 23, 2024
DWG SCALE:	1" = 20'

DRAWING NO.:
C200

P:\335-000\335-329\-CAD\Dwg\C101\335329-C101-C200.dwg(C200) LS(6/19/2024 - Map) - JF, 6/20/2024 7:48 AM



REFERENCE

1. CONTRACTOR SHALL REFER TO OTHER PLANS WITHIN THIS CONSTRUCTION SET FOR OTHER PERTINENT INFORMATION. IT IS NOT THE ENGINEER'S INTENT THAT ANY SINGLE PLAN SHEET IN THE SET OF DOCUMENTS FULLY DEPICT ALL WORK ASSOCIATED WITH THE PROJECT.
2. TOPOGRAPHIC SURVEY COMPLETE BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC. PROJECT NUMBER: 335-329, DATED: NOVEMBER 21, 2023

GENERAL GRADING NOTES:

1. CONTRACTOR SHALL STRICTLY ADHERE TO THE EROSION CONTROL MEASURES PREPARED FOR THIS PROJECT.
2. EARTHWORK SHALL INCLUDE CLEARING AND GRUBBING, STRIPPING AND STOCKPILING TOPSOIL, MASS GRADING, EXCAVATION, FILLING, UNDER CUT AND REPLACEMENT, IF REQUIRED, AND COMPACTION.
3. CONTRACTOR TO REFILL UNDERCUT AREAS WITH SUITABLE MATERIAL AND COMPACT AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
4. PLACE TOPSOIL OVER THE SUBGRADE OF UNPAVED, DISTURBED AREAS TO A DEPTH INDICATED ON THE LANDSCAPE PLANS (6" MINIMUM). PAVEMENT SLOPES ACROSS ACCESSIBLE PARKING STALLS AND ADJOINING ACCESS AISLES SHALL BE MAXIMUM 2%.
5. ALL SLOPES SHALL BE 3:1 (HORIZONTAL:VERTICAL) MAXIMUM UNLESS NOTED OTHERWISE.
6. ALL AREAS NOT PAVED SHALL BE STABILIZED IN ACCORDANCE WITH THE EROSION CONTROL PLAN, UNLESS NOTED OTHERWISE.
7. ALL EXCESS SOIL MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE DESIGNATED SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF OFFSITE AT NO ADDITIONAL COST TO THE OWNER IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS.
8. DRAINAGE SYSTEMS SHALL BE INSPECTED DURING CONSTRUCTION BY A REGISTERED PROFESSIONAL ENGINEER OR LAND SURVEYOR. WITHIN 30 DAYS AFTER COMPLETION OF ON AND OFF–SITE DRAINAGE FACILITIES, THE REGISTERED PROFESSIONAL SHALL CERTIFY IN WRITING THE COMPLIANCE OF THE DRAINAGE FACILITIES PER LOCAL REQUIREMENTS.
9. CONTRACTOR SHALL PERPETUATE ALL DRAINS AND TILES ENCOUNTERED DURING CONSTRUCTION. COORDINATE WITH ENGINEER OF RECORD REGARDING THE CONNECTION TO THE PROPOSED STORM SEWER SYSTEM.
10. STORM STRUCTURES RECEIVING SUB–SURFACE DRAINS (SSD) SHALL HAVE BOTH CONNECTIONS CORE DRILLED. T OR Y BLIND CONNECTIONS ARE NOT ALLOWED.

GRADING LEGEND:

800	EXISTING INDEX CONTOUR
798	EXISTING INTERMEDIATE CONTOUR
800	PROPOSED INDEX CONTOUR
798	PROPOSED INTERMEDIATE CONTOUR
	PROPOSED DRAINAGE SWALE
	PROPOSED GRADE BREAK
	PROPOSED STORM SEWER LINE
	PROPOSED UNDERDRAIN
766.90	PROPOSED SPOT ELEVATION
798.50 / 798.00	PROPOSED CURB SPOT ELEVATION; TOP OF CURB ON TOP, GUTTER ELEVATION ON BOTTOM

ABBREVIATIONS:
TC = TOP OF CURB
BC = BOTTOM OF CURB
TR = TOP OF RAMP
BR = BOTTOM OF RAMP
ME = MATCH EXISTING
TP = TOP OF PAD

FLOOD NOTE:

THE PARCEL DESCRIBED AND SHOWN HEREIN LIES WITHIN ZONES "X" (UN–SHADED) AND ZONE AE, AS SAID PARCEL PLOTS ON MAP NUMBERS 18105C0143D (DATED DECEMBER 17, 2010) AND 18105C0231D (DATED DECEMBER 17, 2010) OF THE FLOOD INSURANCE RATE MAPS FOR THE CITY OF BLOOMINGTON, MONROE COUNTY, INDIANA. THE ACCURACY OF THIS FLOOD HAZARD STATEMENT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE REFERENCED FLOOD INSURANCE RATE MAP.

UTILITY NOTE:

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN–SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH THE SURVEYOR DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES. INDIANA 811 ONE–CALL PUBLIC UTILITY LOCATE SERVICE TICKET NUMBER 2310172633 WAS ISSUED FOR THIS SITE.

PRIOR TO ANY EXCAVATION FOR UNDERGROUND UTILITIES, THE CONTRACTOR SHALL EXPOSE AND VERIFY LOCATIONS (HORIZONTAL AND VERTICAL) OF ALL EXISTING UTILITIES INCLUDING BUT NOT LIMITED TO GAS, WATER, AND SANITARY SEWER. ANY CONFLICTS SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER AND THE APPROPRIATE AUTHORITIES.

BENCHMARKS:

UNLESS OTHERWISE NOTED, ELEVATIONS SHOWN HEREON ARE BASED UPON AN OPUS SOLUTION AND ARE ON THE 1988 NORTH AMERICAN VERTICAL DATUM (NAVD88) (GEOID 18). IT IS MY OPINION THAT THE UNCERTAINTY IN THE ELEVATION OF THE PROJECT BENCHMARK DOES NOT EXCEED 0.10 FOOT.

TBM#1: MAGNAIL SET IN NORTHWEST CORNER OF LIGHT POLE BASE LOCATED ON SOUTH SIDE OF SOUTH ENTRY DRIVEWAY 78'± SOUTHEAST OF SOUTHEAST CORNER OF MAIN BUILDING.
ELEV. = 701.66

TBM#2: MAGNAIL SET IN TOP CENTER OF DRAINAGE HEADWALL LOCATED 10' NORTH OF NORTH PARKING LOT AND 31'± NORTHWEST OF POWER POLE AT NORTHWEST CORNER OF PARKING LOT.
ELEV. = 697.92

TBM#3: MAGNAIL SET IN CURB LOCATED 8'± NORTHEAST OF SOUTHEAST CORNER OF SOUTHWEST BUILDING.
ELEV. = 699.65

SCALE IN FEET
0 20' 40'

FOR BIDDING PURPOSES ONLY

Indiana 811 Know what's below. Call before you dig.

HAND SIGNATURE ON FILE

AARON C. HURT REGISTERED No. PE10300058 STATE OF INDIANA PROFESSIONAL ENGINEER

Aaron C Hurt 05/23/2024

REVISION RECORD

NO	DATE	DESCRIPTION
1	06/08/2024	ADDENDUM #1
2	06/20/2024	ADDENDUM #2

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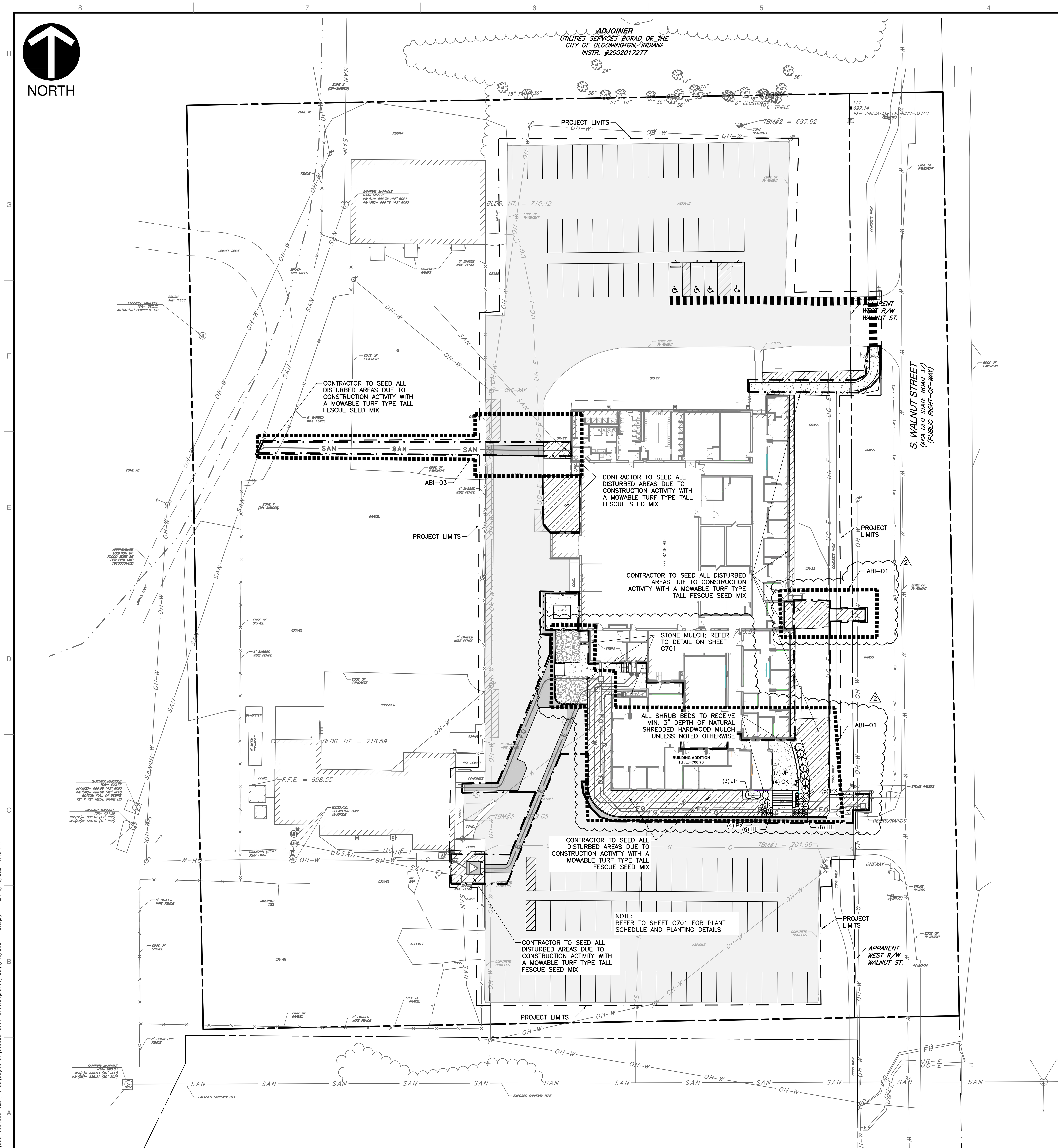
GRADING AND DRAINAGE PLAN

DATE:	MAY 23, 2024	DRAWN BY:	JCB
DWG SCALE:	1"= 20'	CHECKED BY:	BRF
PROJECT NO:	335-329		
APPROVED BY:	ACH		

DRAWING NO.:
C300



PLANTING SOIL PREPARATION NOTES:

1. BEFORE MIXING, CLEAN TOPSOIL OF ROOTS, PLANTS, SODS, STONES, CLAY LUMPS, AND OTHER EXTRANEOUS MATERIALS HARMFUL TO PLANT GROWTH.
2. MIX SOIL AMENDMENTS AS SPECIFIED ON PLANTING DETAILS. MIX FERTILIZERS WITH TOPSOIL AT RATES INDICATED. DELAY MIXING FERTILIZER IF PLANTING DOES NOT FOLLOW PLACING OF PLANTING SOIL WITHIN A FEW DAYS.
3. FOR TREE PIT OR TRENCH BACKFILL, MIX PLANTING SOIL BEFORE BACKFILLING AND STOCKPILE AT SITE.

   PROVIDE SPECIFIED FERTILIZER AT A RATE OF:

   SHADE TREE: 2 POUNDS PER INCH OF CALIPER
   SMALL TREE: 1 POUND PER INCH OF CALIPER

4. FOR PLANTING BEDS, MIX PLANTING SOIL EITHER PRIOR TO PLANTING OR APPLY ON SURFACE OF TOPSOIL AND MIX THOROUGHLY BEFORE PLANTING.

   APPLY SPECIFIED COMMERCIAL FERTILIZER AT RATES AND THOROUGHLY MIX INTO UPPER 2" OF TOPSOIL. PROVIDE SPECIFIED FERTILIZER AT THE FOLLOWING RATES:

   SHRUBS: 1/4 POUND PER FOOT HEIGHT OR SPREAD

   EVERGREENS: 1/8 POUND PER FOOT HEIGHT OR SPREAD
   HERBACEOUS PLANTS: 1/8 POUND PER PLANT.

5 FOR PARKING LOT ISLANDS EXCAVATE MIN. 24" DEPTH TO REMOVE ALL CONSTRUCTION DEBRIS. BACKFILL WITH BLENDED MIX OF 60% TOPSOIL, 305 COMPOST AND 10% SAND MIX. COMPACT BACKFILL IN 8" LIFTS TO PREVENT SETTLING AFTER PLANT INSTALLATION.

6. GROUNDCOVER AND PERENNIAL PLANT BED PREPARATION: TILL SOIL IN BEDS TO A MINIMUM DEPTH OF 8" AND MIX WITH SPECIFIED FERTILIZERS. USED FERTILIZER AT A RATE OF 2 POUNDS PER 100 SQ.FT.

7. FINAL GRADING AND PLACEMENT OF TOPSOIL FOR TURF & PLANTING AREAS:
   A. LOOSEN SUBGRADE AND TURF AREAS TO A MINIMUM DEPTH OF 4"– 6". REMOVE STONES MEASURING OVER 1–1/2" IN ANY DIMENSION. REMOVE STICKS, ROOTS, RUBBISH AND OTHER EXTRANEOUS MATTER. LIMIT PREPARATION TO AREAS WHICH WILL BE PLANTED PROMPTLY AFTER PREPARATION.
   B. SPREAD TOPSOIL TO MINIMUM DEPTH REQUIRED TO MEET LINES, GRADES, AND ELEVATIONS SHOWN, AFTER LIGHT ROLLING AND NATURAL SETTLEMENT.
   C. MINIMUM DEPTH OF TOPSOIL SHALL BE 4" UNLESS OTHERWISE INDICATED. IN TREE AND SHRUB PLANTING AREAS THERE SHALL BE 18"–24" TOPSOIL AROUND THE PLANT, AT LEAST IN AN AREA EQUAL TO THE PLANT'S MATURE CANOPY SIZE.
   D. PLACE APPROXIMATELY1/2 OF TOTAL AMOUNT OF TOPSOIL REQUIRED. WORK INTO TOP OF LOOSENED SUBGRADE TO CREATE A TRANSITION LAYER AND THEN PLACE REMAINDER OF TOPSOIL.
   E. ALL TURF AREAS ADJACENT TO WALKS, CONTRACTOR TO HOLD SOIL DOWN 1" FROM PAVEMENT ELEVATION.
   F. AREAS ADJACENT TO STRUCTURES AND CURB ISLANDS, SHALL BE FREE OF GRAVEL AND DEBRIS, LOOSE COMPACTED HARDPAN– MIN. DEPTH OF 18" BEFORE PLACEMENT OF TOPSOIL.

GENERAL LANDSCAPE NOTES:

1. ALL CONSTRUCTION METHODS AND MATERIALS MUST CONFORM TO CURRENT STANDARDS AND SPECIFICATIONS OF THE FEDERAL, STATE, COUNTY, CITY, OR LOCAL REQUIREMENTS, WHICHEVER HAS JURISDICTION.
2. CONTRACTOR SHALL REQUEST UTILITY LOCATIONS PRIOR TO COMMENCEMENT OF WORK. VERIFY ALL EXISTING UTILITIES AND CONDITIONS PRIOR TO ANY EXCAVATION AT LEAST 72 HOURS PRIOR TO LANDSCAPE INSTALLATION.
3. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS IN THE FIELD PRIOR TO THE START OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FIELD DIMENSIONS AND ELEVATIONS DURING THE ENTIRE CONSTRUCTION SCHEDULE. IF ANY DISCREPANCIES ARE FOUND IN THESE PLANS FROM ACTUAL FIELD DIMENSIONS, THE CONTRACTOR SHALL CONTACT THE ENGINEER IMMEDIATELY.
4. CONTRACTOR SHALL MAINTAIN ONE SET OF AS–BUILT/RECORD DRAWINGS ON THE JOB SITE DURING CONSTRUCTION FOR DISTRIBUTION TO THE OWNER AND/OR OWNER'S REPRESENTATIVE UPON COMPLETION.
5. NO CHANGES TO THE SITE LANDSCAPE LAYOUT ARE ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE LANDSCAPE ARCHITECT.
6. CONTRACTOR SHALL SUPPLY ALL PLANT MATERIALS IN QUALITY AND QUANTITIES SUFFICIENT TO COMPLETE THE PLANTING AS SHOWN ON DRAWINGS. PLANT MATERIAL DELIVERED TO SITE SHALL BE STORED IN SECURE LOCATION NOT IN CONFLICT WITH OTHER CONSTRUCTION OPERATIONS AND MAINTAINED UNTIL TIME OF INSTALLATION.
7. ALL MATERIAL SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE CURRENT "AMERICAN ASSOCIATION OF NURSERY STOCK. ANSI Z60.1–2004", PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMAN.
8. NO PLANT SHALL BE PUT INTO THE GROUND BEFORE ROUGH GRADING HAS BEEN FINISHED AND APPROVED.
9. ALL PLANTS SHALL BE PLANTED SO THAT THE ROOT CROWN IS PLANTED AT GRADE LEVEL.
10. ALL PLANTS SHALL BE BALLED AND WRAPPED OR CONTAINER GROWN AS SPECIFIED. NO CONTAINER GROWN STOCK WILL BE ACCEPTED IF IT IS ROOT BOUND. ALL ROOT WRAPPING MATERIAL MADE OF SYNTHETICS OR PLASTICS SHALL BE REMOVED AT THE TIME OF PLANTING. TWINE OR ROPE SHALL BE REMOVED FROM AROUND CROWN OF TRUNK TO PREVENT GIRDLING OF TREE OR SHRUB.
11. WITH CONTAINER GROWN STOCK, THE CONTAINER SHALL BE REMOVED AND THE CONTAINER BALL SHALL BE CUT THROUGH THE SURFACE IN TWO VERTICAL LOCATIONS.
12. CONTRACTOR TO REMOVE ALL LANDSCAPE DEBRIS FROM PLANTING OPERATIONS FROM THE PROJECT SITE. NO OPEN BURNING SHALL BE PERMITTED ON SITE.
13. THE DAY PRIOR TO PLANTING, THE LOCATIONS OF ALL TREES AND SHRUBS SHALL BE STAKED AND PLANTING BEDLINE OUTLINES DEFINED FOR APPROVAL BY OWNER(S).
14. THE LANDSCAPE CONTRACTOR SHALL REFER TO CONTRACT SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
15. THE LANDSCAPE CONTRACTOR SHALL GUARANTEE NEW PLANT MATERIAL THROUGH ONE (1) CALENDAR YEAR FROM THE TIME OF SUBSTANTIAL COMPLETION OF PROJECT. AT THE END OF THIS PERIOD, ANY PLANT MATERIAL DEEMED UNSATISFACTORY BY LANDSCAPE ARCHITECT SHALL BE REPLACED AT NO ADDITIONAL COST TO OWNER.
16. IF THERE IS A DISCREPANCY BETWEEN THE PLANS AND THE PLANT SCHEDULE, THE PLANS SHALL TAKE PRECEDENCE.
17. CONTRACTOR SHALL REPAIR ANY DAMAGE TO PROPERTY FROM PLANTING OPERATIONS AT NO COST TO OWNER.
18. STAKES AND OR GUY WIRES SHALL BE REMOVED AFTER ONE (1) YEAR OF INSTALLATION.
19. ALL EXISTING LANDSCAPING SHALL BE MAINTAINED DURING CONSTRUCTION. ANY MATERIAL DEEMED DEAD OR UNSATISFACTORY BY LANDSCAPE ARCHITECT, WILL BE REPLACED EQUIVALENT IN SIZE AND SHAPE AT NO COST TO OWNER.
20. IF PLANT SPECIES SPECIFIED ARE FOUND TO BE UNAVAILABLE OR NOT IN SUFFICIENT QUANTITIES AT TIME OF PLANTING, THE CONTRACTOR MAY SUBSTITUTE SPECIES UPON WRITTEN APPROVAL BY LANDSCAPE ARCHITECT.
21. LANDSCAPING SHALL BE SUBSTANTIALLY INSTALLED PRIOR TO THE ISSUANCE OF OCCUPANCY PERMIT FOR THE PRINCIPAL STRUCTURE ON LOT, WEATHER PERMITTING, OR, IN THE EVENT OF ADVERSE WEATHER CONDITIONS, WITHIN NINETY (90) DAYS FOLLOWING THE COMMENCEMENT OF THE NEXT SUCCESSIVE PLANTING SEASON FOLLOWING ISSUANCE OF OCCUPANCY PERMIT.
22. ALL LANDSCAPE PLANTINGS TO BE MAINTAINED BY CONTRACTOR FOR 60 DAYS FOLLOWING FINAL INSPECTION BY LANDSCAPE ARCHITECT. MAINTENANCE TO INCLUDE WATERING, WEED REMOVAL, MULCHING, MOWING AND ALL OTHER NECESSARY OPERATIONS REQUIRED FOR PROPER ESTABLISHMENT OF PLANTINGS AND TURF AREAS.

FLOOD NOTE:

THE PARCEL DESCRIBED AND SHOWN HEREIN LIES WITHIN ZONES "X" (UN–SHADED) AND ZONE AE, AS SAID PARCEL PLOTS ON MAP NUMBERS 18105C0143D (DATED DECEMBER 17, 2010) AND 18105C0231D (DATED DECEMBER 17, 2010) OF THE FLOOD INSURANCE RATE MAPS FOR THE CITY OF BLOOMINGTON, MONROE COUNTY, INDIANA. THE ACCURACY OF THIS FLOOD HAZARD STATEMENT IS SUBJECT TO MAP SCALE UNCERTAINTY AND TO ANY OTHER UNCERTAINTY IN LOCATION OR ELEVATION ON THE REFERENCED FLOOD INSURANCE RATE MAP.

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ELEV. = 699.65

SCALE IN FEET
0 30' 60'

Indiana 811
Know what's below. Call before you dig.

HAND SIGNATURE ON FILE

AARON C. HURT
REGISTERED
No. PE10300058
STATE OF INDIANA
PROFESSIONAL ENGINEER

Aaron C Hunt 05/23/2024

REVISION RECORD

NO	DATE	DESCRIPTION
1	06/08/2024	ADDENDUM #1
2	06/20/2024	ADDENDUM #2

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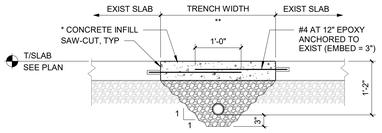
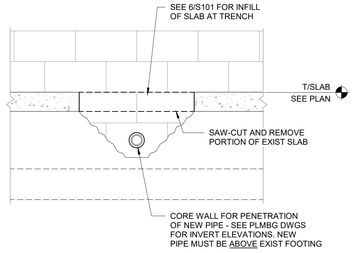
LANDSCAPE PLAN

DATE:	MAY 23, 2024	DRAWN BY:	BRF
DWG SCALE:	1"= 30'	CHECKED BY:	BRF
PROJECT NO:	335-329		
APPROVED BY:	ACH		

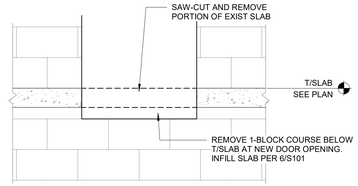
DRAWING NO.:
C700



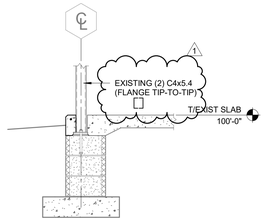
6 TYPICAL SECTION AT TRENCH FOR NEW UNDERSLAB PIPING
3/4" = 1'-0"



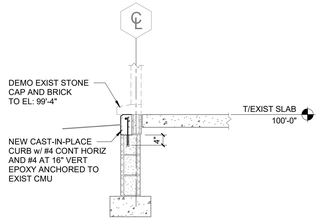
7 TYPICAL PIPE PENETRATION THRU EXIST FOUNDATION WALL
3/4" = 1'-0"



8 TYPICAL SECTION AT NEW DOOR IN EXISTING CMU WALL
3/4" = 1'-0"



5 FOUNDATION SECTION
1/2" = 1'-0"



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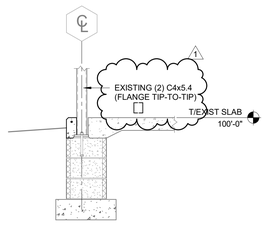
1/2" = 1'-0"



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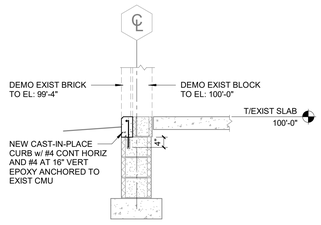
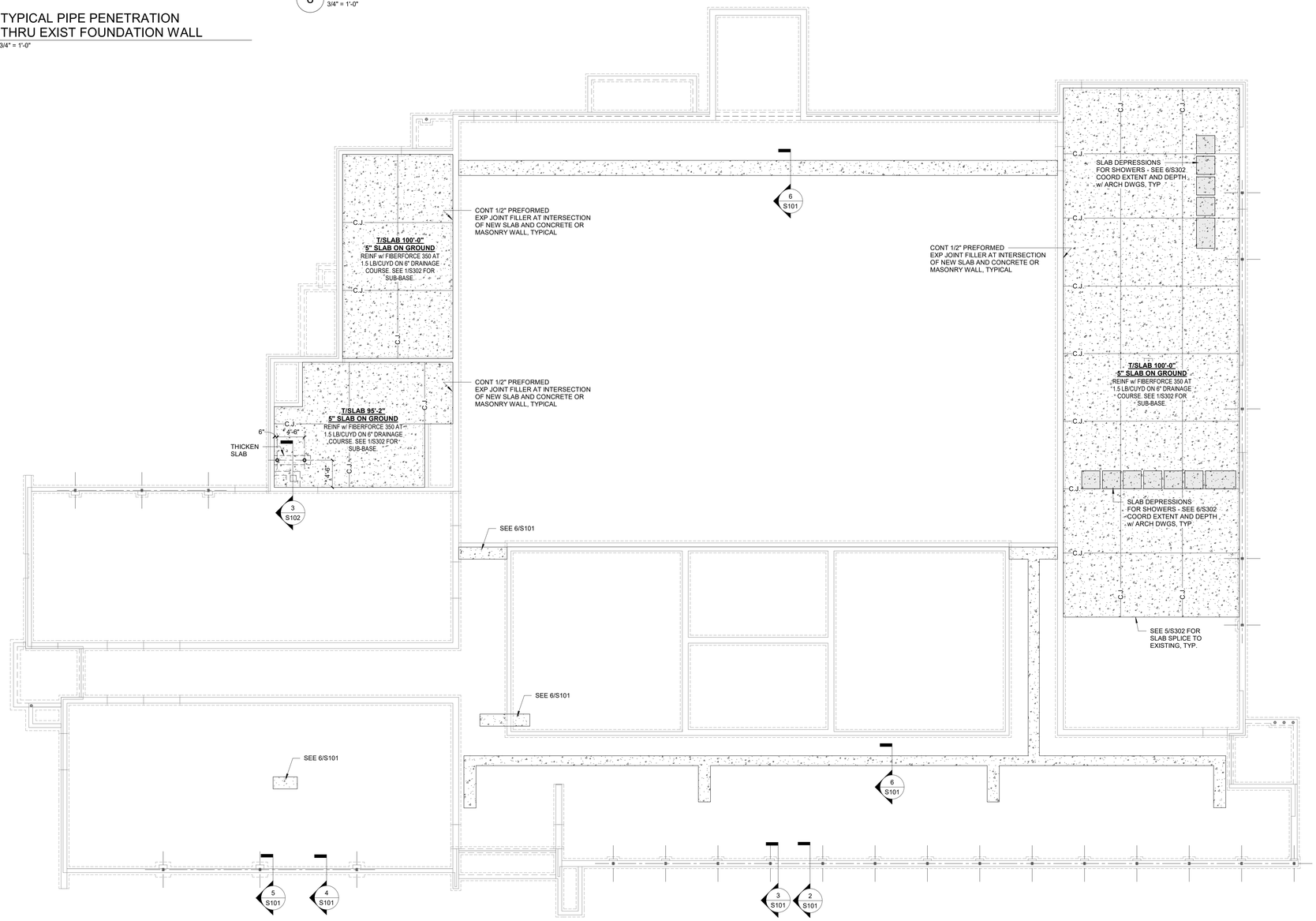
1/2" = 1'-0"



2 FOUNDATION SECTION
1/2" = 1'-0"



1 FOUNDATION PLAN - BASE BID
1/8" = 1'-0"

STUDIO M
ARCHITECTURE & PLANNING

275 Veterans Way
Carmel, Indiana 46032
317.810.1502

Architect / Structural Engineer

Indiana Army National Guard
711 North Pennsylvania St.
Tyndall Armory
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Client Information

Consultant Information

Consultant Information

BLOOMINGTON READINESS CENTER MODERNIZATION

3330 S. Walnut St.
Bloomington, IN 47401

Project Information

#	DESCRIPTION	DATE
1	Addendum 01	6/20/2024

Revisions

JUSTIN HOLMES REGISTERED No. AR11500183 STATE OF INDIANA ARCHITECT

BID DOCUMENTS

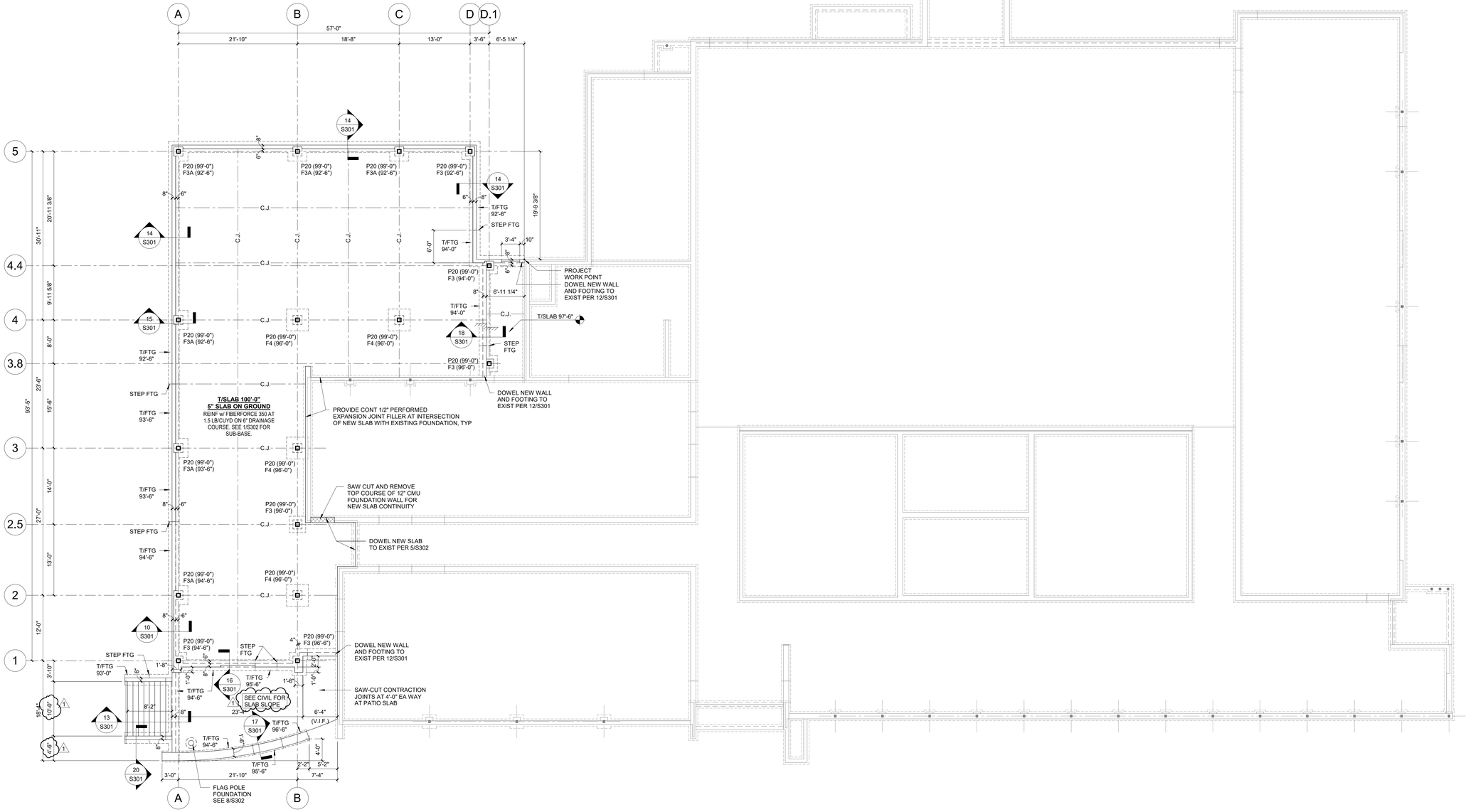
5.23.2024
23043

Project Status

FOUNDATION PLAN - BASE BID

Base Bid

S101



1 FOUNDATION PLAN - ABI-1
1/8" = 1'-0"

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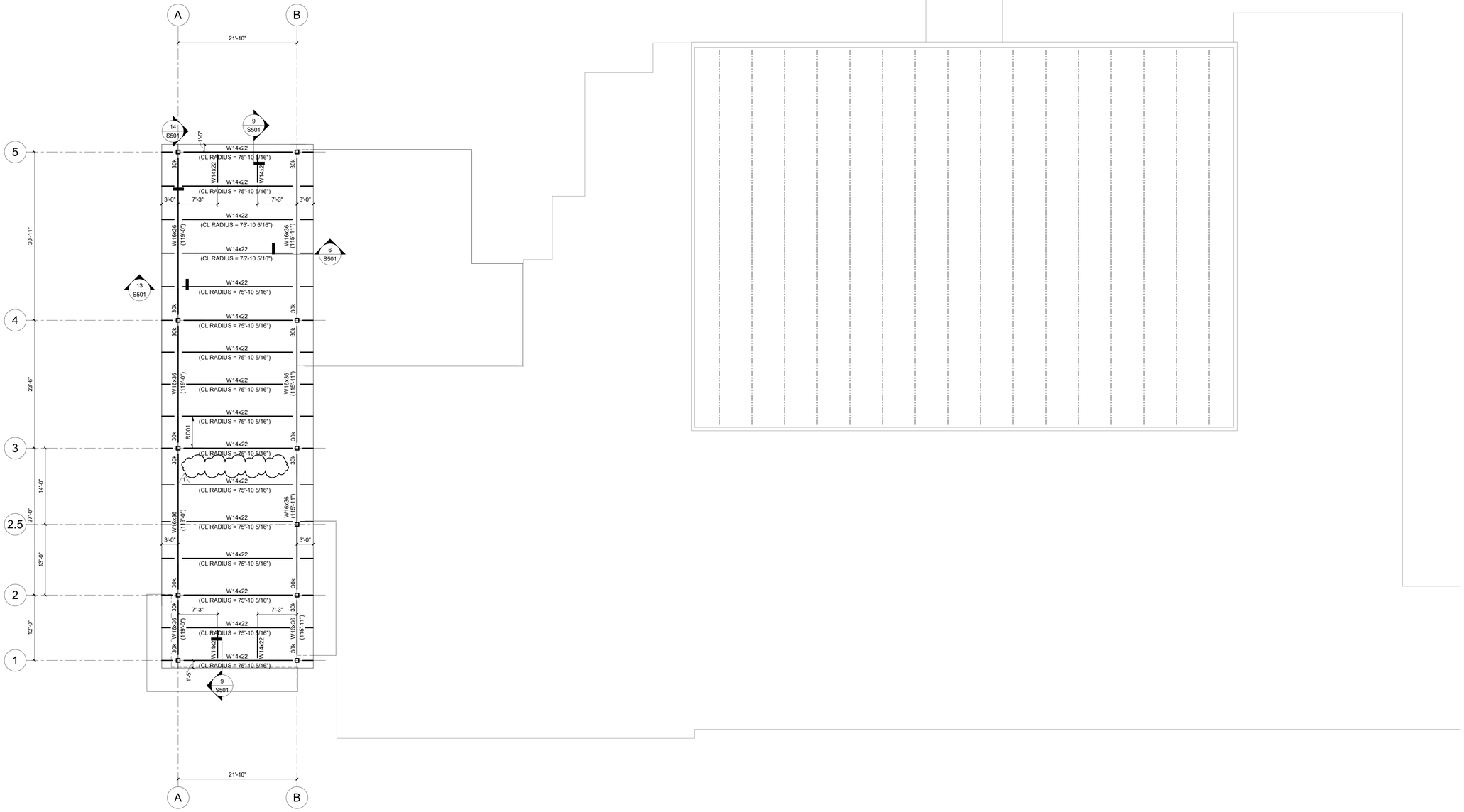
FOUNDATION PLAN - ABI-1

ABI 1

S101.1



1 ROOF FRAMING PLAN - ABI-1
1/8" = 1'-0"

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1	Addendum 01	6/20/2024

Revisions

JUSTIN HOLMES REGISTERED No. AR11500183 STATE OF INDIANA ARCHITECT

BID DOCUMENTS

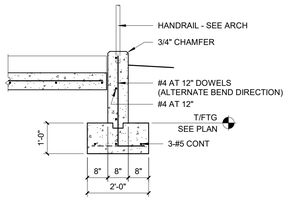
5.23.2024
23043

Project Status

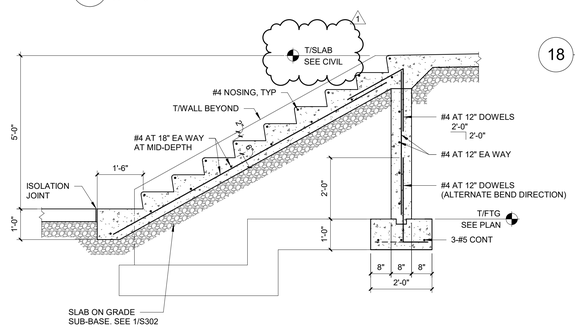
ROOF FRAMING PLAN - ABI-1

ABI 1

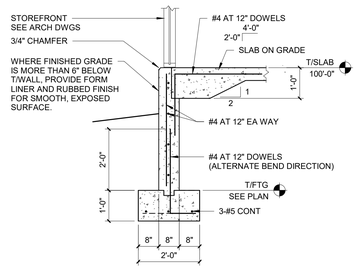
S103.1



20 SECTION AT EXTERIOR STAIR WALL
1/2" = 1'-0"

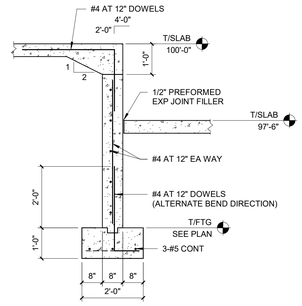


13 SECTION AT EXTERIOR CONCRETE STAIR ON GRADE
1/2" = 1'-0"

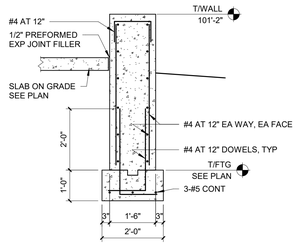


NOTE: SEE ARCHITECTURAL DRAWINGS FOR FOUNDATION INSULATION REQUIREMENTS

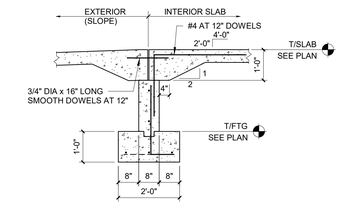
10 TYPICAL FOUNDATION WALL AT EXTERIOR STOREFRONT (AB1)
1/2" = 1'-0"



18 SECTION AT STEPPED SLAB
1/2" = 1'-0"

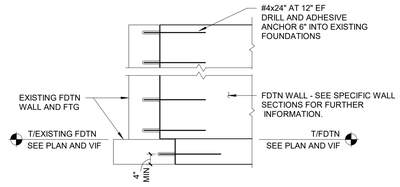


17 SECTION AT CURVED SEATING WALL (AB1)
1/2" = 1'-0"



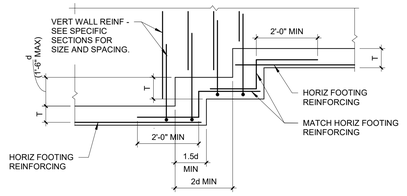
NOTE: SEE ARCHITECTURAL DRAWINGS FOR FOUNDATION INSULATION REQUIREMENTS

16 TYPICAL SLAB CONDITION AT EXTERIOR DOOR (AB1)
1/2" = 1'-0"

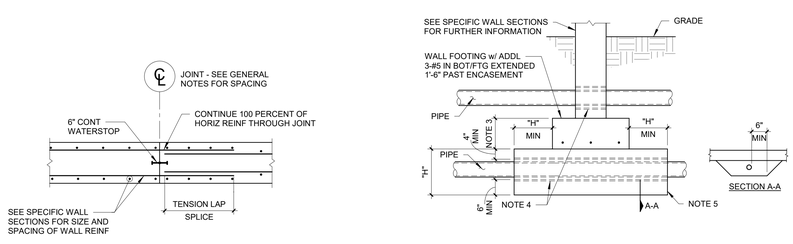


NOTES:
1. ALIGN BOTTOM OF NEW AND EXISTING FOOTINGS. STEP FOOTING AND WALL AS REQUIRED PER TYPICAL DETAILS.
2. EXTEND NEW FOUNDATIONS DOWN TO THE MINIMUM DEPTH.

12 FOUNDATION SPLICE TO EXISTING
1/2" = 1'-0"

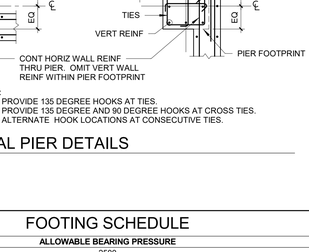


9 TYPICAL STEPPED WALL FOOTING
1/2" = 1'-0"



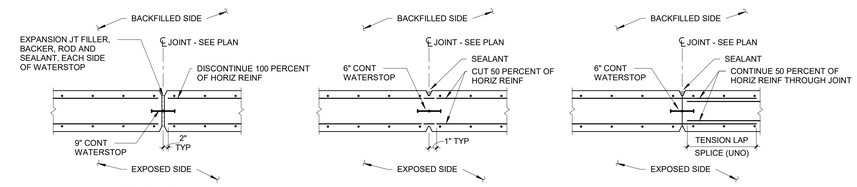
NOTES:
1. WATERSTOP REQUIRED FOR SUB-GRADE WALLS RETAINING BACKFILL MATERIAL. OMIT OTHERWISE.
2. ROUGHEN FIRST POUR TO A 1/4" AMPLITUDE OR FORM THE JOINT WITH A STAY-IN-PLACE PERFORATED METAL BULKHEAD TO ACHIEVE THE SAME RESULT.

11 TYPICAL WALL CONSTRUCTION JOINT
1/2" = 1'-0"



NOTES:
1. DO NOT PLACE PIPE TRENCH BELOW COLUMN FOOTINGS.
2. DO NOT PLACE PIPE TRENCH BELOW WALL FOOTINGS IF PIPE RUNS PARALLEL WITH WALL.
3. NO PIPES WITHIN FTG DEPTH. STEP FTG DOWN BELOW PIPE IF ELEVATION CONFLICT.
4. SLEEVES TO BE 1" CLEAR AROUND PIPE. WRAP PIPE W/ COMPRESSIBLE MATERIAL.
5. PLACE CONCRETE FILL AROUND SLEEVE PRIOR TO POURING FOUNDATION.
6. DIMENSIONS NOTED ARE MINIMUM. IF DIMENSIONS CONFLICT WITH DIMENSIONS GIVEN ELSEWHERE, COMPLY WITH MORE STRINGENT REQUIREMENT.

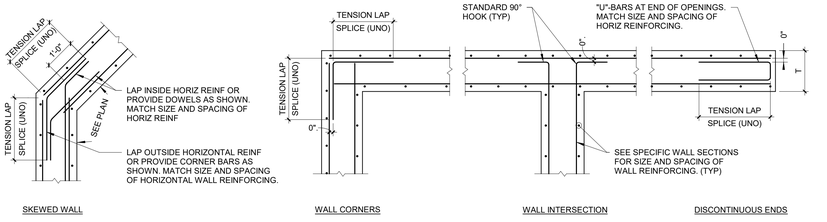
8 TYPICAL PIPE PENETRATION AT WALL
1/2" = 1'-0"



GENERAL NOTES:
1. WATERSTOP REQUIRED FOR SUB-GRADE WALLS RETAINING BACKFILL MATERIAL. OMIT OTHERWISE.
2. SEE SPECIFIC WALL SECTIONS FOR SIZE AND SPACING OF WALL REINFORCING.

CONSTRUCTION JOINT NOTES:
1. ROUGHEN FIRST POUR TO A 1/4" AMPLITUDE OR FORM THE JOINT WITH A STAY-IN-PLACE PERFORATED METAL BULKHEAD TO ACHIEVE THE SAME RESULT.
2. LOCATE CONSTRUCTION JOINTS AT A CONTROL JOINT

7 TYPICAL WALL JOINTS AT EXPOSED FOUNDATION WALLS w/ FORM LINERS AND RUBBED FINISH
1/2" = 1'-0"



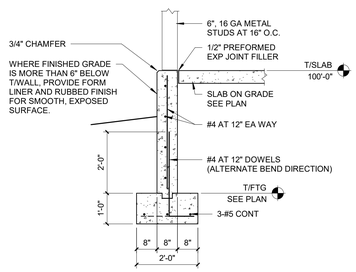
6 TYPICAL FOUNDATION WALL REINFORCING PLAN
1/2" = 1'-0"

TENSION LAP SPLICE LENGTHS FOR BARS ENCLOSED IN TIES OR STIRRUPS									
BAR SIZE	CONCRETE COMPRESSIVE STRENGTH								
	3,000 PSI			4,000 PSI			5,000 PSI		
	BAR TYPE		STD HOOK DEV	BAR TYPE		STD HOOK DEV	BAR TYPE		STD HOOK DEV
	TOP	OTHER		TOP	OTHER		TOP	OTHER	
#3	28	22	6	25	19	6	22	17	6
#4	38	29	8	33	25	7	29	23	6
#5	47	36	10	41	31	8	36	28	7
#6	56	43	12	49	37	10	44	34	9
#7	81	63	13	71	54	12	63	49	10
#8	93	72	15	81	62	13	72	56	12
#9	105	81	17	91	70	15	81	63	13
#10	118	91	19	102	79	17	92	71	15
#11	131	101	22	114	87	19	102	78	17

TENSION LAP SPLICE LENGTHS FOR BARS NOT ENCLOSED IN TIES OR STIRRUPS									
BAR SIZE	CONCRETE COMPRESSIVE STRENGTH								
	3,000 PSI			4,000 PSI			5,000 PSI		
	BAR TYPE		STD HOOK DEV	BAR TYPE		STD HOOK DEV	BAR TYPE		STD HOOK DEV
	TOP	OTHER		TOP	OTHER		TOP	OTHER	
#3	17	16	6	16	16	6	16	16	6
#4	28	22	8	25	19	7	22	17	6
#5	41	32	10	36	28	8	32	25	7
#6	56	43	12	49	37	10	44	34	9
#7	90	69	13	78	60	12	70	54	10
#8	112	86	15	97	74	13	87	67	12
#9	135	104	17	117	90	15	105	81	13
#10	162	125	19	141	108	17	126	97	15
#11	190	146	22	165	127	19	147	114	17

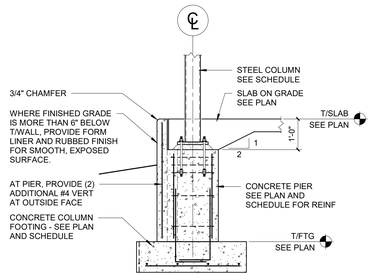
NOTES:
1. TABULATED VALUES ARE GIVEN IN INCHES.
2. DIVIDE TABULATED VALUES BY 1.30 TO ACHIEVE STRAIGHT BAR TENSION DEVELOPMENT LENGTHS.
3. APPLY A 1.30 MULTIPLIER ON TABULATED VALUES FOR USE IN LIGHTWEIGHT CONCRETE.
4. APPLY A 1.50 MULTIPLIER ON TABULATED VALUES FOR EPOXY COATED BARS WITH COVER LESS THAN 3-BAR DIAMETERS OR CLEAR SPACING LESS THAN 6 BAR DIAMETERS. APPLY A 1.20 MULTIPLIER ON ALL OTHER EPOXY COATED BARS.
5. MULTIPLIERS FOR LIGHTWEIGHT CONCRETE AND EPOXY COATING ARE ADDITIVE.
6. TOP BARS ARE DEFINED AS HORIZONTAL REINFORCEMENT WITH MORE THAN 12 INCHES OF CONCRETE CAST BELOW THE DEVELOPMENT LENGTH OR SPLICE.
7. "SIDE LAP" LAP SPLICES TO MAINTAIN SPECIFIED CONCRETE COVER. WHEN BARS OF DIFFERENT SIZE ARE LAP SPLICED, USE THE LARGER OF THE DEVELOPMENT LENGTH OF THE LARGER BAR OR THE LAP SPLICE LENGTH OF THE SMALLER BAR.
8. NON-CONTACT SPLICES NOT PERMITTED.

19 TENSION LAP SPLICE LENGTHS FOR GRADE 60 REINFORCEMENT



NOTE: SEE ARCHITECTURAL DRAWINGS FOR FOUNDATION INSULATION REQUIREMENTS

14 TYPICAL FOUNDATION WALL (AB1)
1/2" = 1'-0"



NOTE: SEE ARCHITECTURAL DRAWINGS FOR FOUNDATION INSULATION REQUIREMENTS

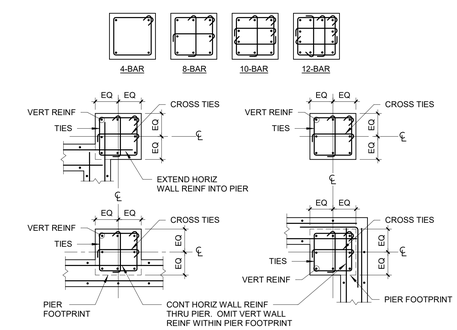
15 TYPICAL FOUNDATION WALL AT COLUMN PIER (AB1)
1/2" = 1'-0"

CONCRETE PIER SCHEDULE					
			REINFORCEMENT		
MARK	WIDTH	LENGTH	VERTICAL	TIES	REMARKS
P20	20"	20"	4-#6	#4 AT 12"	

PIER SCHEDULE NOTES:

1. SET LOWEST TIE AT ONE HALF THE TIE SPACING ABOVE TOP OF FOOTING.
2. PROVIDE TIES AT 4" ON CENTER FULL LENGTH OF ANCHOR RODS.
3. PIERS ARE CENTERED ON COLUMN CENTERLINES UNLESS NOTED OTHERWISE.
4. CONFIGURE TIES USING ACI REQUIREMENTS AND TO AVOID CONFLICTS WITH ANCHOR RODS.

5 PIER SCHEDULE AND NOTES



NOTES:
1. PROVIDE 135 DEGREE HOOKS AT TIES.
2. PROVIDE 135 DEGREE AND 90 DEGREE HOOKS AT CROSS TIES.
3. ALTERNATE HOOK LOCATIONS AT CONSECUTIVE TIES.

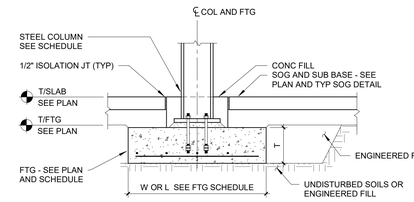
4 TYPICAL PIER DETAILS
1/2" = 1'-0"

FOOTING SCHEDULE					
ALLOWABLE BEARING PRESSURE					
2500					
MARK	WIDTH	LENGTH	THICKNESS	REINFORCING (EW BOT UNO)	REMARKS
F3	3'-0"	3'-0"	1'-0"	4-#5	
F3A	3'-6"	3'-6"	1'-0"	4-#5	
F4	4'-0"	4'-0"	1'-0"	5-#5	

FOOTING SCHEDULE NOTES:

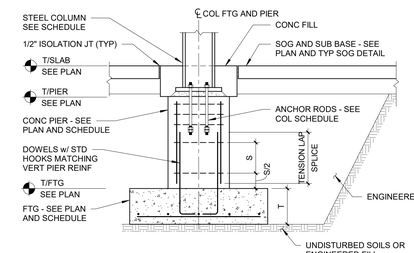
1. SEE PLANS AND DETAILS FOR TOP OF FOOTING ELEVATIONS.
2. SEE S001 FOR FOUNDATION AND CONCRETE NOTES.

3 FOOTING SCHEDULE AND NOTES
1/2" = 1'-0"



NOTES:
1. T = FOOTING THICKNESS - SEE FOOTING SCHEDULE.
2. EVENLY SPACE FOOTING REINFORCEMENT.

2 TYPICAL COLUMN FOOTING WITHOUT PIER
1/2" = 1'-0"



NOTES:
1. T = FOOTING THICKNESS - SEE FOOTING SCHEDULE.
2. S = PIER TIE SPACING - SEE PIER SCHEDULE.
3. EVENLY SPACE FOOTING REINFORCEMENT.

1 TYPICAL COLUMN FOOTING WITH PIER
1/2" = 1'-0"

STUDIO M
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Architect / Structural Engineer

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Tyndall Armory
Indianapolis, IN 46204

Client Information

Consultant Information

Consultant Information

3380 S. Walnut St.
Bloomington, IN 47401

BLOOMINGTON READINESS CENTER MODERNIZATION

Project Information

#	DESCRIPTION	DATE
1	Addendum 01	6/20/2024

Revisions

JUSTIN HOLMES REGISTERED No. AR11500183 STATE OF INDIANA ARCHITECT

BID DOCUMENTS

5.23.2024

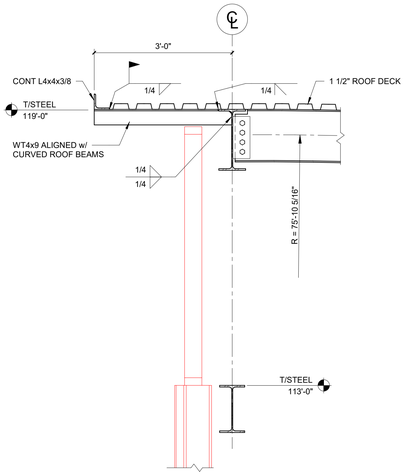
23043

Project Status

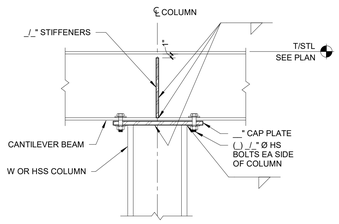
TYPICAL FOUNDATION DETAILS

ABI 1

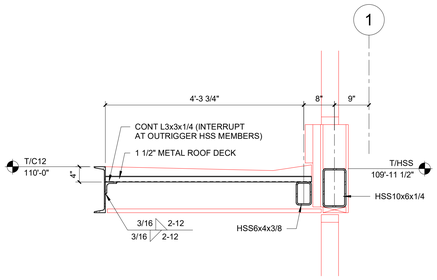
S301



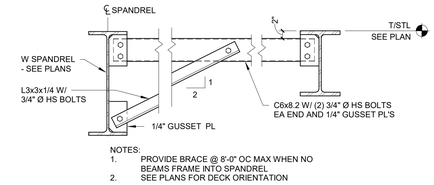
13 SECTION AT CURVED ROOF
3/4" = 1'-0"



15 CONTINUOUS BEAM
OVER TOP OF COLUMN DETAIL
3/4" = 1'-0"

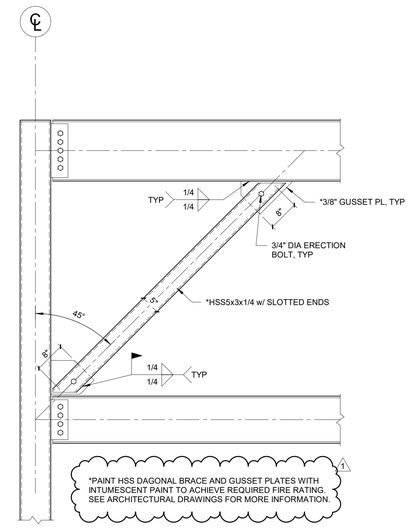


12 SECTION AT ENTRY CANOPY ROOF
3/4" = 1'-0"

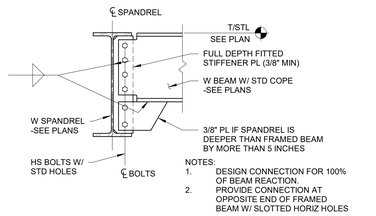


NOTES:
1. PROVIDE BRACE @ 8'-0" OC MAX WHEN NO BEAMS FRAME INTO SPANDREL
2. SEE PLANS FOR DECK ORIENTATION

11 TYPICAL SPANDREL BEAM BRACE
3/4" = 1'-0"

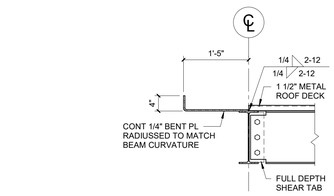


14 TYPICAL DIAGONAL BRACE DETAIL
3/4" = 1'-0"

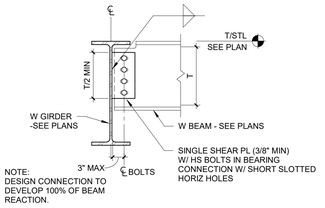


NOTES:
1. DESIGN CONNECTION FOR 100% OF BEAM REACTION. PROVIDE CONNECTION AT OPPOSITE END OF FRAMED BEAM W/ SLOTTED HORIZ HOLES
2.

10 TYPICAL FRAMED
BEAM TO SPANDREL CONNECTION
3/4" = 1'-0"

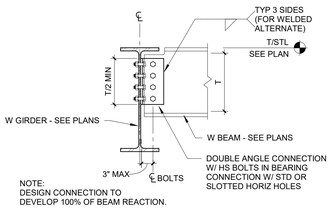


9 SECTION AT CURVED ROOF
3/4" = 1'-0"



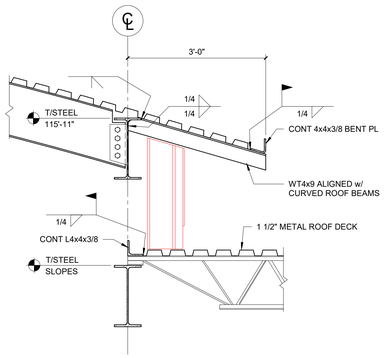
NOTE:
DESIGN CONNECTION TO
DEVELOP 100% OF BEAM
REACTION.

8 ALTERNATE
FRAMED BEAM CONNECTION
3/4" = 1'-0"

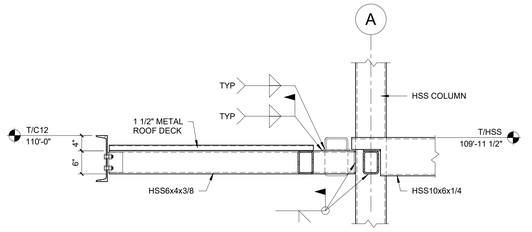


NOTE:
DESIGN CONNECTION TO
DEVELOP 100% OF BEAM REACTION.

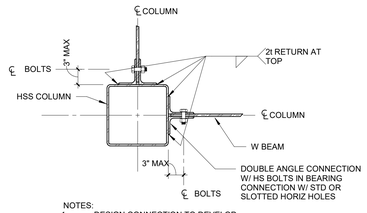
7 TYPICAL FRAMED BEAM CONNECTION
3/4" = 1'-0"



6 SECTION AT HIGH ROOF
OVERHANGING LOW ROOF
3/4" = 1'-0"

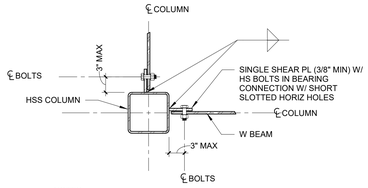


5 SECTION AT ENTRY CANOPY ROOF
3/4" = 1'-0"



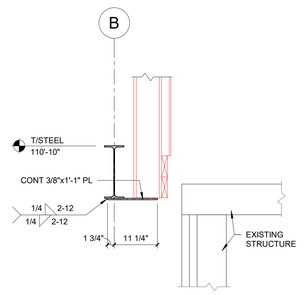
NOTES:
1. DESIGN CONNECTION TO DEVELOP 100% OF BEAM REACTION.
2. PROVIDE DOUBLE ANGLES AT LEAST ONE HALF THE DEPTH OF THE FRAMED BEAM.

TYPICAL
FRAMED BEAM TO HSS COLUMN
CONNECTION - HSS FACE DIM >8"
4
1" = 1'-0"

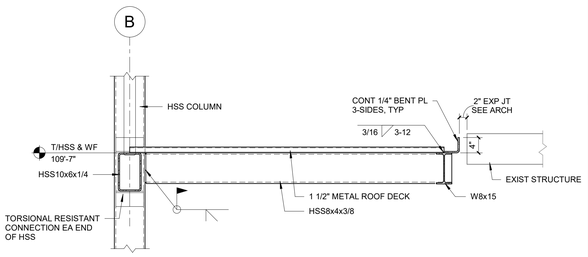


NOTES:
1. DESIGN CONNECTION TO DEVELOP 100% OF BEAM REACTION.
2. PROVIDE SHEAR PL AT LEAST ONE HALF THE DEPTH OF THE FRAMED BEAM.

TYPICAL
FRAMED BEAM TO HSS COLUMN
CONNECTION - HSS FACE DIM <8"
3
1" = 1'-0"



2 SECTION AT WALL SUPPORT
3/4" = 1'-0"



1 SECTION AT LOW ROOF INFILL
3/4" = 1'-0"

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BLOOMINGTON
READINESS
CENTER
MODERNIZATION

Project Information

#	DESCRIPTION	DATE
1	Addendum 01	6/20/2024

Revisions

JUSTIN HOLMES
REGISTERED
No. AR11500183
STATE OF
INDIANA
ARCHITECT

BID DOCUMENTS

5.23.2024
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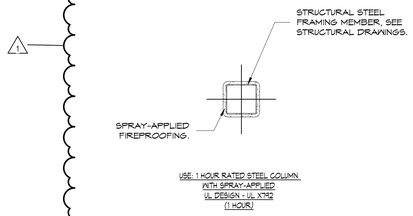
Project Status

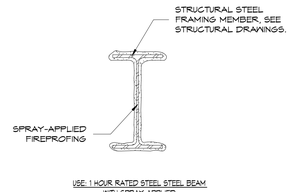
TYPICAL STEEL
FRAMED DETAILS

ABI 1

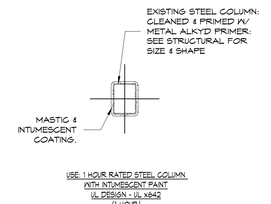
S501



Steel Column Fire Resistance Rating

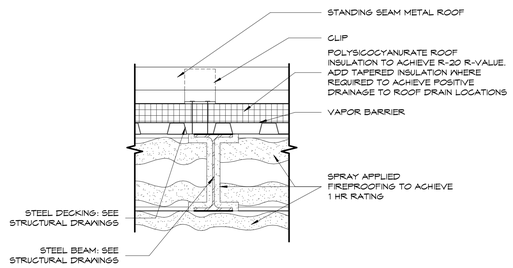


Steel Beam Fire Resistance Rating



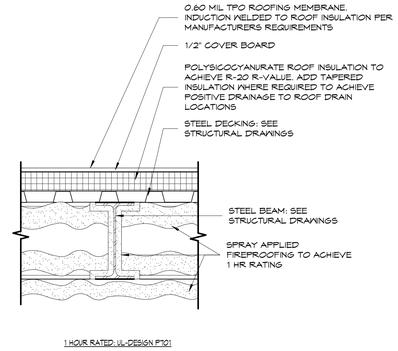
NOTE: EXISTING COLUMNS TO BE FIREPROOFED WHERE EXPOSED DURING CONSTRUCTION/ DEMOLITION

Existing Steel Column Fire Resistance Rating



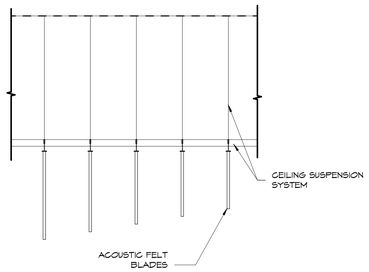
R2

Roof Assembly



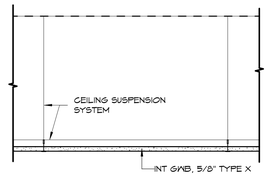
R1

Roof Assembly



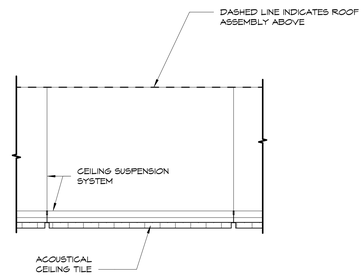
C3

Acoustic Felt Ceiling Tile Assembly



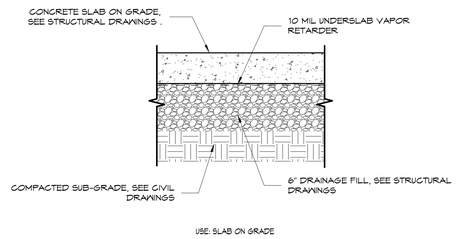
C2

Suspended 5/8" Gypsum Board Ceiling Assembly



C1

Acoustical Panel Ceiling Assembly



USE: SLAB ON GRADE

F1

Floor Assembly

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Consultant Information

BLOOMINGTON READINESS CENTER MODERNIZATION

3330 S. Walnut St.
Bloomington, IN 47401

Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON
PE 11800012
STATE OF INDIANA
REGISTERED ARCHITECT

Bid Documents

5.23.2024

23043

Project Status

Floor and Roof Assemblies

A032

WINDOW GENERAL NOTES:

- ALL WINDOWS THAT ARE LESS THAN 24 INCHES FROM DOORS ARE TO RECEIVE TEMPERED GLASS PER 2014 INDIANA BUILDING CODE.
- ALL INTERIOR STOREFRONT, BUTT GLAZE JOINT BETWEEN GLAZING PANELS IS TYPICAL UNLESS MULLION IS NOTED.

2014 INDIANA BUILDING CODE EXCERPTS FOR TEMPERED GLAZING REQUIREMENTS:

2406.4 HAZARDOUS LOCATIONS
THE LOCATIONS SPECIFIED IN SECTIONS 2406.4.1 SHALL BE CONSIDERED TO BE SPECIFIC HAZARDOUS LOCATIONS REQUIRING SAFETY GLAZING MATERIALS.

2406.4.1 GLAZING IN DOORS
GLAZING IN ALL FIXED AND OPERABLE PANELS OF SWING, SLIDING, AND BI-FOLD DOORS SHALL BE CONSIDERED TO BE A HAZARDOUS LOCATION.
EXCEPTIONS:
- GLAZED OPENINGS OF A SIZE THROUGH WHICH A 3" DIAMETER SPHERE IS UNABLE TO PASS
- DECORATIVE GLAZING
- GLAZING MATERIALS USED AS CURVED GLAZED PANELS IN REVOLVING DOORS
- COMMERCIAL REFRIGERATED CABINET GLAZED DOORS

2406.4.2 GLAZING ADJACENT TO DOORS
GLAZING IN AN INDIVIDUAL FIXED FOR OPERABLE PANEL ADJACENT TO A DOOR WHERE THE NEAREST VERTICAL EDGE OF THE GLAZING IS WITHIN 24" ARC OF EITHER VERTICAL EDGE OF THE DOOR IN A CLOSED POSITION AND WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 60" ABOVE THE WALKING SURFACE SHALL BE CONSIDERED TO BE A HAZARDOUS LOCATION.
EXCEPTIONS:
- DECORATIVE GLAZING
- WHERE THERE IS AN INTERVENING WALL OR OTHER PERMANENT BARRIER BETWEEN THE DOOR AND GLAZING
- WHERE ACCESS THROUGH THE DOOR IS TO A CLOSET OR STORAGE AREA 3 FEET OR LESS IN DEPTH. GLAZING IN THIS APPLICATION SHALL COMPLY WITH SECTION 2406.4.3
- GLAZING IN WALLS ON THE LATCH SIDE OF AND PERPENDICULAR TO THE PLAN OF THE DOOR IN A CLOSED POSITION IN ONE- AND TWO- FAMILY DWELLINGS OR WITHIN DWELLING UNITS IN GROUP R-2

2406.4.3 GLAZING IN WINDOWS
GLAZING IN AN INDIVIDUAL FIXED OR OPERABLE PANEL THAT MEETS ALL OF THE FOLLOWING CONDITIONS SHALL BE CONSIDERED TO BE A HAZARDOUS LOCATION:
- THE EXPOSED AREA OF AN INDIVIDUAL PANE IS GREATER THAN 9 SQUARE FEET
- THE BOTTOM EDGE OF THE GLAZING IS LESS THAN 18" ABOVE THE FLOOR
- THE TOP EDGE OF THE GLAZING IS GREATER THAN 36" ABOVE THE FLOOR
- ONE OR MORE WALKING SURFACE(S) ARE WITHIN 36", MEASURED HORIZONTALLY AND IN A STRAIGHT LINE, OF THE PLANE OF THE GLAZING

EXCEPTIONS:
- DECORATIVE GLAZING
- WHERE A HORIZONTAL RAIL IS INSTALLED ON THE ACCESSIBLE SIDE(S) OF THE GLAZING 34 TO 38 INCHES ABOVE THE WALKING SURFACE THE RAIL SHALL BE CAPABLE OF WITHSTANDING A HORIZONTAL LOAD OF 50 POUNDS PER LINEAR FOOT WITHOUT CONTACTING THE GLASS AND NOT BE LESS THAN 1.5" IN CROSS-SECTIONAL HEIGHT
- OUTBOARD PANES IN INSULATION GLASS UNITS OR MULTIPLE GLAZING WHERE THE BOTTOM EXPOSED EDGE OF THE GLASS IS 25 FEET OR MORE ABOVE ANY GRADE, ROOF, WALKING SURFACE OR OTHER HORIZONTAL OR SLOPED (WITHIN 45 DEGREES OF HORIZONTAL) SURFACE ADJACENT TO THE GLASS EXTERIOR

2406.4.6 GLAZING ADJACENT TO STAIRWAYS AND RAMPS
GLAZING WHERE THE BOTTOM EXPOSED EDGE OF THE GLAZING IS LESS THAN 60 INCHES ABOVE THE PLANE OF THE ADJACENT WALKING SURFACE OF STAIRWAYS, LANDINGS BETWEEN FLIGHTS OF STAIRS AND RAMPS SHALL BE CONSIDERED TO BE A HAZARDOUS LOCATION
EXCEPTIONS:
- THE SIDE OF A STAIRWAY, LANDING, OR RAMP THAT HAS A GUARD COMPLYING WITH THE PROVISIONS OF SECTIONS 1015 AND 1607.9, AND THE PLANE OF THE GLASS IS GREATER THAN 18 INCHES FROM THE RAILING
- GLAZING 36 INCHES OR MORE MEASURED HORIZONTALLY FROM THE WALKING SURFACE

2406.4.7 GLAZING ADJACENT TO THE BOTTOM STAIRWAY LANDING
GLAZING ADJACENT TO THE LANDING AT THE BOTTOM OF A STAIRWAY WHERE THE GLAZING IS LESS THAN 60 INCHES ABOVE THE LANDING AND WITHIN A 60 INCH HORIZONTAL ARC THAT IS LESS THAN 180 DEGREES FROM THE BOTTOM TREAD NOSING SHALL BE CONSIDERED TO BE A HAZARDOUS LOCATION
EXCEPTION:
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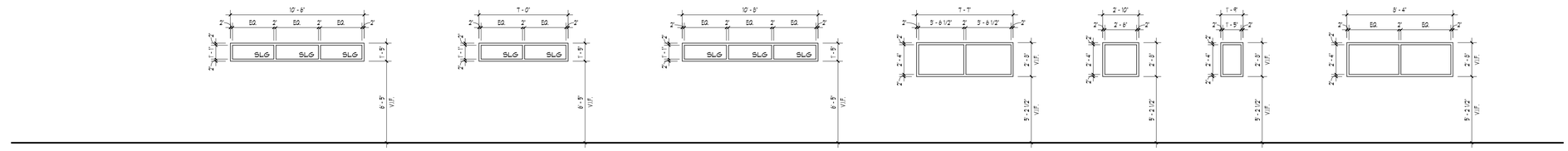
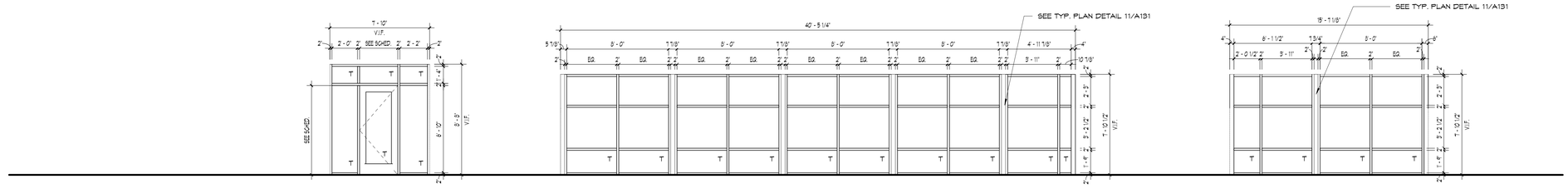
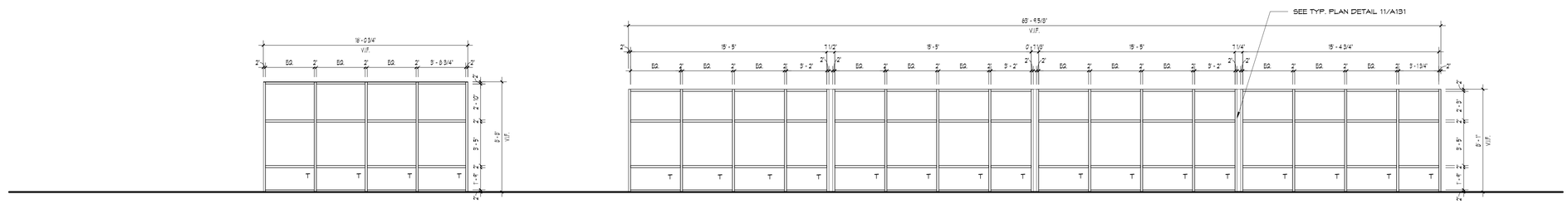
GLAZING NOTES

1. T: 1/4" CLEAR TEMPERED GLAZING
2. BLACK ALUMINUM STROEFRONT SYSTEM
3. SEE SPECS FOR GLAZING TYPE
4. SLG: SPANDREL PANEL
5. BLACK ALUMINUM WINDOWS







STOREFRONT ELEVATIONS
SCALE: 1/4" = 1'-0"

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275 Veterans Way
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Consultant Information

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Bloomington, IN 47401

Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON
REGISTERED
AP 11512
STATE OF
INDIANA
ARCHITECT

Bid Documents

5.23.2024
23043

Project Status

Storefront
Elevations

Base Bid

A051

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GLAZING NOTES

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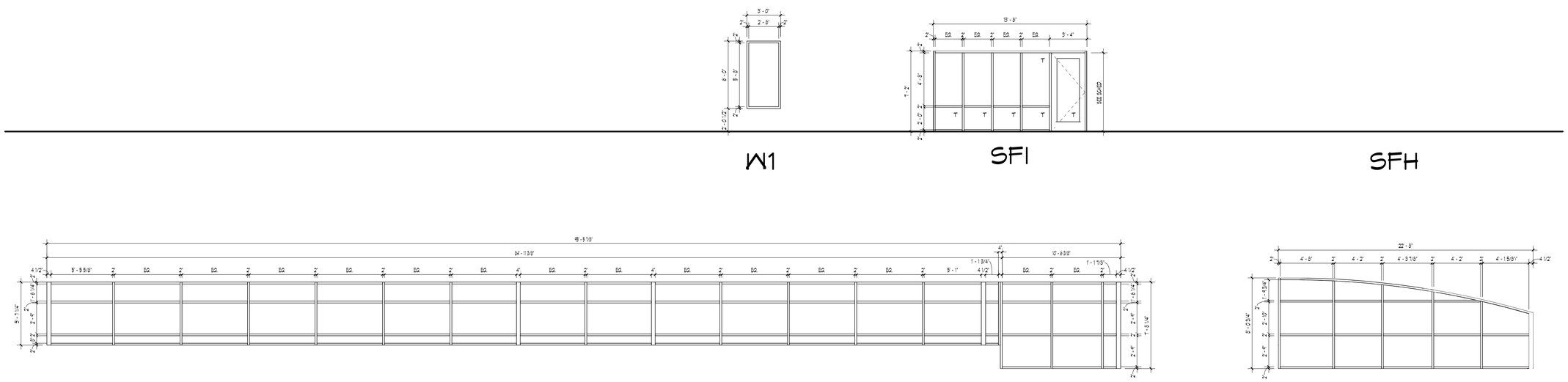
3. SEE SPECS FOR GLAZING TYPE
4. SLG: SPANDREL PANEL
5. BLACK ALUMINUM WINDOWS

1



STOREFRONT ELEVATIONS
SCALE: 1/4" = 1'-0"

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Consultant Information

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Consultant Information

BLOOMINGTON
READINESS
CENTER
MODERNIZATION

3380 S. Walnut St.
Bloomington, IN 47401
Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON
REGISTERED
AP 11500112
STATE OF
INDIANA
ARCHITECT

Bid Documents

5.23.2024
23043
Project Status

Storefront
Elevations

ABI 1

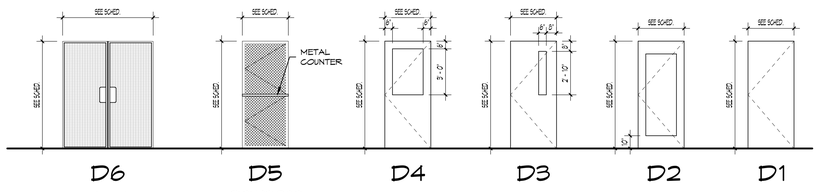
A051.1

Bloomington Door and Frame Schedule

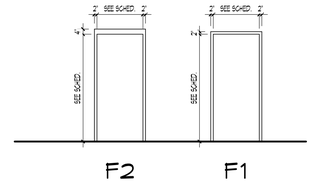
Room Name	Mark	Door Size H	Door Size W	Door Elevation	Door Material	Door Glass	Frame Material	Frame Elevation	Frame Glass	Fire Rating	Hardware Set	Jamb/ Head Condition	Remarks
CORRIDOR	100	7' - 0"	6' - 0"	D3	WD	TG	HM	F1	--	90 MIN	SEE SPECS	MTL Stud	
LOBBY	101	7' - 0"	3' - 0"	D4	WD	TG	HM	F2	--	20 MIN	SEE SPECS	CMU	
MED NCO	102	7' - 0"	3' - 0"	D1	WD	TG	HM	F1	--		SEE SPECS	MTL Stud	
HR SGT/ DEERS	103	7' - 0"	3' - 0"	D3	WD	TG	HM	F1	--		SEE SPECS	MTL Stud	
SR HR SGT	104	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
STOR.	105	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
S1 OFFICE	106	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
S1 OFFICE	107	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
SR MNT SUP	108	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
SR MNT SUP	109	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
CORRIDOR	110	7' - 0"	3' - 0"	D4	WD	--	HM	F2	--	20 MIN	SEE SPECS	CMU	
S1/ S4 GENERAL SPACE	111	7' - 0"	3' - 0"	D4	WD	--	HM	F2	--	20 MIN	SEE SPECS	CMU	
CORRIDOR	112	7' - 0"	6' - 0"	D3	HM	TG	HM	F2	--	90 MIN	SEE SPECS	CMU	
CORRIDOR	113	7' - 0"	3' - 0"	D2	AL	IG	AL	SFE	IG		SEE SPECS	STF	
MECH.	114	7' - 0"	2' - 8"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
CHAPLAIN	115	7' - 0"	3' - 0"	D4	WD	--	HM	F1	--	20 MIN	SEE SPECS	MTL Stud	
CMS.	116	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
BATTALION COMMAND TEAM	117	7' - 0"	3' - 0"	D4	WD	TG	HM	F1	--	20 MIN	SEE SPECS	MTL Stud	
MECH.	118	7' - 0"	2' - 8"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
CDR	119	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
CO	120	7' - 0"	3' - 0"	D4	WD	--	HM	F1	--	20 MIN	SEE SPECS	MTL Stud	
CO 1SG	121	7' - 0"	3' - 0"	D4	WD	--	HM	F1	--	20 MIN	SEE SPECS	MTL Stud	
RNCO	122	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
MECH.	123	7' - 0"	2' - 8"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
HHB	124	7' - 0"	3' - 0"	D4	WD	TG	HM	F1	--	20 MIN	SEE SPECS	MTL Stud	
HHB MEDICAL	125	7' - 0"	3' - 0"	D4	WD	TG	HM	F1	--	20 MIN	SEE SPECS	MTL Stud	
HHB MEDICAL OFFICE	126	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
DISTANCE LEARNING	127	7' - 0"	3' - 0"	D3	HM	TG	HM	F2	--	20 MIN	SEE SPECS	CMU	
FITNESS	128	7' - 0"	6' - 0"	D1	HM	--	HM	F2	--		SEE SPECS	CMU	
CORRIDOR	129	7' - 0"	6' - 0"	D3	HM	TG	HM	F2	--	90 MIN	SEE SPECS	CMU	
MECH.	130	7' - 0"	3' - 0"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
HHB SUPPLY ROOM	131	7' - 0"	4' - 0"	D5			HM		--		SEE SPECS	WIREMESH	WIREMESH
SUPPLY SGT.	132	7' - 0"	3' - 0"	D4	WD	TG	HM	F1	--		SEE SPECS	MTL Stud	
VESTIBULE	133	7' - 0"	6' - 0"	D1	HM	--	HM	F2	--	90 MIN	SEE SPECS	CMU	
CORR.	134	7' - 0"	6' - 0"	D1	HM	--	HM	F2	--	90 MIN	SEE SPECS	CMU	
ADDITIONAL UNIT SUPPLY	137	7' - 0"	6' - 0"	D5			HM		--		SEE SPECS	WIREMESH	WIREMESH
MECH.	138	7' - 0"	2' - 8"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
MECH.	139	7' - 0"	2' - 8"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	
CLASSROOM	140	7' - 0"	3' - 0"	D4	WD	TG	HM	F2	--	20 MIN	SEE SPECS	CMU	
BSN OFFICE	141	7' - 0"	3' - 0"	D1	WD	TG	HM	F2	--	20 MIN	SEE SPECS	CMU	
DRILL HALL	142A	7' - 0"	3' - 0"	D1	HM	--	HM	F2	--	90 MIN	SEE SPECS	CMU	
BOILER	142B	7' - 0"	3' - 0"	D1	HM	--	HM	F2	--		SEE SPECS	CMU	
WATER ROOM	143	7' - 0"	3' - 0"	D1	HM	--	HM	F2	--		SEE SPECS	CMU	
MDF/ STOR.	144	7' - 0"	3' - 0"	D1	HM	--	HM	F2	--		SEE SPECS	CMU	
KITCHEN STORAGE	145	7' - 0"	6' - 0"	D1	HM	--	HM	F1	--		SEE SPECS	MTL Stud	
KITCHEN	146	7' - 0"	3' - 6"	D1	HM	--	HM	F2	--		SEE SPECS	CMU	
DRILL HALL	147A	7' - 0"	3' - 0"	D1	HM	--	HM	F2	--		SEE SPECS	CMU	
DRILL HALL	147B	7' - 0"	3' - 0"	D1	HM	--	HM	F2	--		SEE SPECS	CMU	
BSN STORAGE	148	7' - 0"	6' - 0"	D1	HM	--	HM	F2	--	90 MIN	SEE SPECS	CMU	
JAN.	150	7' - 0"	3' - 0"	D1	HM	--	HM	F1	--		SEE SPECS	MTL Stud	
MECH./ FCU	151	7' - 0"	3' - 0"	D1	HM	--	HM	F1	--		SEE SPECS	MTL Stud	
WOMEN'S RESTROOM	152	7' - 0"	3' - 0"	D1	HM	--	HM	F1	--		SEE SPECS	MTL Stud	
WOMEN'S LOCKER ROOM	153	7' - 0"	3' - 0"	D1	HM	--	HM	F1	--		SEE SPECS	MTL Stud	
MEN'S RESTROOM	154	7' - 0"	3' - 0"	D1	HM	--	HM	F2	--		SEE SPECS	CMU	
MECH./ FCU	155	7' - 0"	2' - 8"	D1	HM	--	HM	F1	--		SEE SPECS	MTL Stud	
MEN'S LOCKER ROOM	156	7' - 0"	3' - 0"	D1	HM	--	HM	F1	--		SEE SPECS	MTL Stud	
LACTATION	157	7' - 0"	3' - 0"	D1	HM	--	HM	F2	--		SEE SPECS	CMU	
MECH.	158	7' - 0"	2' - 8"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud	

ABBREVIATIONS:

AL	Aluminum
HM	Hollow Metal
WD	Wood
TG	Tempered Glazing



DOOR PANEL ELEVATIONS
SCALE: 1/4" = 1'-0"



DOOR FRAME ELEVATIONS
SCALE: 1/4" = 1'-0"

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Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON — REGISTERED — APPROVED — STATE OF INDIANA — ARCHITECT

Bid Documents

5.23.2024
23043

Project Status

Door Schedule

Base Bid

A061

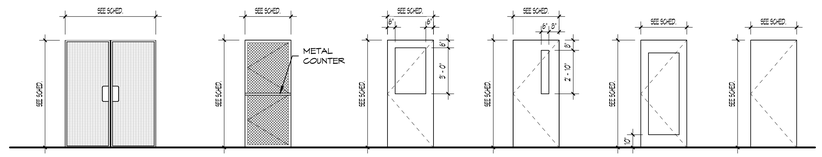
Bloomington Door and Frame Schedule

Room Name	Mark	Door Size H	Door Size W	Door Size TH	Door Elevation	Door Material	Door Glass	Frame Material	Frame Elevation	Frame Glass	Fire Rating	Hardware Set	Jamb/ Head Condition
VESTIBULE	100.1B	8' - 0"	6' - 0"	0" - 1 3/4"	D2	AL	IG	AL	SF1A	IG		SEE SPECS	STF
VESTIBULE	100.1A	8' - 0"	6' - 0"	0" - 1 3/4"	D2	AL	IG	AL	SF1A	IG		SEE SPECS	STF
CONF. ROOM	102.1	7' - 0"	3' - 0"	0" - 1 3/4"	D2	WD	TG	HM	SF1	--		SEE SPECS	MTL Stud
SPEC. SCRN	103.1	7' - 0"	3' - 0"	0" - 1 3/4"	D1	HM	--	HM	F1	--		SEE SPECS	CMU
EX. OFFICE	104.1	7' - 0"	3' - 0"	0" - 1 3/4"	D1	HM	--	HM	F2	--	20 MIN	SEE SPECS	CMU
FDC	105.1	7' - 0"	3' - 0"	0" - 1 3/4"	D4	WD	TG	HM	F1	--	20 MIN	SEE SPECS	MTL Stud
S3 OFFICE	106.1	7' - 0"	3' - 0"	0" - 1 3/4"	D1	WD	--	HM	F1	--	20 MIN	SEE SPECS	MTL Stud
S2 OFFICE	107.1	7' - 0"	3' - 0"	0" - 1 3/4"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud
S6 OFFICE	108.1	7' - 0"	3' - 0"	0" - 1 3/4"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud
S2/ S3/ S6 GENERAL	109.1	7' - 0"	3' - 0"	0" - 1 3/4"	D3	WD	TG	HM	F1	--	20 MIN	SEE SPECS	MTL Stud
S3 OFFICE	110.1	7' - 0"	3' - 0"	0" - 1 3/4"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud
S3 OFFICE	111.1	7' - 0"	3' - 0"	0" - 1 3/4"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud
WAR ROOM	112.1	7' - 0"	3' - 0"	0" - 1 3/4"	D3	HM	TG	HM	F1	--		SEE SPECS	MTL Stud
S3 OFFICE	113.1	7' - 0"	3' - 0"	0" - 1 3/4"	D1	WD	--	HM	F1	--		SEE SPECS	MTL Stud
ELEC.	114.1	7' - 0"	3' - 0"	0" - 1 3/4"	D1	HM	--	HM	F2	--		SEE SPECS	MTL Stud
CORRIDOR	115.1	7' - 0"	3' - 0"	0" - 1 3/4"	D4	WD	TG	HM	F1	--	20 MIN	SEE SPECS	MTL Stud
VESTIBULE	117.1	7' - 0"	6' - 0"	0" - 1 3/4"	D2	HM	TG	HM	F1	--		SEE SPECS	MTL Stud

1

ABBREVIATIONS:

AL	Aluminum
HM	Hollow Metal
WD	Wood
TG	Tempered Glazing



D6 — Wiremesh Door

D5 — Chain Link Dutch Door w/ integrated 16" deep counter

D4

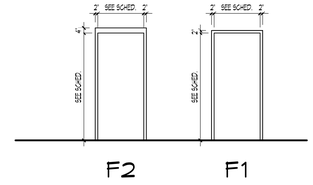
D3

D2

D1

DOOR PANEL ELEVATIONS

SCALE: 1/4" = 1'-0"



F2 F1

DOOR FRAME ELEVATIONS

SCALE: 1/4" = 1'-0"

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Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON ARCHITECTS
AP 11300012
STATE OF INDIANA
ARCHITECT

Bid Documents

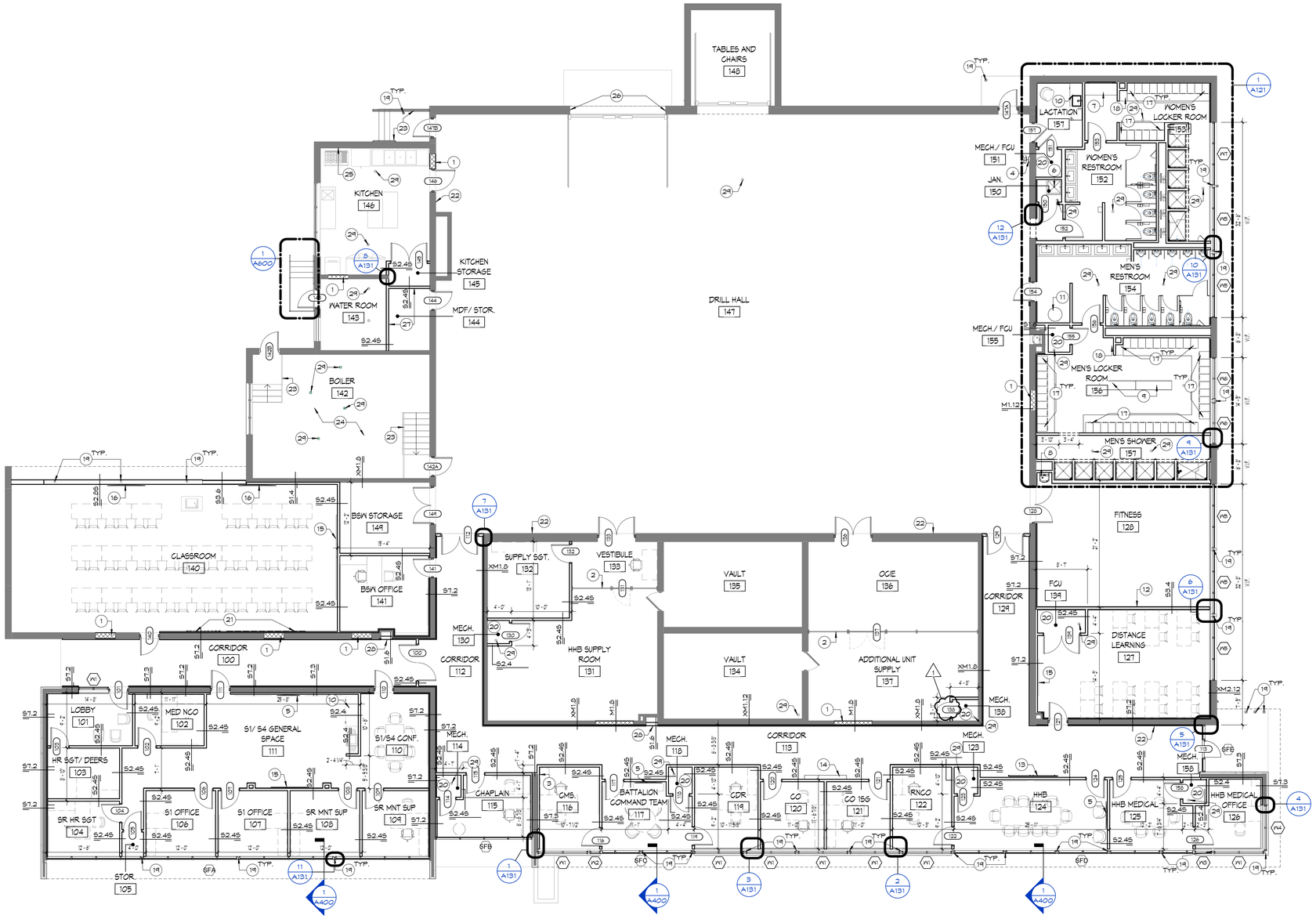
5.23.2024
23043

Project Status

Door Schedule

ABI 1

A061.1



1 A101 First Floor Plan - Base Bid
SCALE: 1/8" = 1'-0"

NORTH

GENERAL NOTES

A. THE GENERAL CONTRACTOR SHALL VERIFY ALL CONDITIONS AT THE JOBSITE. NOTIFY ARCHITECT OF ANY DEVIATIONS FROM THOSE CONDITIONS AS THEY ARE NOTED ON THE DRAWINGS.

B. ALL DIMENSIONS SHOWN ARE TO FACE OF STUD OR MASONRY, UNLESS NOTED OTHERWISE. DIMENSIONS DESIGNATED AS "CLR" INDICATE A CLEAR DIMENSION FROM FACE OF FINISH TO FACE OF FINISH. DIMENSIONS OF EXTERIOR WALLS ARE TO OUTSIDE EDGE OF FOUNDATION.

C. PROVIDE BRACING AND BLOCKING AS REQUIRED IN WALLS SUPPORTING CASEWORK, TACKBOARDS, MARKERBOARDS, TELEVISIONS, RESTROOM ACCESSORIES, AND ANY ADDITIONAL WALL MOUNTED EQUIPMENT. COORDINATE WALL MOUNTED EQUIPMENT WITH MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION DRAWINGS.

D. ALL COMMERCIAL DOOR FRAMES ARE LOCATED 4" FROM ADJACENT WALL, UNLESS NOTED OTHERWISE.

E. THE GENERAL CONTRACTOR SHALL COORDINATE AND SCHEDULE ALL WORK WITH THE OWNER.

F. ALL GYPSUM WALLBOARD IS 5/8" TYPE "X", UNLESS NOTED OTHERWISE.

G. THE GENERAL CONTRACTOR IS RESPONSIBLE FOR COMPLIANCE WITH ALL STATE AND LOCAL BUILDING CODES AND GOVERNMENT REGULATORY AGENCIES.

H. THE GENERAL CONTRACTOR IS TO SUBMIT SHOP DRAWINGS-PROJECT DATA AND SAMPLES TO OWNER / ARCHITECT FOR APPROVAL PRIOR TO FABRICATION OF ALL MILLWORK AND WALL FINISHES.

I. DO NOT SCALE ANY DRAWING. ANY DIMENSIONS ARE TO BE OBTAINED FROM THE ARCHITECT IF NOT NOTED ON THE DRAWINGS. REFER ALL QUESTIONS TO THE ARCHITECT OF ENGINEER ON RECORD.

J. THE GENERAL CONTRACTOR SHALL KEEP ONE SET OF PLANS AT THE JOB SITE FOR THE SPECIFIC PURPOSE OF RECORDING ACTUAL CONSTRUCTION CONDITIONS. SUCH PROJECT RECORD DOCUMENTS SHALL BE PROVIDED TO THE OWNER UPON COMPLETION OF THE PROJECT.

K. THE GENERAL CONTRACTOR SHALL VERIFY SIZE, LOCATION, AND CHARACTERISTICS OF ALL WORKS AND EQUIPMENT SUPPLIED BY THE OWNER OR OTHERS WITH THE MANUFACTURER OR SUPPLIER PRIOR TO THE START OF THE WORK.

L. THE GENERAL CONTRACTOR SHALL SEE THAT ALL SUBCONTRACTORS RECEIVE COMPLETE WORKING DRAWINGS AND ASSUME FULL RESPONSIBILITY FOR COORDINATION OF WORK.

M. SEE STRUCTURAL FOR CONTROL/ EXPANSION JOINT LOCATIONS.

N. ALL ADA SHOWER UNITS ARE TO RECEIVE BUILT IN SHOWER SEAT AND CODE COMPLIANT GRAB BARDS, UNLESS NOTED OTHERWISE.

FLOOR PLAN NOTES

Key	Note
1	WALL INFILL TO MATCH ADJACENT WALL CONSTRUCTION. ALIGN FINISH FACES AND PREPARE FOR NEW FINISH.
2	FLOOR TO CEILING WIRE MESH PARTITION SYSTEM. PROVIDE GATE AS INDICATED. FIELD MEASURE TO ENSURE MAX 2" GAP
3	ALIGN FINISH FACE
4	SALVAGED RECESSED FIRE EXTINGUISHER CABINET
5	WALL MOUNTED MONITOR/TV PROVIDED BY OWNER. PROVIDE BLOCKING AS REQUIRED. COORDINATE WITH ELECTRICAL DRAWINGS
6	UTILITY SINK, SEE PLUMBING DRAWINGS. PROVIDE A 48" TALL STAINLESS STEEL BACKSPLASH 12" PAST BASIN EDGE AND BROOM HOLDER
7	BUILT- IN VANITY, SEE INTERIOR DRAWINGS FOR SCOPE AND MATERIAL
8	SALVAGED ELECTRIC WATER COOLER
9	MANUFACTURED FLOOR MOUNTED BENCH
10	BUILT-IN CASEWORK AND COUNTER, SEE INTERIOR DRAWINGS FOR SCOPE AND MATERIAL
11	BUCKET TRASH CAN
12	CUSTOM FRAMELESS MIRROR, SEE INTERIOR DRAWINGS FOR SCOPE
13	WALL MOUNTED MAGNETIC MEMORANDUM BOARD, SEE INTERIOR DRAWINGS FOR SCOPE. PROVIDE BLOCKING IN WALL FOR MOUNTING
14	WALL MOUNTED WOOD SHELVES, SEE INTERIOR DRAWINGS FOR SCOPE. PROVIDE BLOCKING IN WALL FOR MOUNTING
15	WALL MOUNTED WHITEBOARD, SEE INTERIOR DRAWINGS FOR SCOPE. PROVIDE BLOCKING IN WALL FOR MOUNTING
16	WALL MOUNTED TV 4'-0" A.F.F. PROVIDE BRACKETS AND BLOCKING IN WALL FOR MOUNTING
17	SINGLE TIER LOCKERS, SEE SHEET ID502 FOR DETAILS
18	DOUBLE TIER LOCKERS, SEE SHEET ID502 FOR DETAILS
19	ALL EXISTING COLUMNS TO BE TREATED TO 1 HR RATING PER STEEL COLUMN FIRE RESISTANCE RATING ON A032. APPLY FINISH COAT OF PAINT OVER INTUMESCENT COATING
20	ALL WALLS IN MECH. ROOMS TO WITHIN SPACE TO RECEIVE FRT PLYWOOD 3/4" IN LIEU OF GYPSUM WALLBOARD.
21	WALL MOUNTED LETTERS AND FRAMES. PROVIDE BLOCKING AS REQUIRED. SEE INTERIOR DRAWINGS FOR SCOPE
22	EXISTING RECESSED FIRE EXTINGUISHER CABINET TO REMAIN
23	PRIMED AND PAINTED NEW RAIL. COORDINATE WITH ARCH FOR COLOR
24	EPOXY PAINT. COORDINATE WITH ARCH FOR FINISHES
25	PROVIDE STAINLESS STEEL BACKSPLASH
26	PAINT STEEL FRAME OF OVERHEAD DOOR
27	PROVIDE FRTPLYWOOD ON STUD WALL
28	RECESSED FIRE EXTINGUISHER CABINET
29	FLOOR DRAIN, REFERENCE PLUMBING DRAWINGS

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BLOOMINGTON READINESS CENTER MODERNIZATION

Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON
STATE OF INDIANA
APPROVED
ARCHITECT

Bid Documents

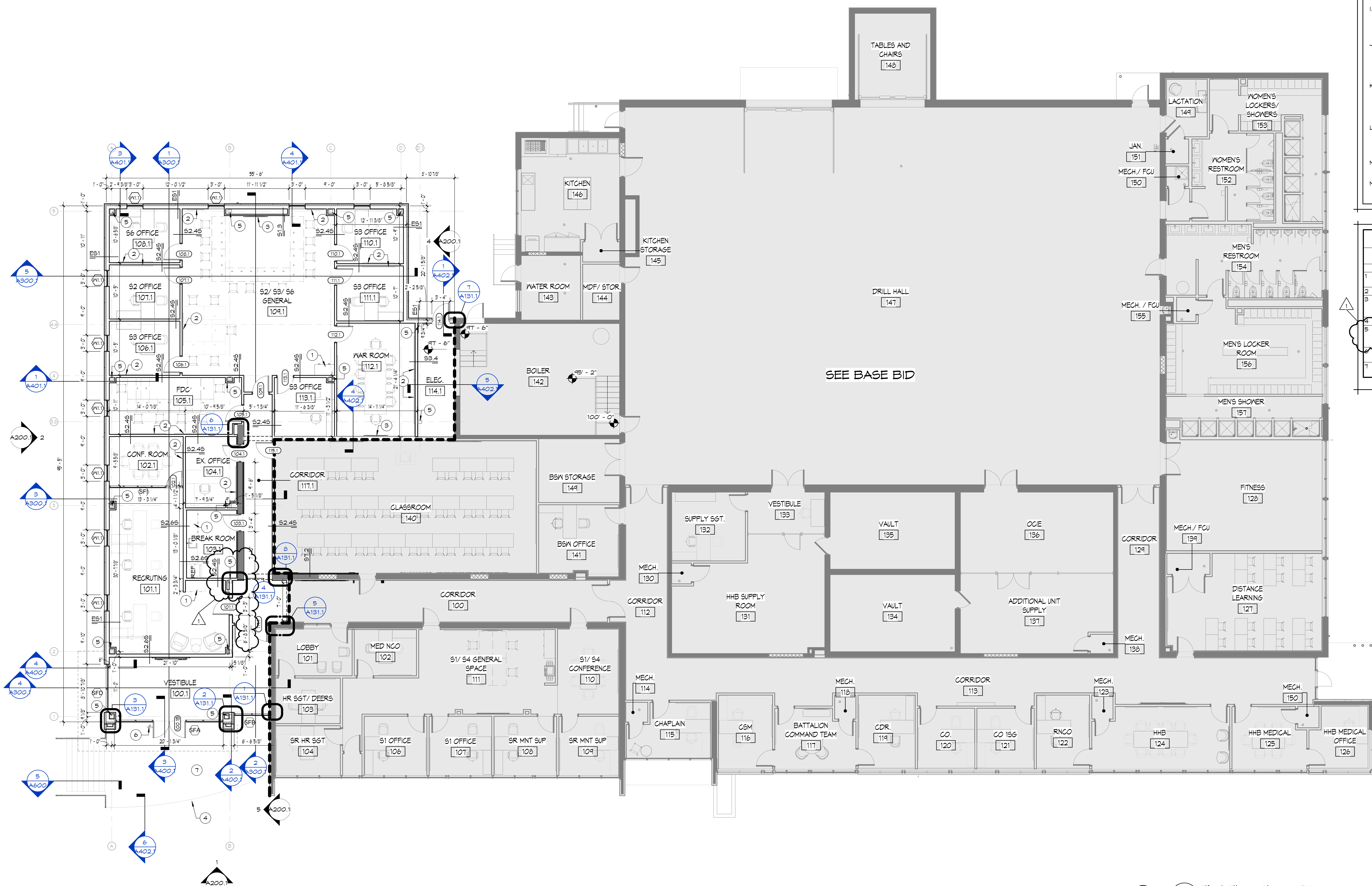
5.23.2024
23043

Project Status

First Floor Overall Plan

Base Bid

A101



1 First Floor Plan - ABI1
A101.1 SCALE: 1/8" = 1'-0"

NORTH

GENERAL NOTES

A. THE GENERAL CONTRACTOR SHALL VERIFY ALL CONDITIONS AT THE JOBSITE. NOTIFY ARCHITECT OF ANY DEVIATIONS FROM THOSE CONDITIONS AS THEY ARE NOTED ON THE DRAWINGS.

B. ALL DIMENSIONS SHOWN ARE TO FACE OF STUD OR MASONRY, UNLESS NOTED OTHERWISE. DIMENSIONS DESIGNATED AS "CLR" INDICATE A CLEAR DIMENSION FROM FACE OF FINISH TO FACE OF FINISH. DIMENSIONS OF EXTERIOR WALLS ARE TO OUTSIDE EDGE OF FOUNDATION.

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L. THE GENERAL CONTRACTOR SHALL SEE THAT ALL SUBCONTRACTORS RECEIVE COMPLETE WORKING DRAWINGS AND ASSUME FULL RESPONSIBILITY FOR COORDINATION OF WORK.

M. SEE STRUCTURAL FOR CONTROL/ EXPANSION JOINT LOCATIONS.

N. ALL ADA SHOWER UNITS ARE TO RECEIVE BUILT IN SHOWER SEAT AND CODE COMPLIANT GRAB BARDS, UNLESS NOTED OTHERWISE.

ABI1 FLOOR PLAN NOTES

Key	Note
1	BUILT-IN CASEWORK AND COUNTER, SEE INTERIOR DRAWINGS FOR SCOPE AND MATERIAL
2	WHITE BOARD PROVIDED BY OWNER
3	WALL MOUNTED MONITOR/TV PROVIDED BY OWNER. PROVIDE BLOCKING AS REQUIRED. COORDINATE WITH ELECTRICAL DRAWINGS
4	CONCRETE WALL. SEE STRUCTURAL DRAWINGS FOR SCOPE
5	ALL NEW COLUMNS TO BE TREATED TO 1 HR RATING PER STEEL COLUMN FIRE RESISTANCE RATING ON A032. APPLY SPRAY FIREPROOFING AND PAINT CEILING PER ID
6	PEDESTAL W/ CALL BOX. SEE TECH DRAWINGS. MOUNT KNOX BOX ON PEDESTAL
7	CONCRETE SLAB. SEE STRUCTURAL DRAWINGS FOR DETAILS

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BLOOMINGTON READINESS CENTER MODERNIZATION

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Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

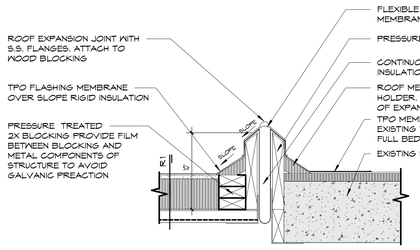
Revisions

Bid Documents
5.23.2024
23043
Project Status

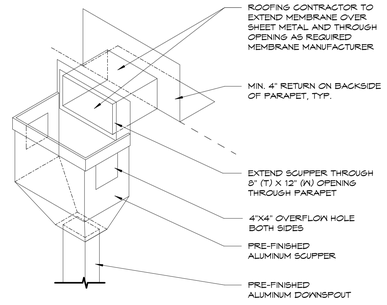
First Floor Plan

ABI 1

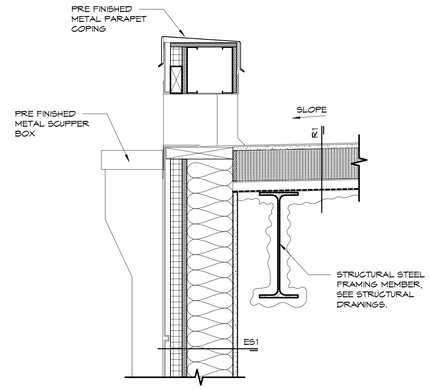
A101.1



4 A102.1 ROOF EXPANSION JOINT DETAIL
SCALE: 1 1/2" = 1'-0"



3 A102.1 SCUPPER DETAIL
SCALE: 1" = 1'-0"



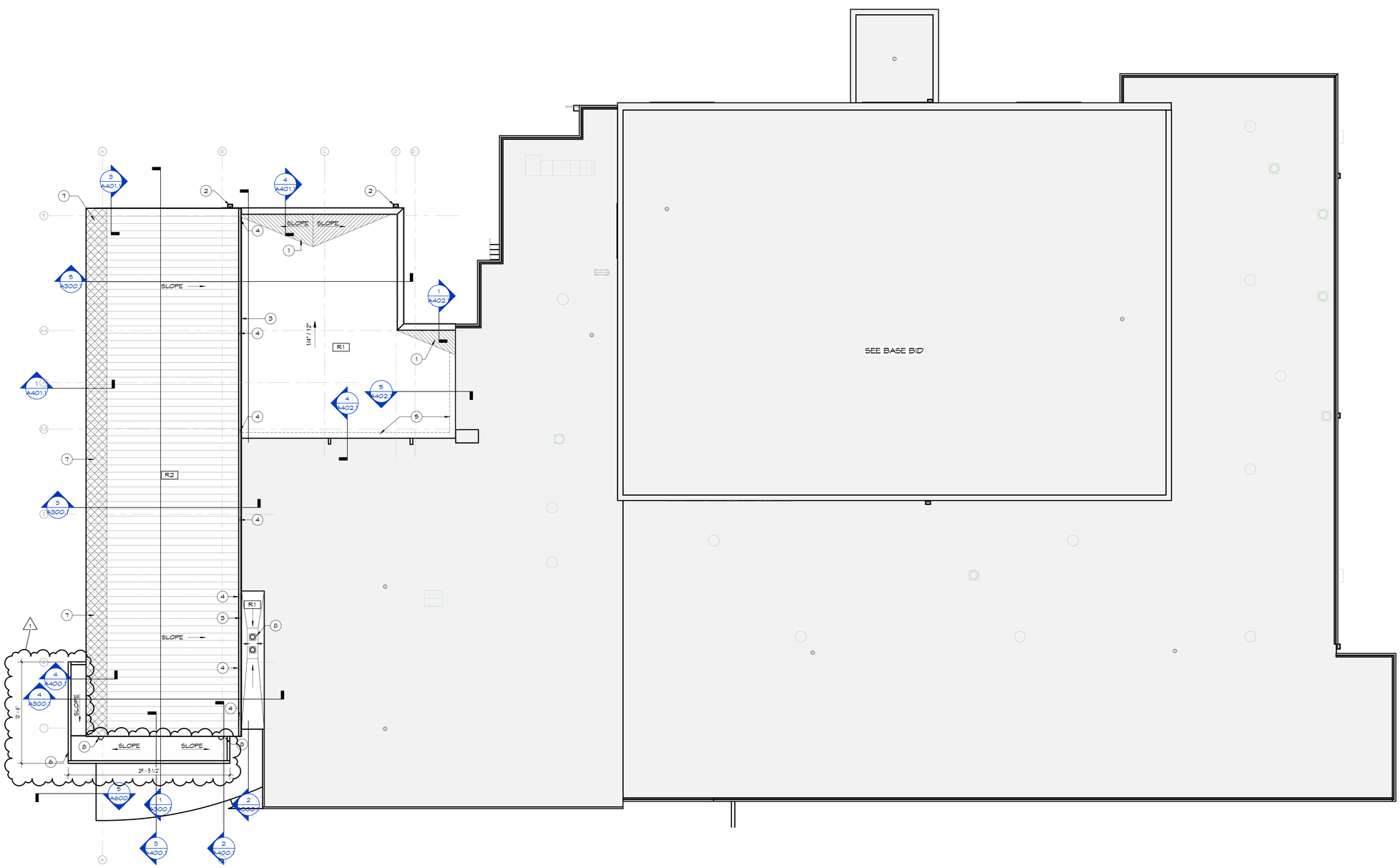
2 A102.1 SCUPPER DETAIL
SCALE: 1 1/2" = 1'-0"

GENERAL ROOF PLAN NOTES

1. PATCH AN REPAIR EXISTING ROOF TO REMAIN AS NEEDED FOR COORDINATION OF NEW WORK
2. NEW ROOF PENETRATIONS TO BE INSTALLED TO MAINTAIN WARRANTY OF EXISTING ROOF. COORDINATE WITH MECHANICAL, PLUMBING, AND ELECTRICAL DOCUMENTS TO CONFIRM LOCATIONS.

ROOF PLAN NOTES - ABI1

Key	Note
1	AREA OF TAPERED INSULATION TO ACHIEVE POSITIVE DRAINAGE
2	THRU-WALL SCUPPER WITH COLLECTION BOX AND 4" X 5" DOWNSPOUT, SEE DETAIL - 2/A102.1 AND 3/A102.1
3	6" PREMANUFACTURED GUTTER
4	ROOF DRAIN. SEE PLUMBING DRAWINGS FOR SCOPE
5	LINE OF EXISTING ROOF BELOW
6	PREMANUFACTURED / PREFINISHED METAL CANOPY SYSTEM
7	AREA OF TAPERED INSULATION
8	ROOF DRAIN AND OVERFLOW DRAIN. SEE PLUMBING DRAWINGS FOR DETAILS AND LEADER SIZE



NORTH

1 A102.1 Overall Roof Plan - ABI1
SCALE: 1/8" = 1'-0"

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Project Information

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1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON
REGISTERED
06/11/2012
STATE OF INDIANA
ARCHITECT

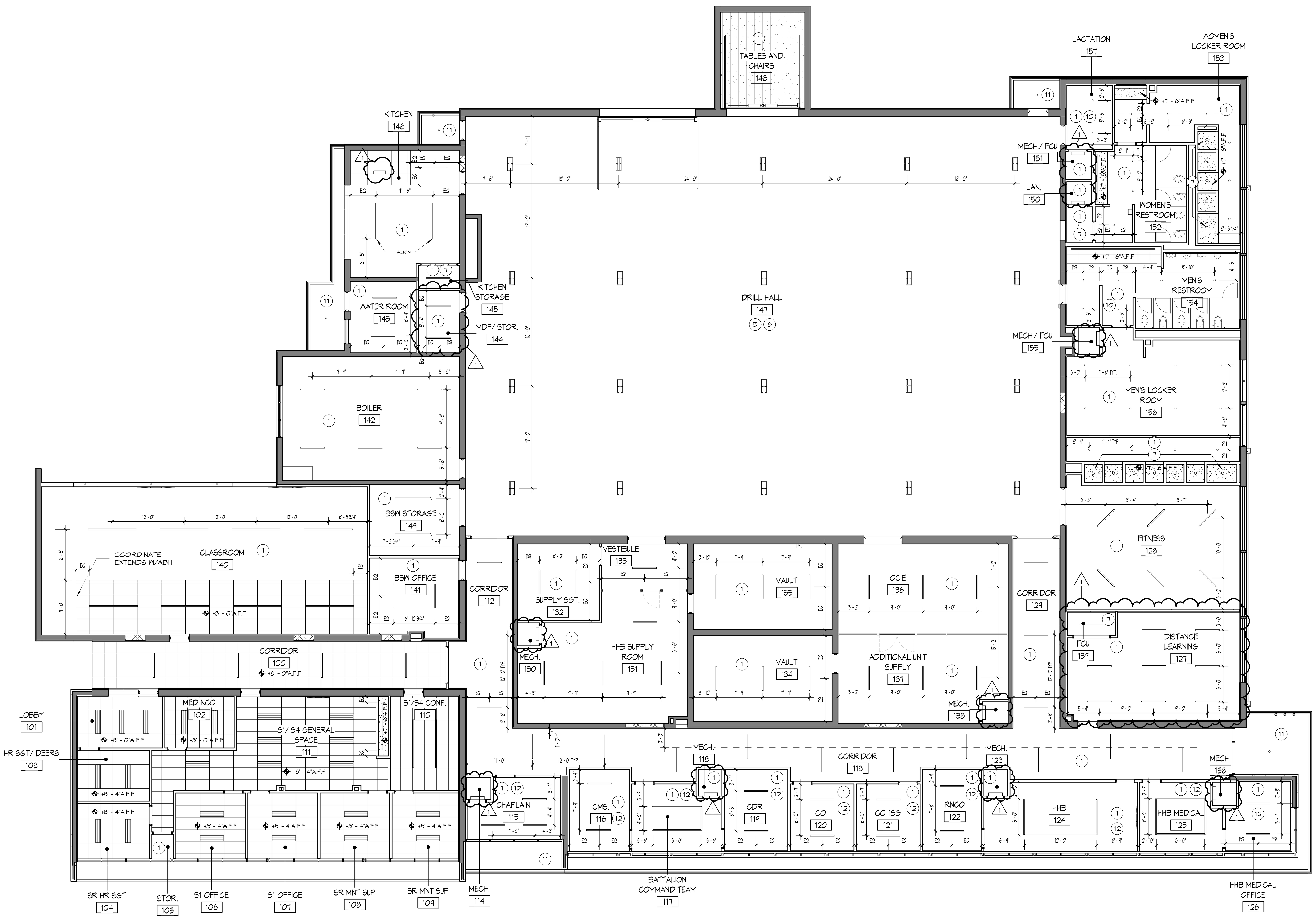
Bid Documents

5.23.2024
23043
Project Status

Overall Roof Plan

ABI 1

A102.1



1 A111 Reflected Ceiling Plan - Base Bid
SCALE: 1/8" = 1'-0"

GENERAL CEILING NOTES

A. LIGHTS, DIFFUSERS, AND SPRINKLER HEADS ARE SHOWN FOR LOCATION ONLY. SEE ENGINEERING DRAWINGS FOR ADDITIONAL INFORMATION

B. ALL WALLS TO EXTENDED TO DECK UNLESS NOTED OTHERWISE

C. DO NOT SCALE DRAWINGS.

D. REFERENCE MEP DRAWING FOR LOCATIONS OF DEVICES + EQUIPMENT.

E. INSTALL SPRINKLER HEADS, SMOKE ALARMS, LIGHT FIXTURES OR OTHER EXPOSED DEVICES AT CENTER OF ACOUSTICAL TILE (WHERE OCCURS), AT CENTER OF OFFICE (WHERE OCCURS), OR AT CENTER OF ROOM, UNO. IF DIMENSION TO LOCATE A SPECIFIC DEVICE IS GIVEN IN ONE DIRECTION, CONTRACTOR TO CENTER THE DEVICE ON CEILING OR SOFFIT IN OTHER DIRECTION. COORDINATE ALL DISCREPANCIES WITH INTERIOR DESIGNER PRIOR TO INSTALLATION.

F. REMOVE ALL BARCODE, TAGS, ETC. FROM CONDUIT, PIPING AND DUCTWORK PRIOR TO INSTALLATION. ROTATE PERMANENT MARKINGS TO CONCEAL.

G. ALL CEILING HEIGHTS INDICATED ARE FROM TOP OF FINISHED FLOOR, UNLESS NOTED OTHERWISE.

H. AT ALL EXPOSED CEILING CONDITIONS, COORDINATE ALL WIRING, CONDUIT, DUCTS, ETC. FOR AN ORGANIZED FINISHED LOOK.

I. SEE INTERIOR ELEVATIONS / SECTIONS / DETAILS FOR ADDITIONAL INFORMATION ON FINISHED SOFFIT, BULKHEAD, CEILING, ETC. WHERE NOT INDICATED ON REFLECTED CEILING PLAN.

J. REFER TO ADDITIONAL NOTES AND REQUIREMENTS ON ALL OTHER DOCUMENTS AND OTHER DISCIPLINES' DOCUMENTS.

K. PAINT ALL STRUCTURE EXPOSED TO VIEW UNLESS NOTED OTHERWISE. PAINT ALL EXPOSED CONDUIT, PIPE, DUCTWORK, ETC.

L. PAINT ALL GYPSUM BOARD CEILINGS, SEE FINISH SCHEDULE FOR PAINT COLOR.

M. COORDINATE LOCATION OF ALL LIGHT SWITCHES AND THERMOSTATS WITH INTERIOR DESIGNER AND OWNER PRIOR TO CONSTRUCTION.

N. INSTALL MECHANICAL AND PLUMBING WORK TIGHT TO STRUCTURAL ELEMENTS TO MAINTAIN MAXIMUM CEILING HEIGHT, UNLESS NOTED OTHERWISE.

O. COORDINATE WITH ALL TRADES INVOLVED AND COMPARE COMPOSITE SHOP DRAWINGS TO ENSURE CLEARANCES FOR LIGHT FIXTURES, DUCT WORK, CEILINGS, CABLING, ETC. NECESSARY TO MAINTAIN THE SPECIFIED FINISH CEILING HEIGHT ABOVE THE FINISH FLOOR SLAB AS NOTED ON THE DRAWINGS. CLARIFY CONFLICTS WITH INTERIOR DESIGNER IMMEDIATELY.

P. PREPARE AND SUBMIT THE FOLLOWING DRAWINGS TO THE INTERIOR DESIGNER AND MECHANICAL ENGINEER FOR REVIEW AND COORDINATION PRIOR TO ORDER OR FABRICATION OF MATERIALS AND / OR INSTALLATION OF SYSTEM:
   A. HVAC DRAWINGS.
   B. ELECTRICAL DRAWINGS, INCLUDING SWITCH LOCATIONS
   C. SPRINKLER DIAGRAMS AND HEAD LOCATIONS.

Q. WORK SHALL BE COMPLETED IN ACCORDANCE WITH ALL APPLICABLE BUILDING AND ENERGY CODES.

R. PAINT ALL EXPOSED CEILING AND ALL VISIBLE AREAS ABOVE DECORATIVE CEILINGS.

CEILING PLAN NOTES

Key	Note
1	OPEN TO STRUCTURE. EXPOSED CEILING & MEP TO BE PAINTED PT1
2	BULKHEAD
3	PREMANUFACTURED / PREFINISHED METAL CANOPY SYSTEM
4	PROVIDE SOUND ATTENUATION BLANKET ON TOP OF CEILING TILES
5	ACT3 COLORS TO BE SPLIT 50/50 AND INSTALLED TIGHT TO DECK AT RANDOM. SEE ID001 FOR PRODUCT INFO
6	EXPOSED CEILING TO BE PAINTED PT7
7	CENTER FIXTURE IN ROOM
8	BOTTOM OF FIXTURE TO BE MOUNTED AT 7'-6" AFF
9	BOTTOM OF FIXTURE TO BE MOUNTED AT 9'-0" AFF
10	COORDINATE LIGHT FIXTURE PLACEMENT WITH NEW MEP
11	<varies>
12	BOTTOM OF FIXTURE TO BE MOUNTED AT 7'-8 "AFF & ALIGN WITH LOWEST HEIGHT OF MEP

CEILING LEGEND

CL1 - ACOUSTICAL PANEL CEILING
2X4 LAY-IN CEILING

CL2 - SUSPENDED 5/8" GYPSUM BOARD CEILING

ACT3 - ACOUSTIC FELT CEILING TILE
TOP OF CEILING @ 17' - 0"

CL3 - ACOUSTIC FELT BLADES - SEE ID SHEETS FOR HANGING HEIGHT

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Architect / Structural Engineer

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317.344.8044
Consultant Information

BLOOMINGTON READINESS CENTER MODERNIZATION

3380 S. Walnut St.
Bloomington, IN 47401
Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

Bid Documents
5.23.2024
23043
Project Status

First Floor RCP

Base Bid

A111

NORTH

1 A111.1 Reflecting Ceiling Plan - ABI 1
SCALE: 1/8" = 1'-0"

GENERAL CEILING NOTES

A. LIGHTS, DIFFUSERS, AND SPRINKLER HEADS ARE SHOWN FOR LOCATION ONLY. SEE ENGINEERING DRAWINGS FOR ADDITIONAL INFORMATION

B. ALL WALLS TO EXTENDED TO DECK UNLESS NOTED OTHERWISE

C. DO NOT SCALE DRAWINGS.

D. REFERENCE MEP DRAWING FOR LOCATIONS OF DEVICES + EQUIPMENT.

E. INSTALL SPRINKLER HEADS, SMOKE ALARMS, LIGHT FIXTURES OR OTHER EXPOSED DEVICES AT CENTER OF ACOUSTICAL TILE (WHERE OCCURS), AT CENTER OF OFFICE (WHERE OCCURS), OR AT CENTER OF ROOM, UNO. IF DIMENSION TO LOCATE A SPECIFIC DEVICE IS GIVEN IN ONE DIRECTION, CONTRACTOR TO CENTER THE DEVICE ON CEILING OR SOFFIT IN OTHER DIRECTION. COORDINATE ALL DISCREPANCIES WITH INTERIOR DESIGNER PRIOR TO INSTALLATION.

F. REMOVE ALL BARCODE, TAGS, ETC. FROM CONDUIT, PIPING AND DUCTWORK PRIOR TO INSTALLATION. ROTATE PERMANENT MARKINGS TO CONCEAL.

G. ALL CEILING HEIGHTS INDICATED ARE FROM TOP OF FINISHED FLOOR, UNLESS NOTED OTHERWISE.

H. AT ALL EXPOSED CEILING CONDITIONS, COORDINATE ALL WIRING, CONDUIT, DUCTS, ETC. FOR AN ORGANIZED FINISHED LOOK.

I. SEE INTERIOR ELEVATIONS / SECTIONS / DETAILS FOR ADDITIONAL INFORMATION ON FINISHED SOFFIT, BULKHEAD, CEILING, ETC. WHERE NOT INDICATED ON REFLECTED CEILING PLAN.

J. REFER TO ADDITIONAL NOTES AND REQUIREMENTS ON ALL OTHER DOCUMENTS AND OTHER DISCIPLINES' DOCUMENTS.

K. PAINT ALL STRUCTURE EXPOSED TO VIEW UNLESS NOTED OTHERWISE. PAINT ALL EXPOSED CONDUIT, PIPE, DUCTWORK, ETC.

L. PAINT ALL GYPSUM BOARD CEILINGS, SEE FINISH SCHEDULE FOR PAINT COLOR.

M. COORDINATE LOCATION OF ALL LIGHT SWITCHES AND THERMOSTATS WITH INTERIOR DESIGNER AND OWNER PRIOR TO CONSTRUCTION.

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CEILING PLAN NOTES

Key	Note
1	OPEN TO STRUCTURE. EXPOSED CEILING & MEP TO BE PAINTED PT1
2	BULKHEAD
3	PREMANUFACTURED / PREFINISHED METAL CANOPY SYSTEM
4	PROVIDE SOUND ATTENUATION BLANKET ON TOP OF CEILING TILES
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2X4 LAY-IN CEILING

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CEILING TILE
TOP OF CEILING @ 17' - 0"

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FOR HANGING HEIGHT

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Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON REGISTERED ABI 11400012 STATE OF INDIANA ARCHITECT

Bid Documents

5.23.2024
23043

Project Status

First Floor RCP

ABI 1

A111.1

1 A111.5 Reflecting Ceiling Plan - ABI 5
SCALE: 1/8" = 1'-0"

GENERAL CEILING NOTES

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Consultant Information

BLOOMINGTON READINESS CENTER MODERNIZATION

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Bloomington, IN 47401

Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON REGISTERED ARCHITECT STATE OF INDIANA

Bid Documents

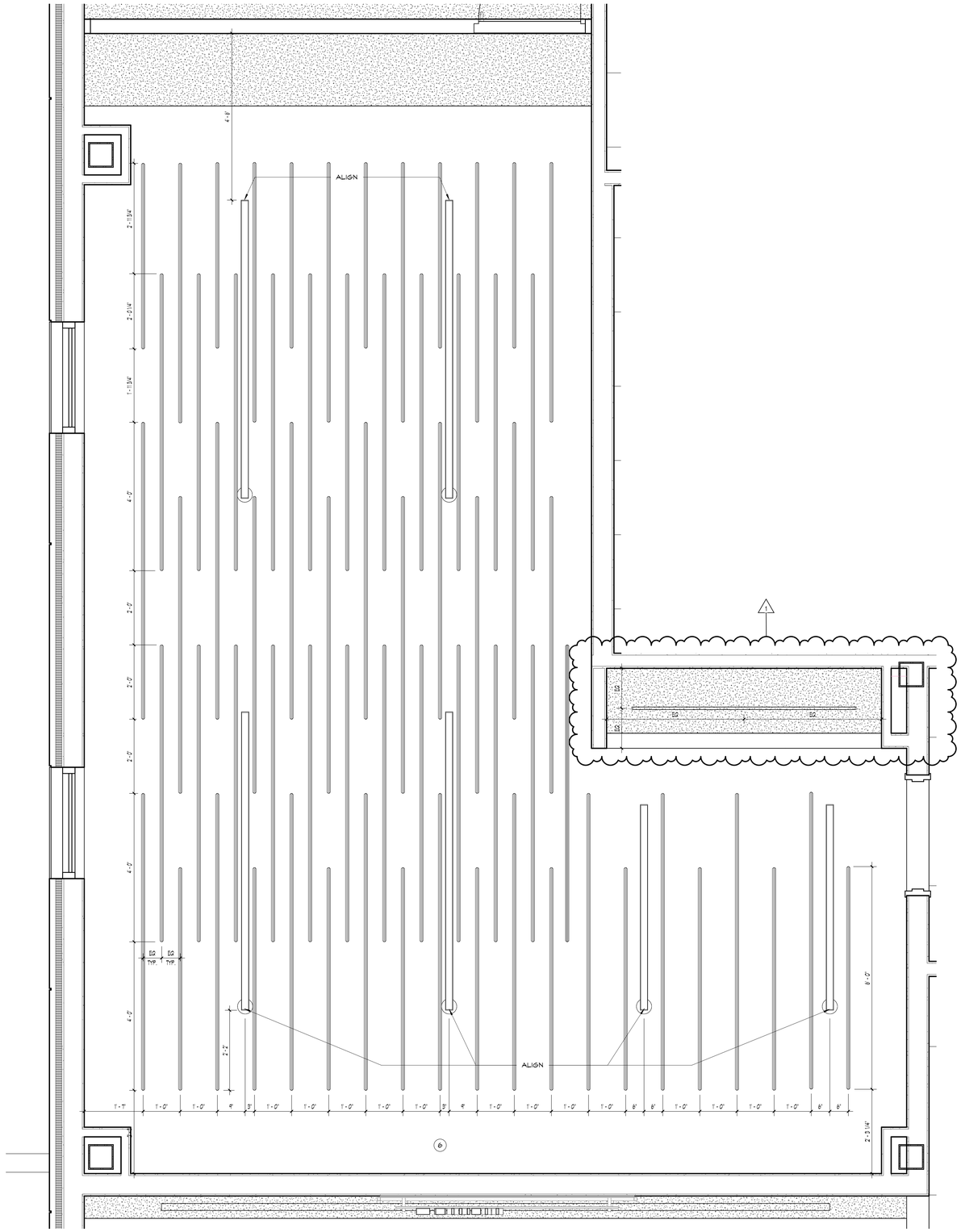
5.23.2024
23043

Project Status

First Floor RCP

ABI 5

A111.5



1 A112.1 Enlarged First Floor RCP
SCALE: 3/4" = 1'-0"

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2X4 LAY-IN CEILING

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CEILING TILE
TOP OF CEILING @ 17' - 0"

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BLADES - SEE ID SHEETS
FOR HANGING HEIGHT

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BLOOMINGTON READINESS CENTER MODERNIZATION

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Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON ARCHITECT
AP.11.2012
STATE OF INDIANA
ARCHITECT

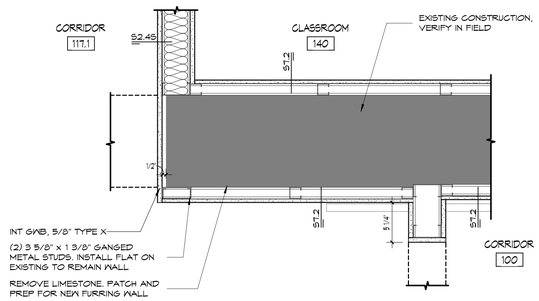
Bid Documents

5.23.2024
23043
Project Status

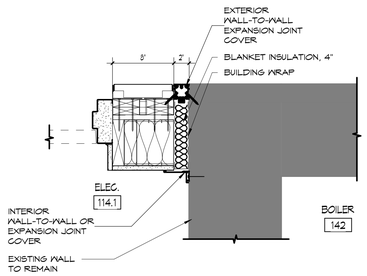
Enlarged First Floor RCP

ABI 1

A112.1



8 Plan Detail
A131.1 SCALE: 1 1/2" = 1'-0"



7 Plan Detail
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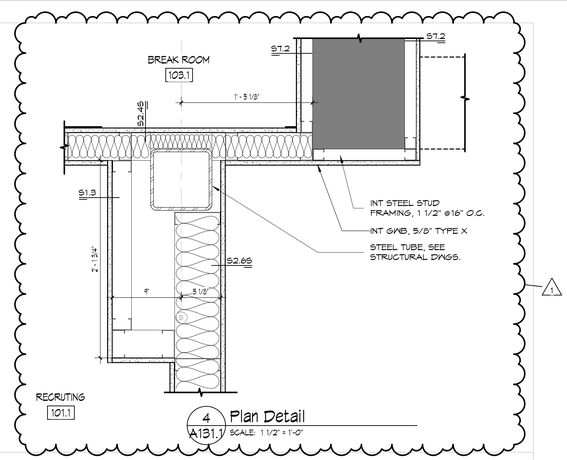

4 Plan Detail
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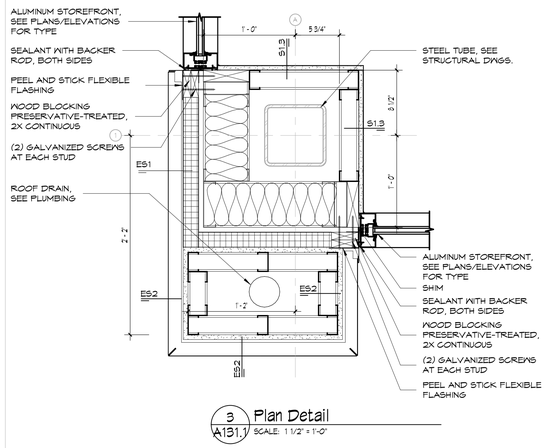
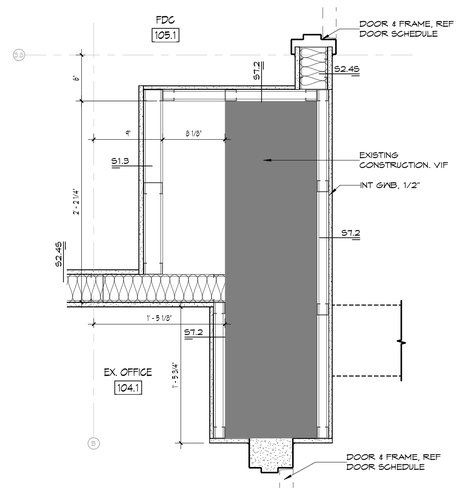
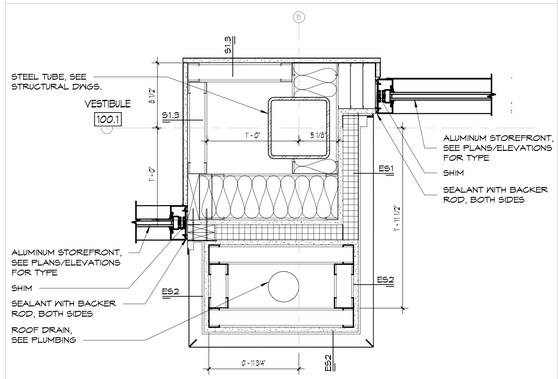


3 Plan Detail
A131.1 SCALE: 1 1/2" = 1'-0"



6 Plan Detail
A131.1 SCALE: 1 1/2" = 1'-0"



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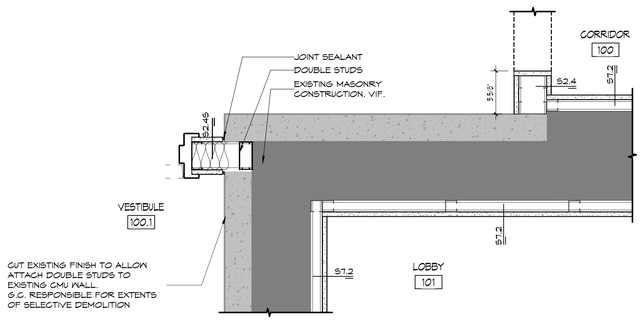
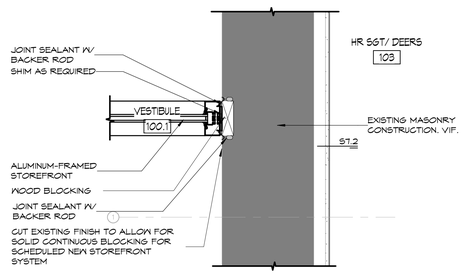
A131.1 SCALE: 1 1/2" = 1'-0"



5 Plan Detail
A131.1 SCALE: 1 1/2" = 1'-0"



1 Plan Detail
A131.1 SCALE: 1 1/2" = 1'-0"

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Consultant Information

BLOOMINGTON READINESS CENTER MODERNIZATION

3330 S. Walnut St.
Bloomington, IN 47401
Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON
REGISTERED
AP. 11, 2012
STATE OF INDIANA
ARCHITECT

Bid Documents

5.23.2024
23043
Project Status

Plan Details

ABI 1

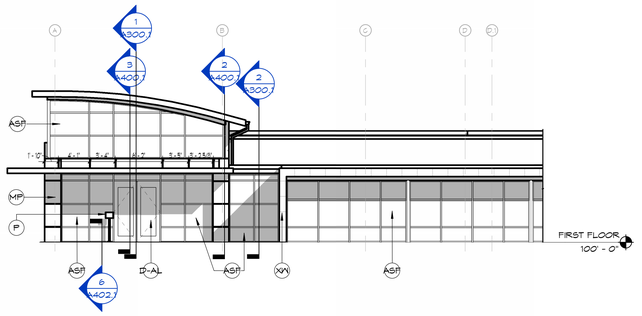
A131.1

ELEVATION NOTES

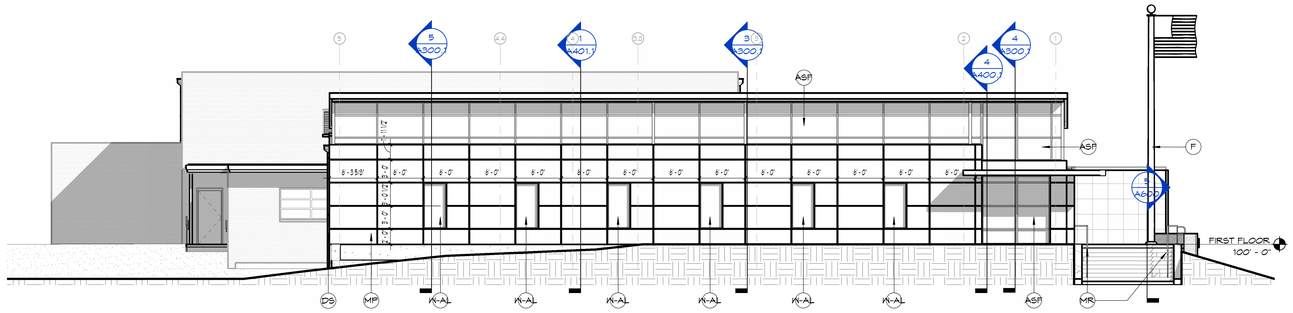
1. FINISH FLOOR ELEVATIONS SHOWN ON EXTERIOR ELEVATIONS AND SECTIONS ARE TO TOP OF SLAB ON GRADE.
2. ALL EXTERIOR EXHAUST VENTS TO BE PREFINISHED, COLOR TO CLOSELY MATCH ADJACENT MATERIAL. SEE MATERIAL LEGEND BELOW FOR COLOR.
3. ALL EXTERIOR FINISHES AND COLORS ARE TO WRAP OUTSIDE CORNERS AND RETURN TO INSIDE CORNERS UNLESS NOTED OTHERWISE - SEE PLANS FOR REFERENCE OF WALL RETURNS.
4. ALL EXISTING MASONRY TO BE CLEANED

ELEVATION NOTES - ABI1

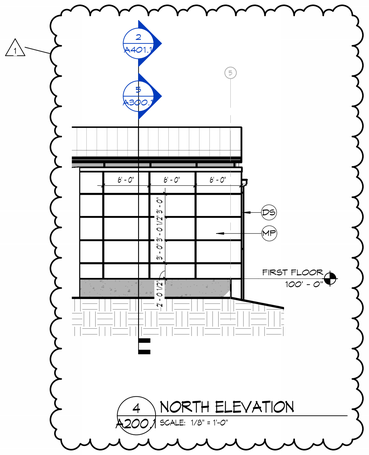
Key	Note
ASF	PREFINISHED ALUMINUM CURTAINWALL SYSTEM
D-AL	ALUMINUM STOREFRONT DOOR
D-HM	HOLLOW METAL DOOR AND FRAME, SEE DOOR SCHEDULE
DS	MANUFACTURED METAL DOWNSPOU
F	FLAG POLE
MP	SIDING - METAL PANEL
MR	METAL RAILING PAINTED
P	PEDESTAL W/ CALL BOX. SEE TECH DRAWINGS. MOUNT KNOX BOX ON PEDESTAL
W-AL	WINDOW - ALUMINUM
XN	EXISTING EXTERIOR WALL TO REMAIN



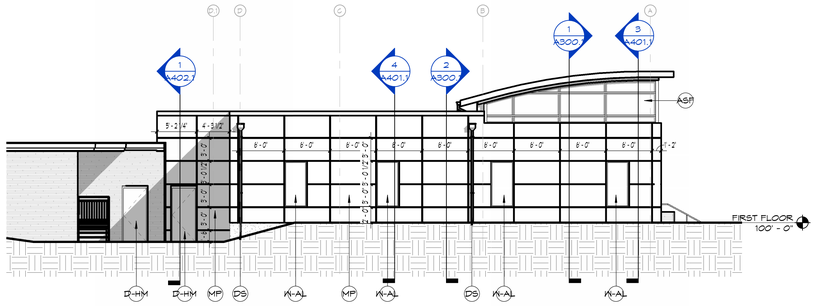
1 A200.1 EAST ELEVATION
SCALE: 1/8" = 1'-0"



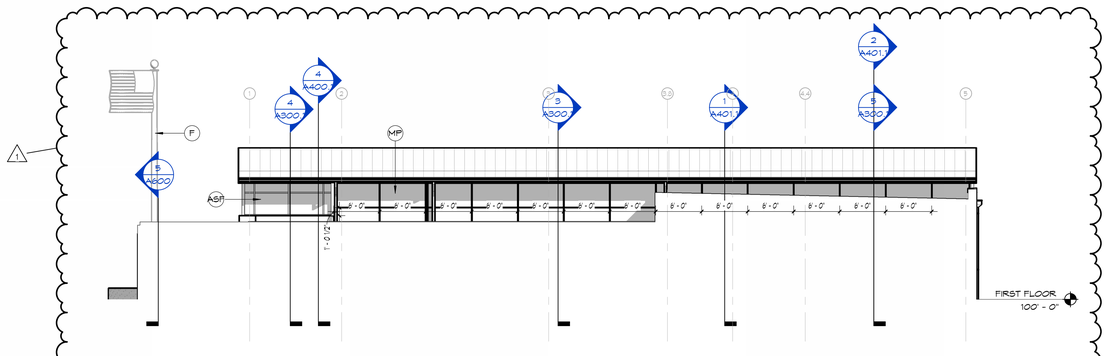
2 A200.1 SOUTH ELEVATION
SCALE: 1/8" = 1'-0"



4 A200.1 NORTH ELEVATION
SCALE: 1/8" = 1'-0"



3 A200.1 WEST ELEVATION
SCALE: 1/8" = 1'-0"



5 A200.1 NORTH ELEVATION 2
SCALE: 1/8" = 1'-0"

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3380 S. Walnut St.
Bloomington, IN 47401

Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON
REGISTERED
06/11/24
STATE OF
INDIANA
ARCHITECT

Bid Documents

5.23.2024
23043

Project Status

Overall Elevations

ABI 1

A200.1

CLEANING/REPAIR NOTES

1. SEE A200 FOR REFERENCE TO LOCATIONS BELOW AND WORK TO BE COMPLETED.
2. MASONRY CLEANING TO BE COMPLETE FOR ALL EXISTING STONE PER SPEC SECTION 040110.
3. REPAIR MASONRY IN LOCATIONS INDICATED ON A200 AND PER SPEC SECTION 040140.61.
4. CAULKING AT STONE TO BE REMOVED AND REPAIRED IN LOCATIONS INDICATED ON A200 AND PER SPEC SECTION 079200.

13 STONE CLEANING

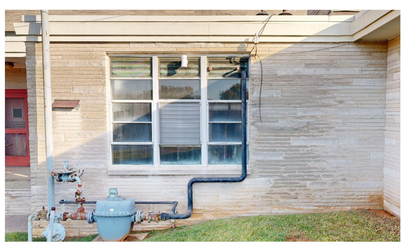
12 STONE CLEANING

11 STONE CLEANING AND CAULKING

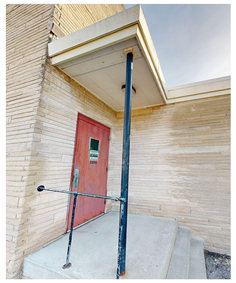
10 STONE CLEANING

09 STONE CLEANING AND CAULKING

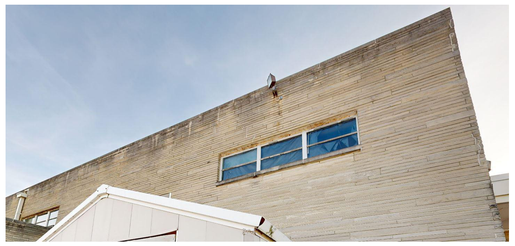
08 PAINTING



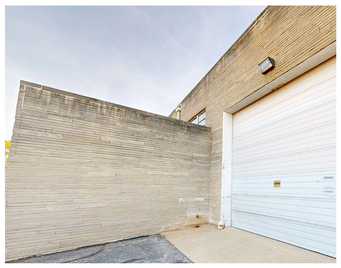
07 STONE CLEANING



06 STONE CLEANING, PAINT COLUMN AND RAILING

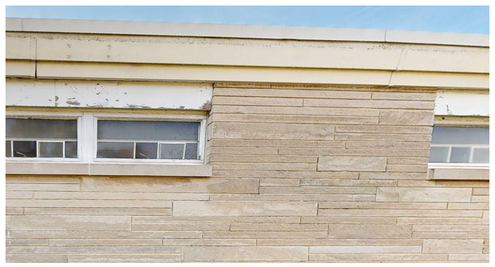


05 STONE CLEANING



04 STONE CLEANING

03 STONE CLEANING



02 PAINTING

01 STONE CLEANING AND CAULKING

STUDIO M
ARCHITECTURE & PLANNING

275 Veterans Way
Carmel, Indiana 46032
317.810.1502

Architect / Structural Engineer

Indiana Army National Guard
711 North Pennsylvania St.
Tyndall Armory
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Client Information

Civil & Environmental
Consultants, Inc
530 E. Ohio Street, Suite G
Indianapolis, IN 46204

Consultant Information

275 Veterans Way Suite 300
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317.344.8044

Consultant Information

BLOOMINGTON READINESS CENTER MODERNIZATION

3380 S. Walnut St.
Bloomington, IN 47401

Project Information

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Revisions

MICHAEL JOHNSON
REGISTERED
AP 11512
STATE OF INDIANA
ARCHITECT

Bid Documents

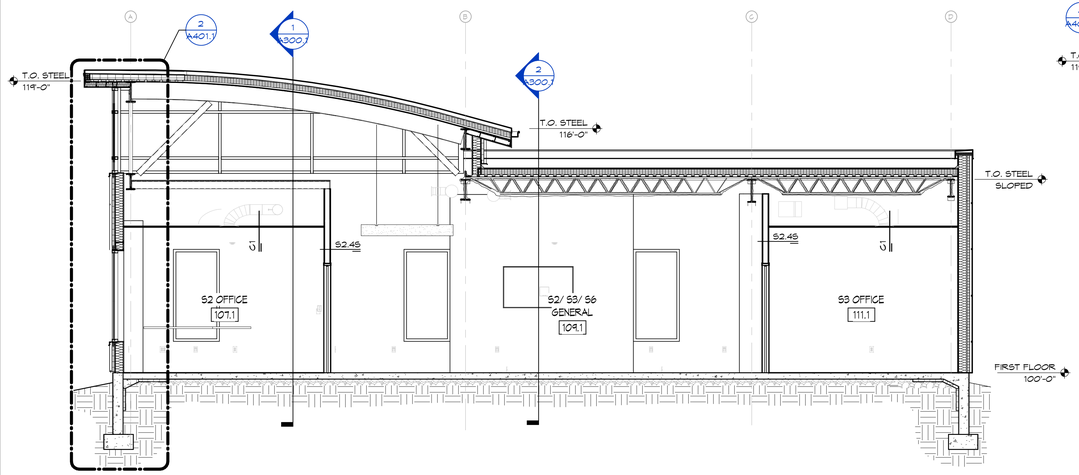
5.23.2024
23043

Project Status

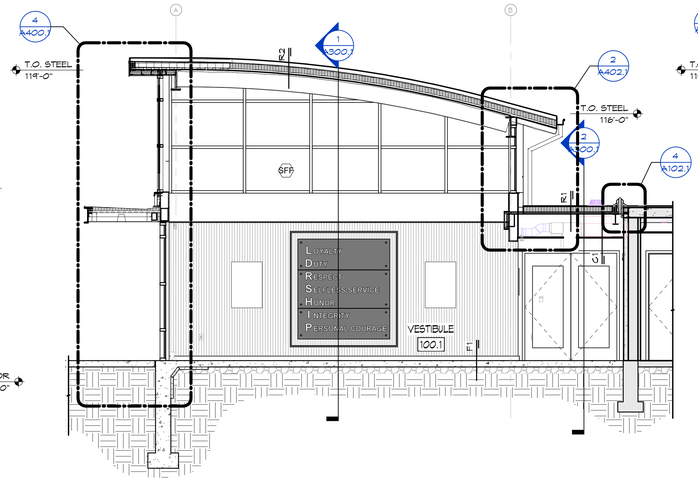
Elevations Repair Reference Images

Base Bid

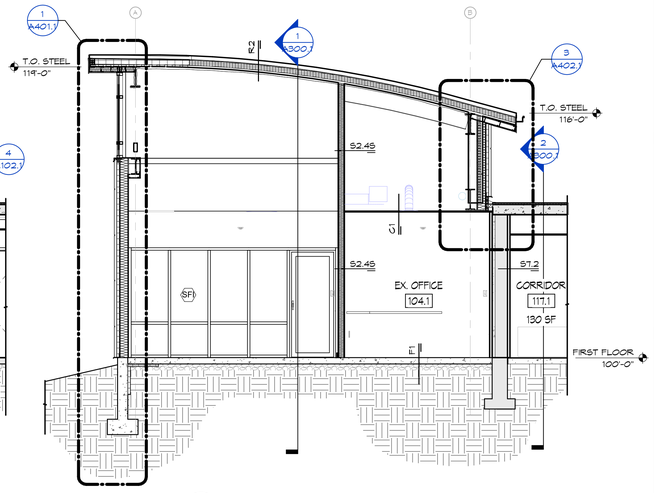
A203



5 A300.1 Building Section
SCALE: 1/4" = 1'-0"



4 A300.1 Building Section
SCALE: 1/4" = 1'-0"



3 A300.1 Building Section
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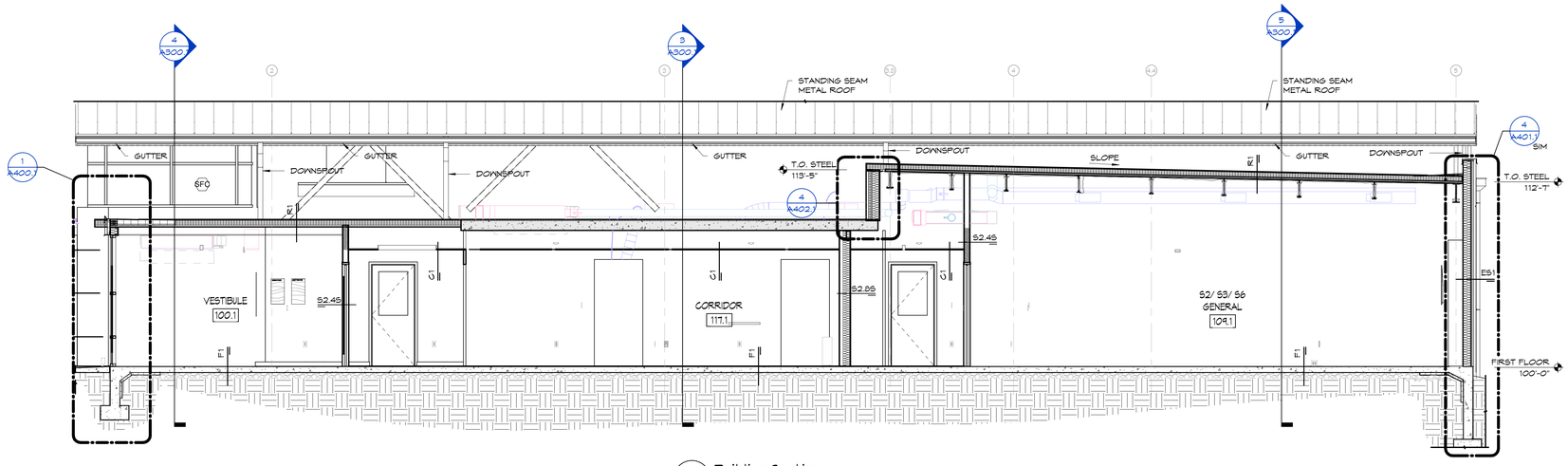

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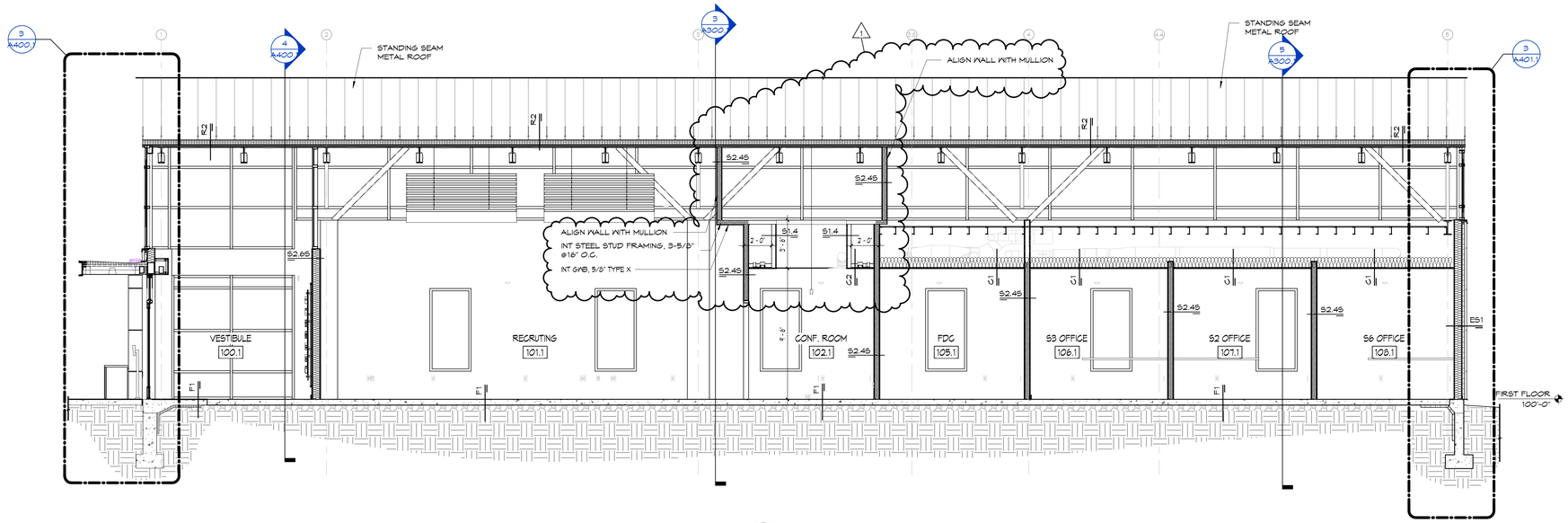

1 A300.1 Building Section
SCALE: 1/4" = 1'-0"

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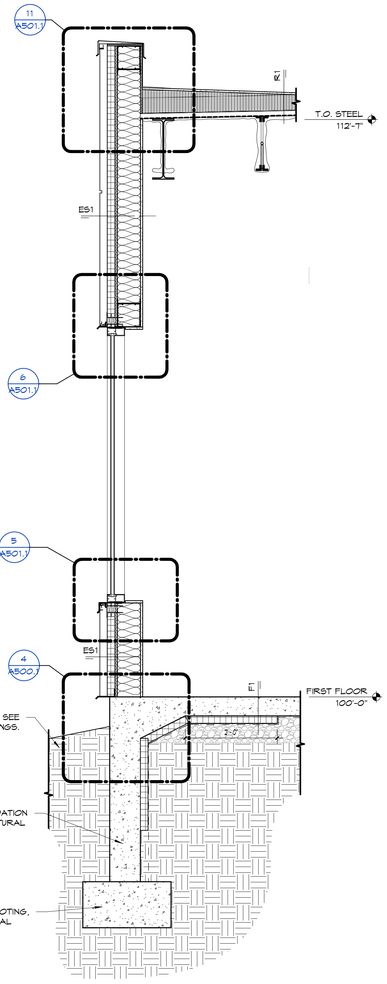
Project Status

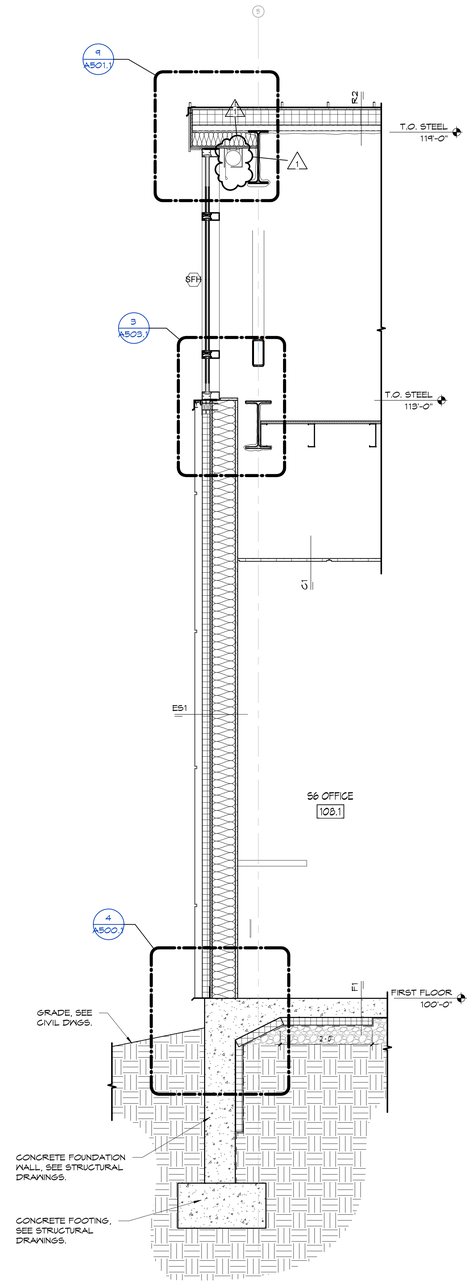
Building Sections

ABI 1

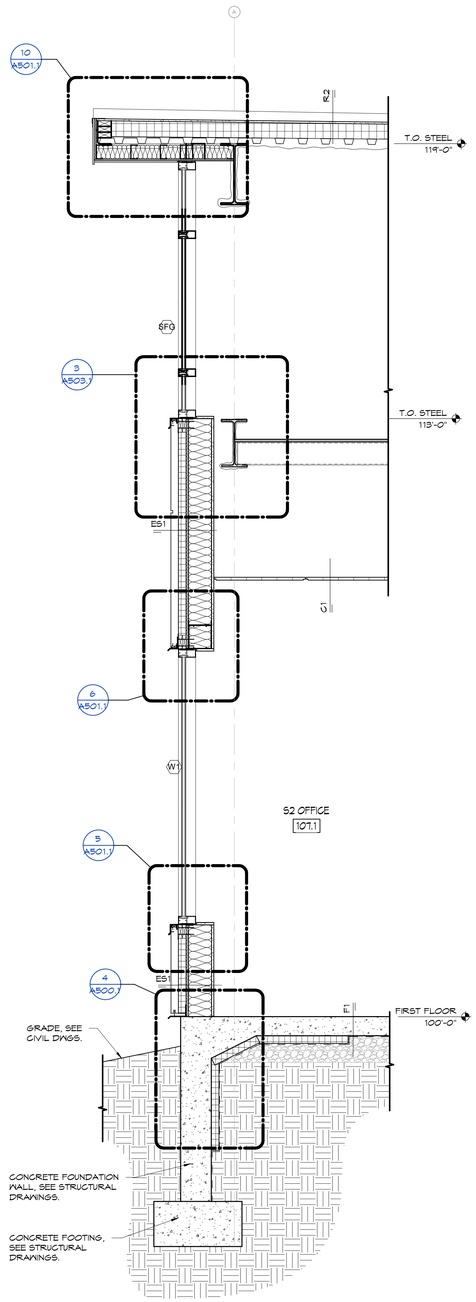
A300.1



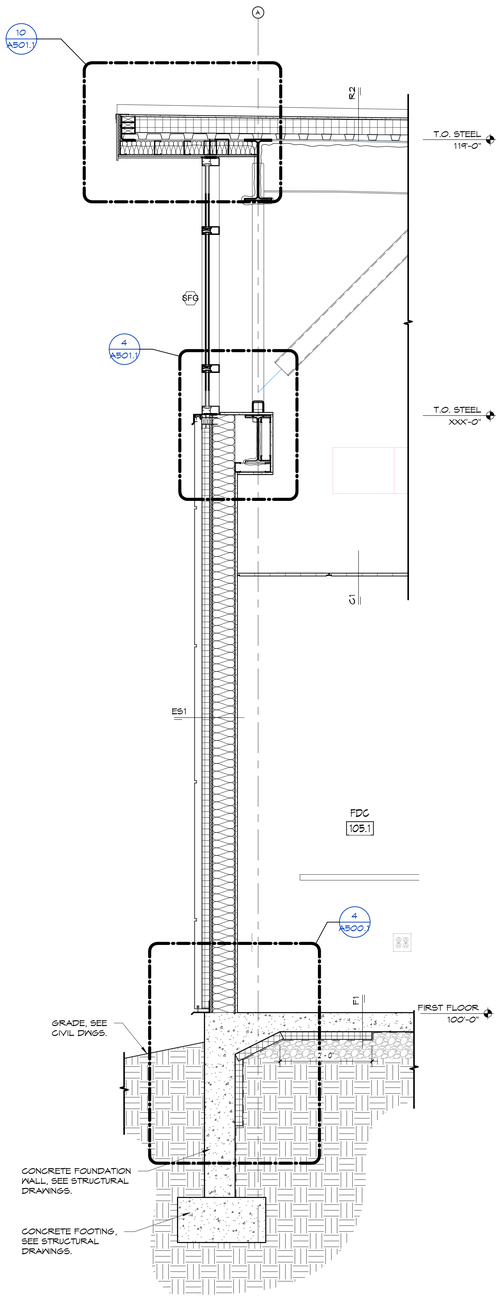
4 Wall Section
A401.1 SCALE: 3/4" = 1'-0"



3 Wall Section
A401.1 SCALE: 3/4" = 1'-0"



2 Wall Section
A401.1 SCALE: 3/4" = 1'-0"



1 Wall Section
A401.1 SCALE: 3/4" = 1'-0"

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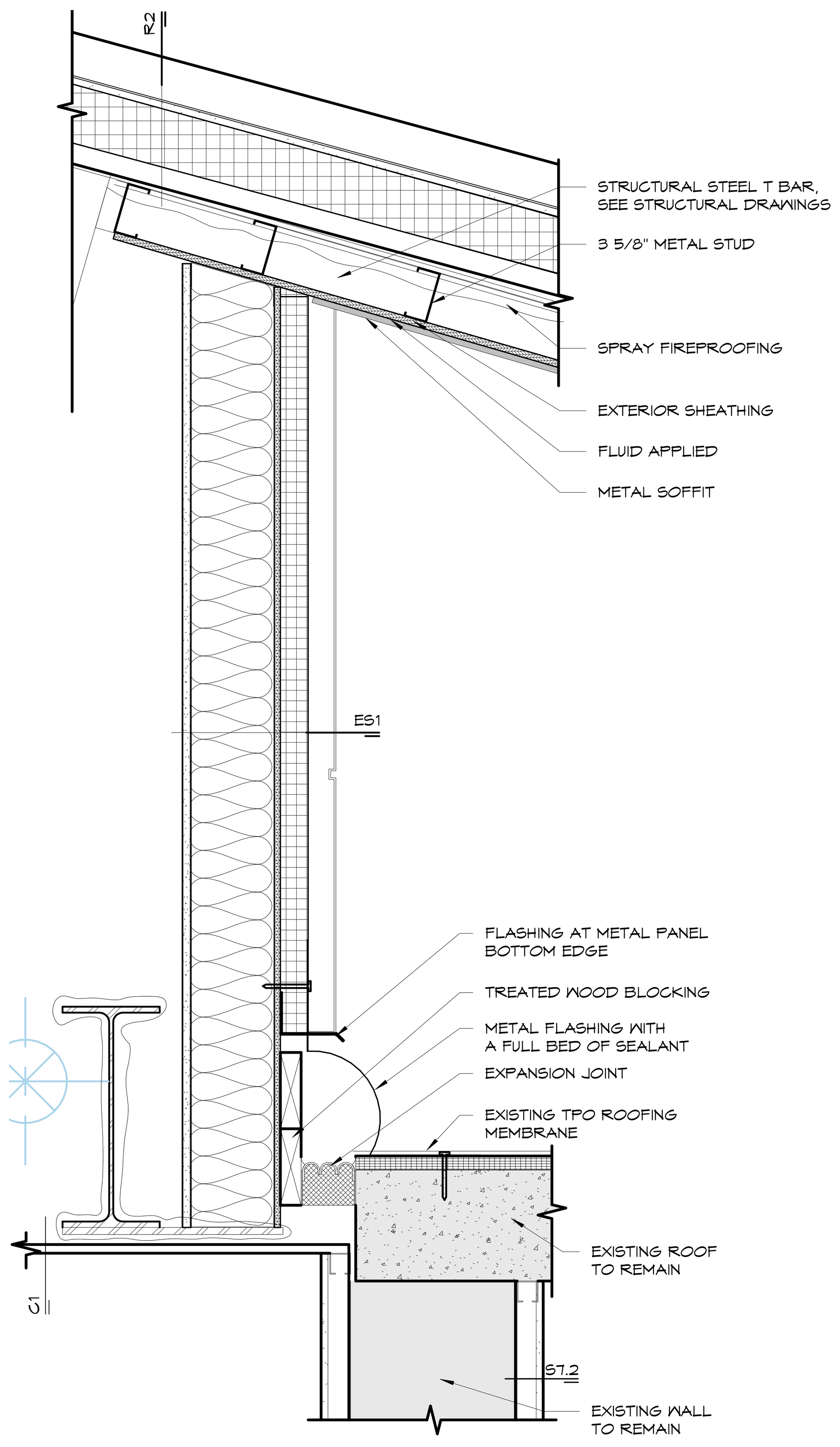
Project Status

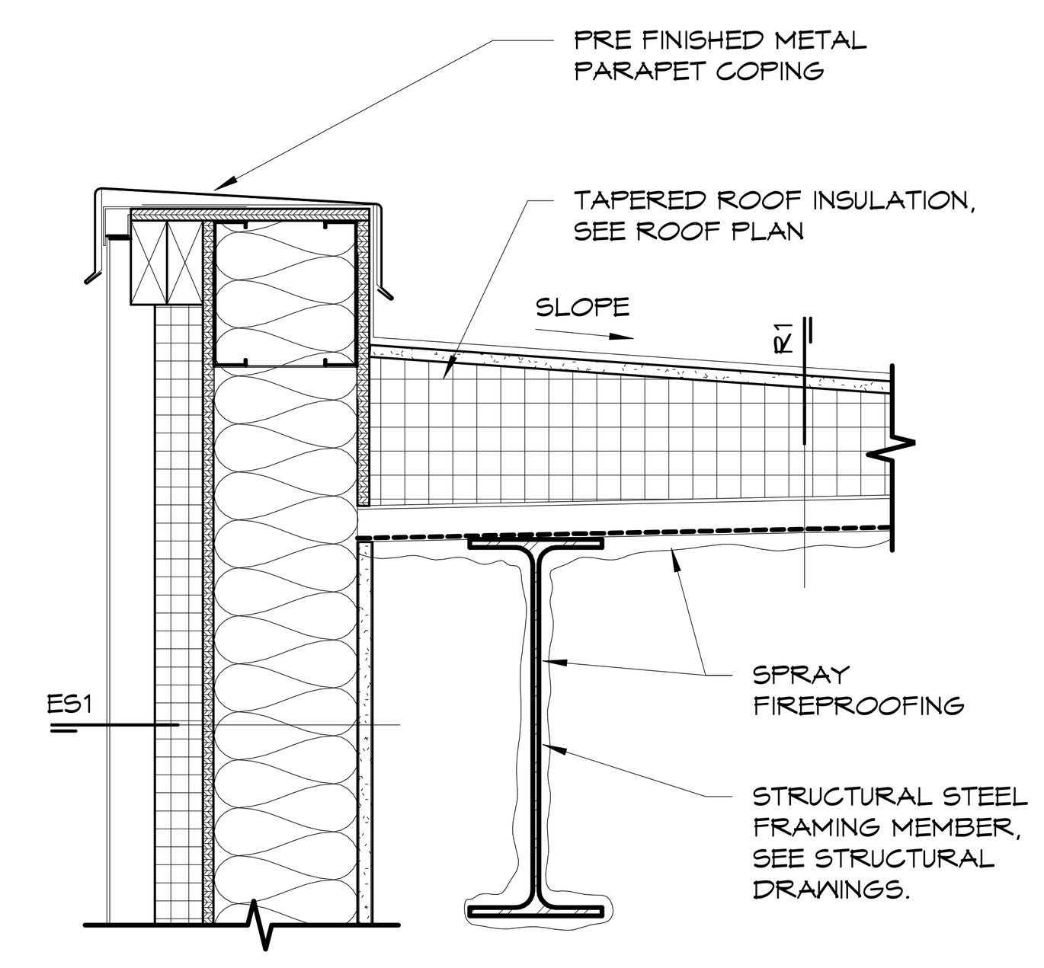
Wall Sections

ABI 1

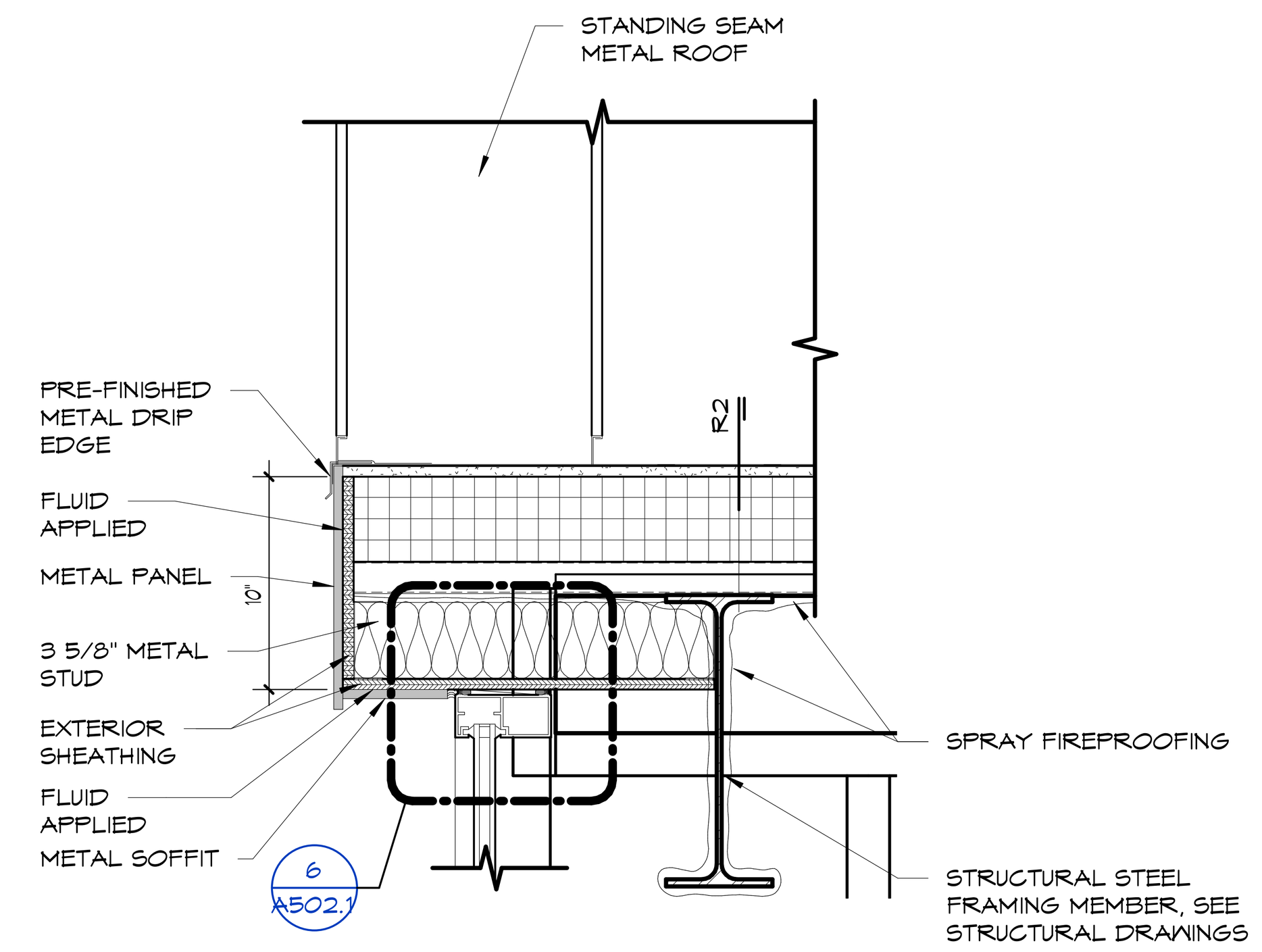
A401.1



13 Section Detail A501.1 SCALE: 1 1/2" = 1'-0"



11 Section Detail A501.1 SCALE: 1 1/2" = 1'-0"



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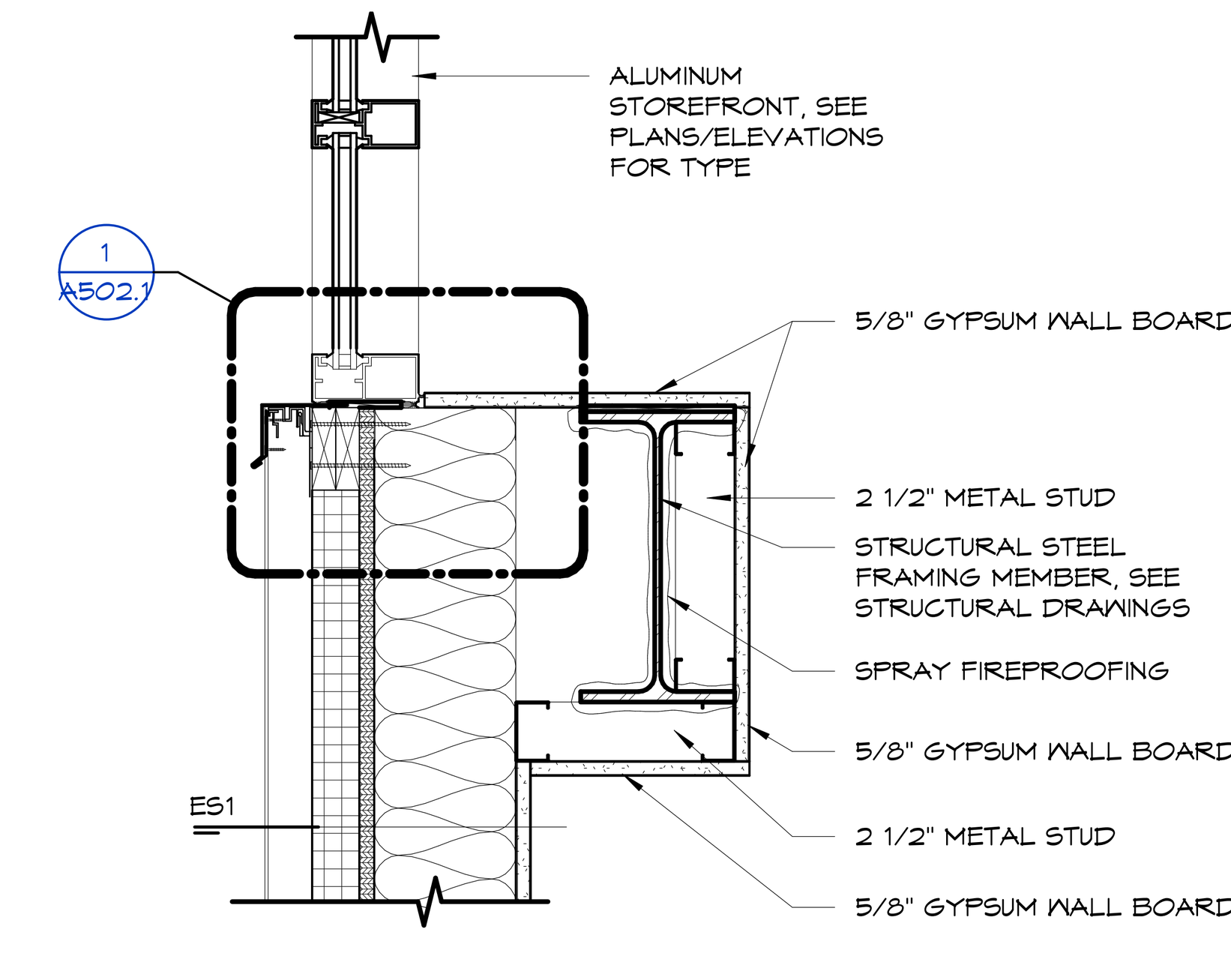
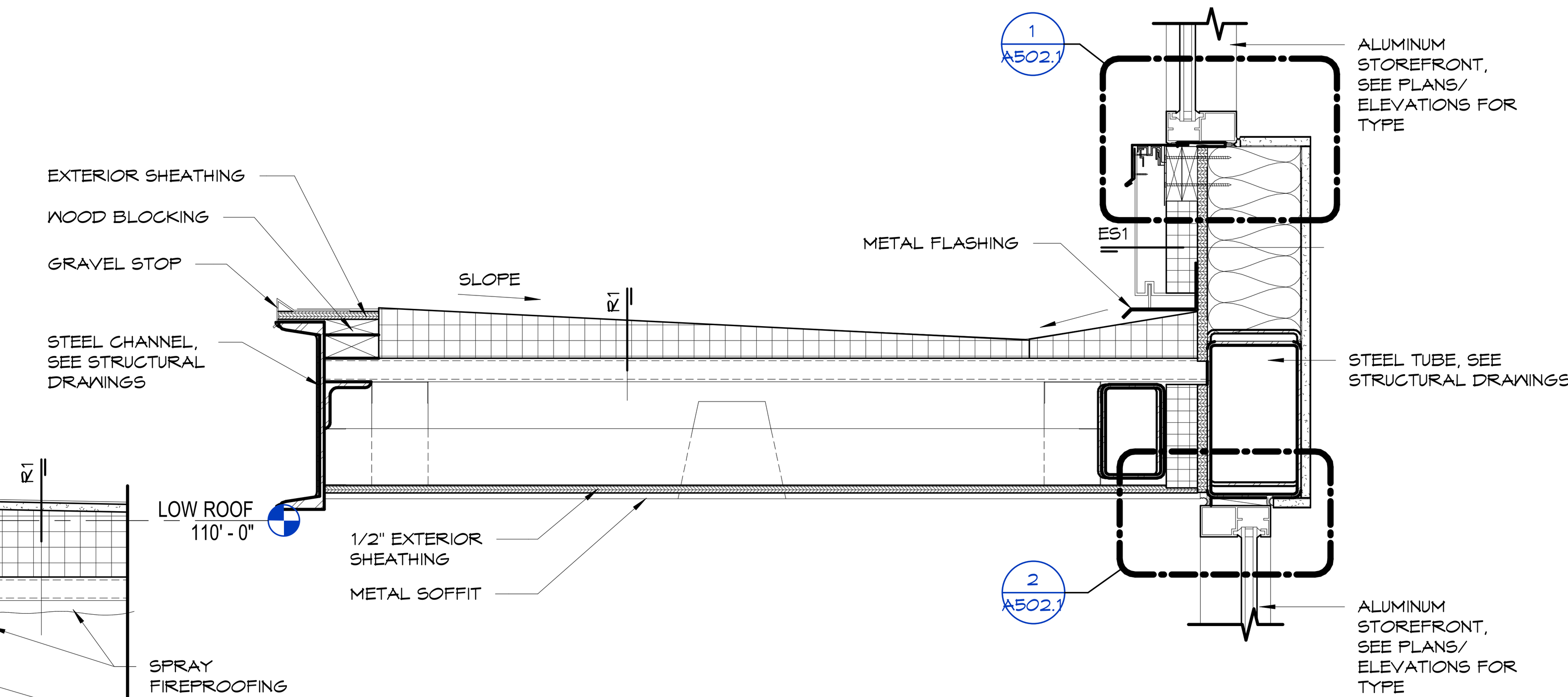


4 Section Detail A501.1 SCALE: 1 1/2" = 1'-0"



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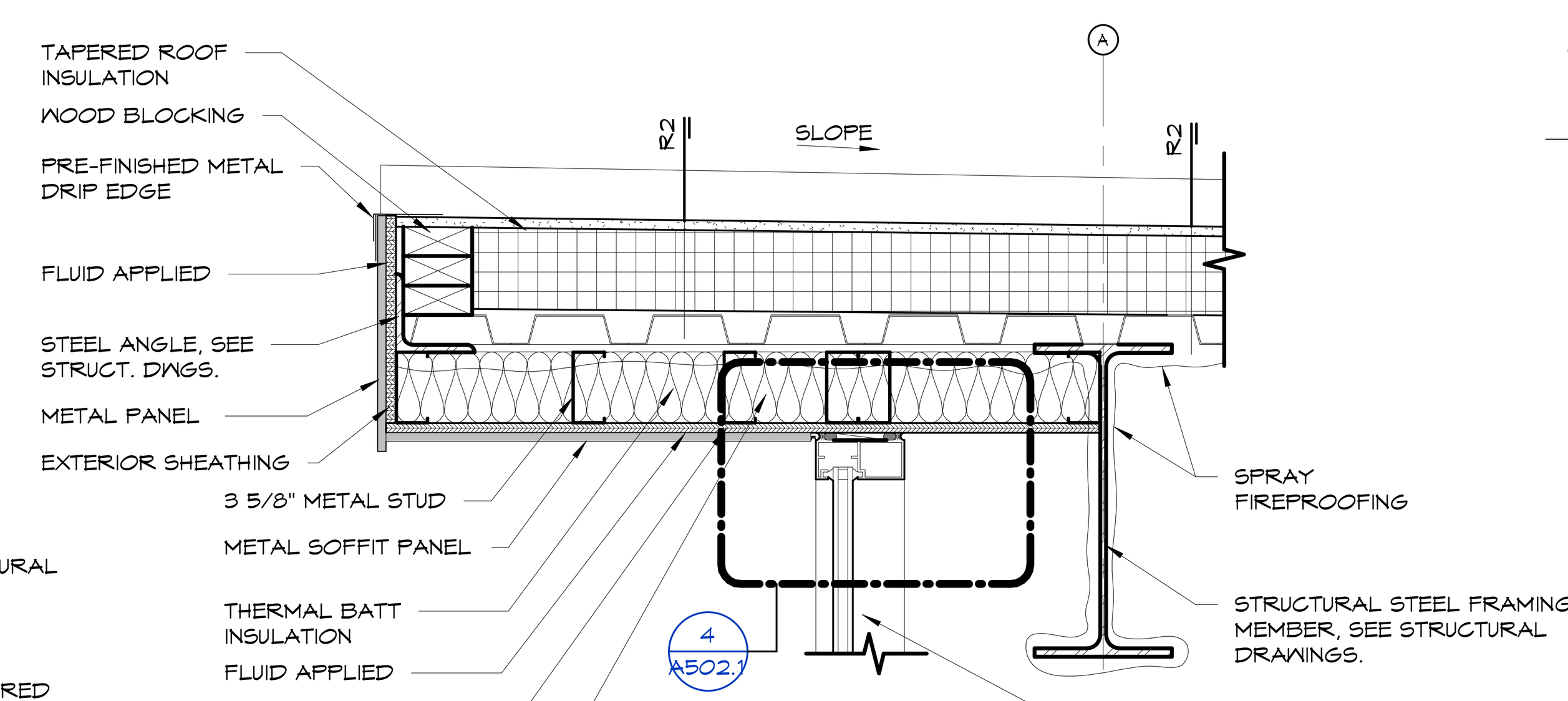
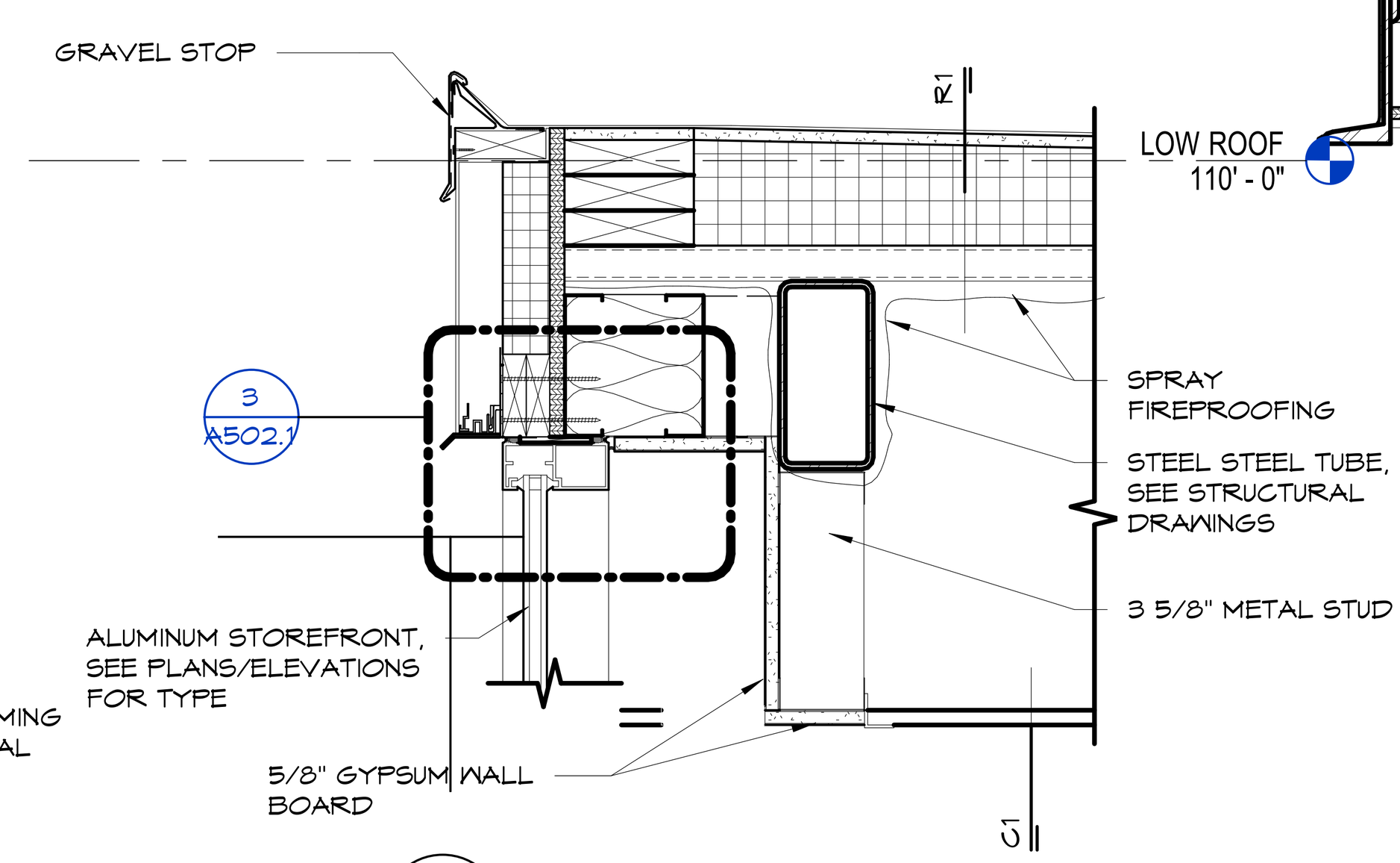


10 Section Detail A501.1 SCALE: 1 1/2" = 1'-0"



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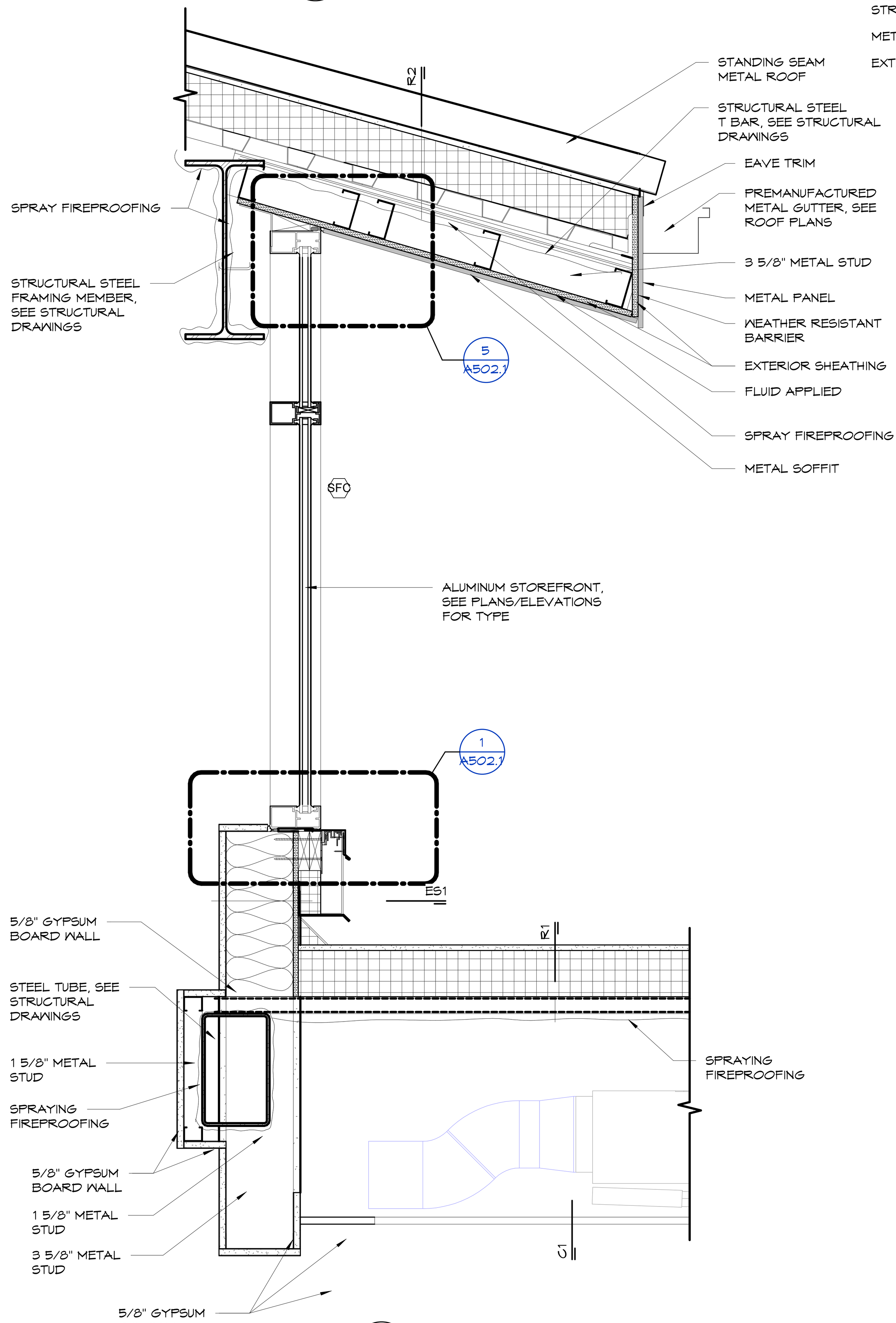
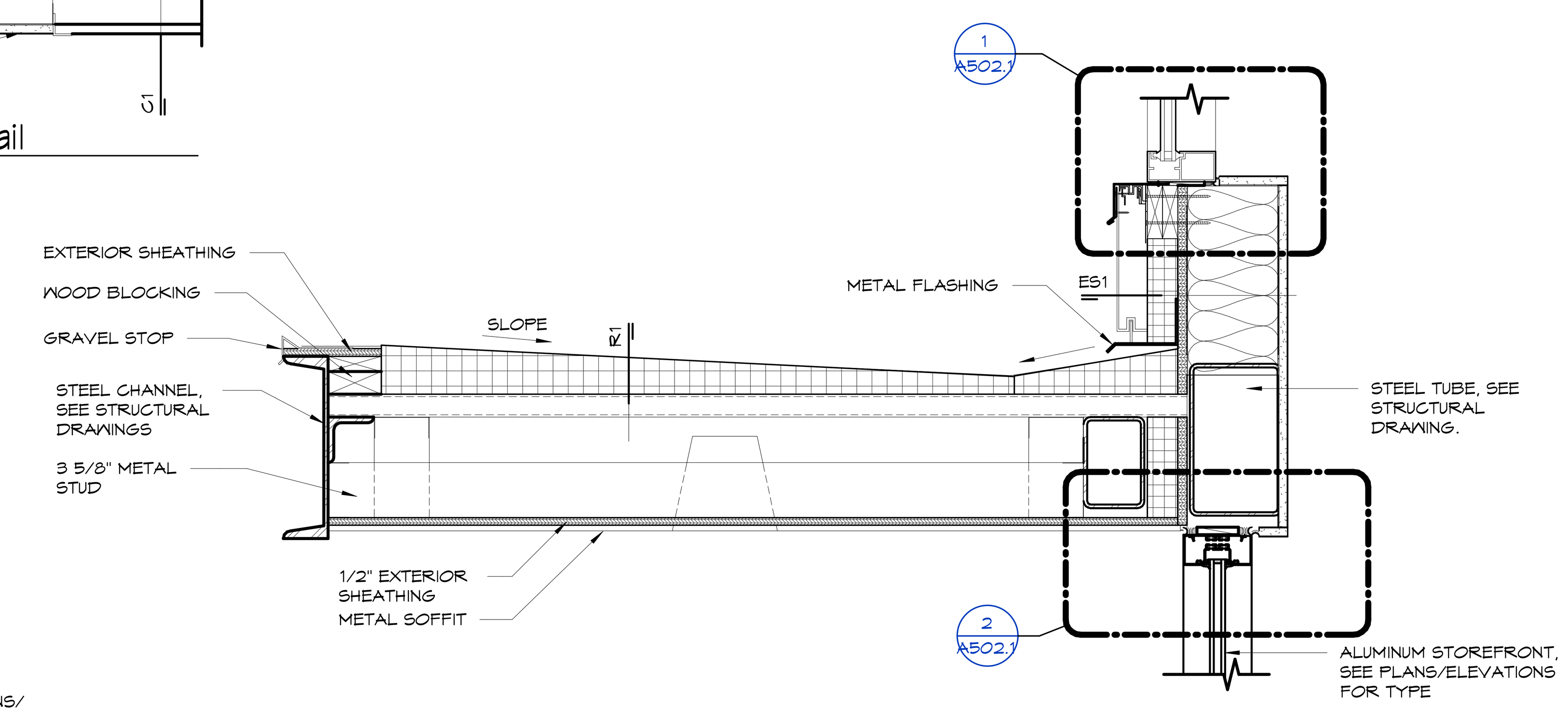


12 Section Detail A501.1 SCALE: 1 1/2" = 1'-0"



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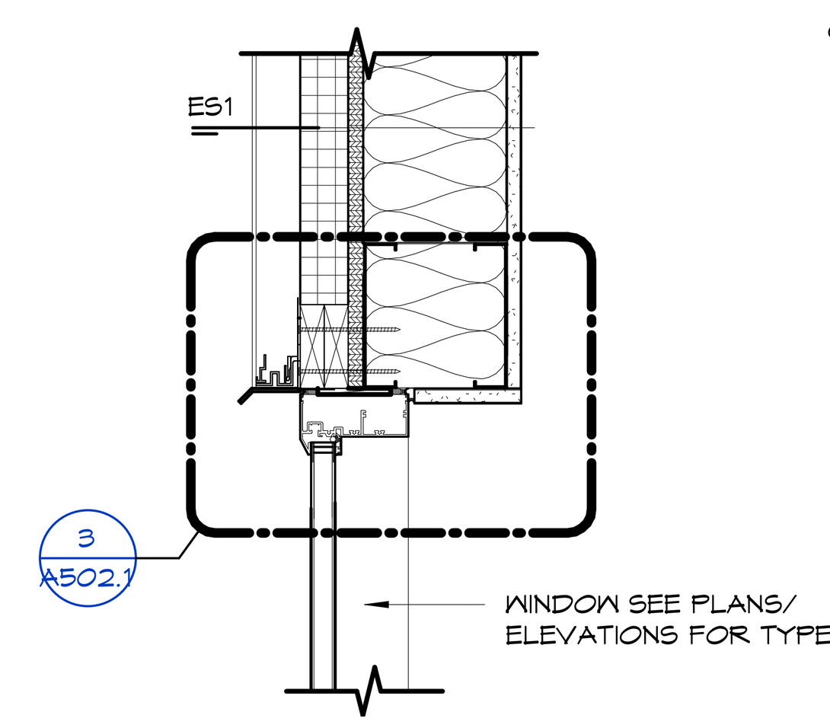
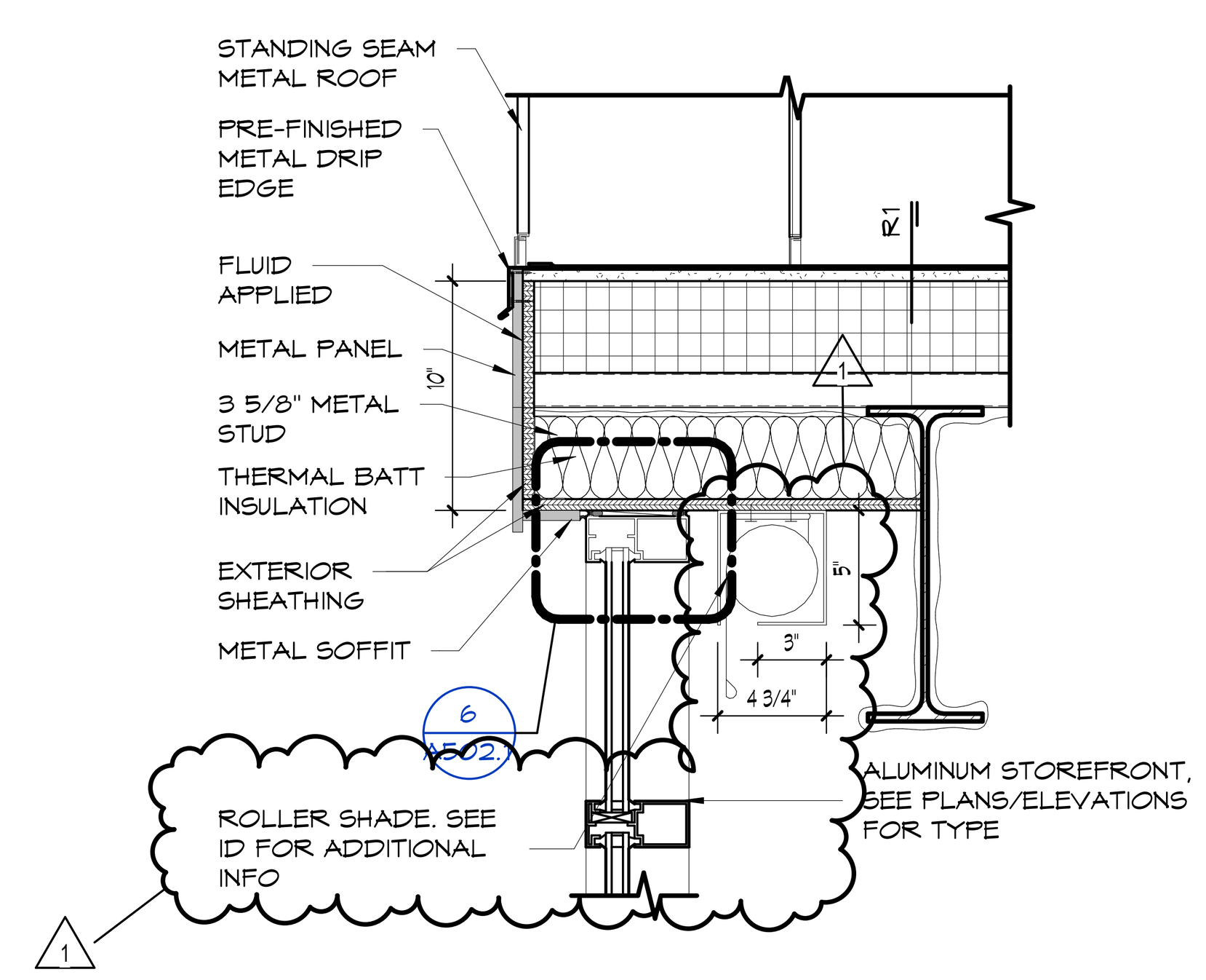
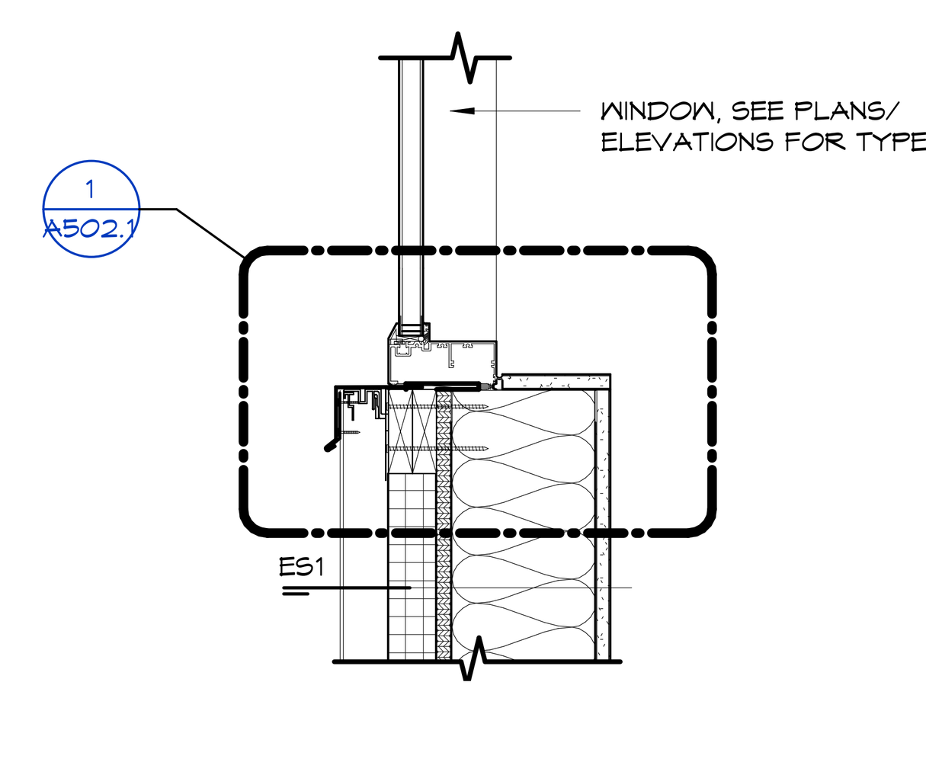


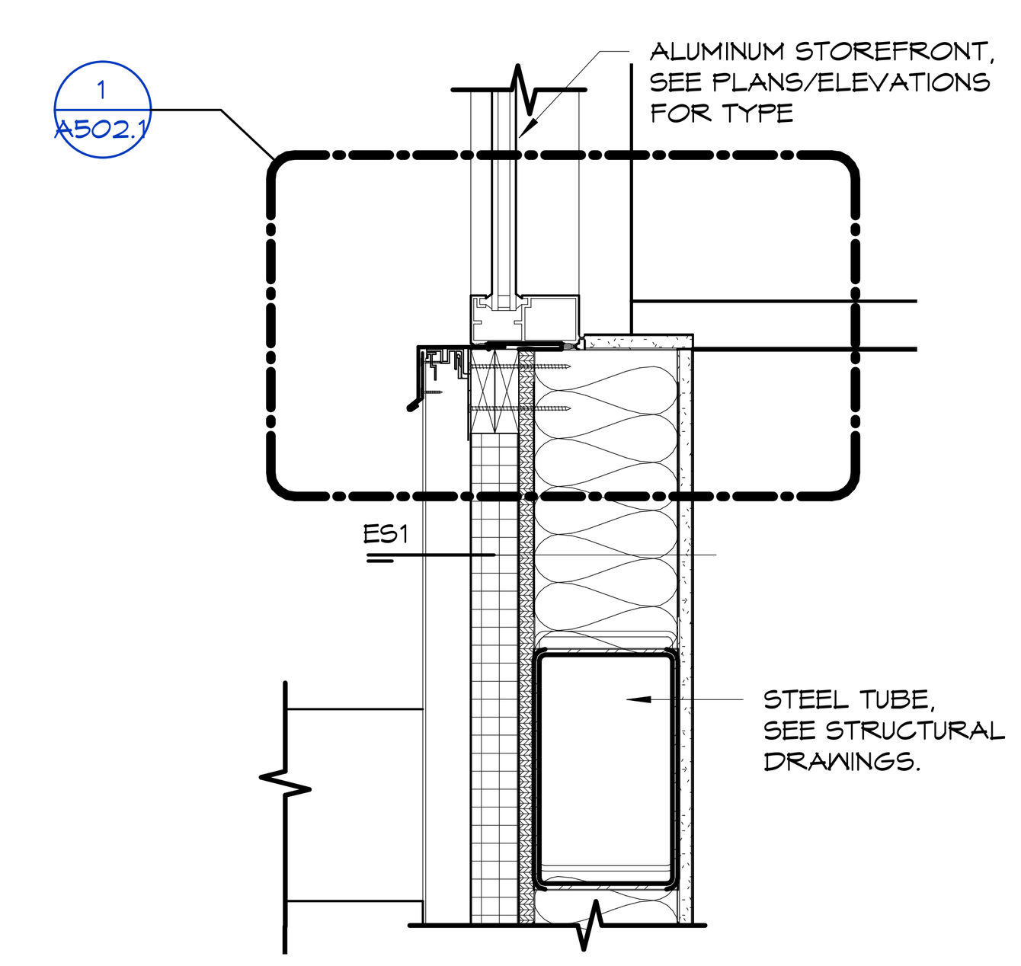
6 Section Detail A501.1 SCALE: 1 1/2" = 1'-0"



9 Section Detail A501.1 SCALE: 1 1/2" = 1'-0"



5 Section Detail A501.1 SCALE: 1 1/2" = 1'-0"



1 Section Detail A501.1 SCALE: 1 1/2" = 1'-0"

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Project Status

Section Details

ABI 1

A501.1

RESTROOM ACCESSORIES

	T1	GRAB BAR	BOBRICK	B-9806 x 18		STAINLESS STEEL	18"X1.5" DIA		RESTROOM GRAB BAR	Amy Fehribach 317-253-5248 AMY@WMBAKERCO.COM
	T2	GRAB BAR	BOBRICK	B-9806 x 42		STAINLESS STEEL	42"X1.5" DIA		RESTROOM GRAB BAR	Amy Fehribach 317-253-5248 AMY@WMBAKERCO.COM
	T3	TOILET TISSUE DISPENSER	PROVIDED BY OWNER						RESTROOM TOILET TISSUE DISPENSER	~
	T4	GRAB BAR	BOBRICK	B-9806 x 36		STAINLESS STEEL	36"X1.5" DIA		RESTROOM GRAB BAR	Amy Fehribach 317-253-5248 AMY@WMBAKERCO.COM
	T5	SANITARY NAPKIN DISPENSER	PROVIDED BY OWNER						RESTROOM SANITARY NAPKIN DISPENSER	~
	T6	GRAB BAR	BOBRICK	B-9806 x 24		STAINLESS STEEL	24"X1.5" DIA		RESTROOM GRAB BAR	Amy Fehribach 317-253-5248 AMY@WMBAKERCO.COM
	T7	TOILET PARTITIONS	BOBRICK	TRADITIONAL COLLECTION	DURA LINE SERIES STANDARD PRIVACY (1080/1180-G-.67P)	CGL GRAPHITE GRAFIX 515-58	DOOR & SIDE PANEL SIZE 72"H STANDARD DOOR CLEARANCE 4.5" AFF 30" W DOOR	GAP FREE MOUNTED: FLOOR TO CEILING WITH OVERHEAD BRACE	TOILET PARTITIONS TO BE ATTACHED AT FLOOR AND CEILING WITH OVERHEAD BRACE.	Amy Fehribach 317-253-5248 AMY@WMBAKERCO.COM
	T8	URINAL SCREEN	BOBRICK	TRADITIONAL COLLECTION	DURA LINE SERIES STANDARD PRIVACY (1080/1180-G-.67P)	CGL GRAPHITE GRAFIX 515-58	24W X 48"H	GAP FREE MOUNTED: WALL HUNG	URINAL DIVIDER TO BE WALL HUNG (1085/1185)	Amy Fehribach 317-253-5248 AMY@WMBAKERCO.COM
	T9	ADA SHOWER SEAT	SEACHROME	REVERSIBLE L-SHAPED TRANSFER SHOWER SEAT		SEAT: WHITE (PWS) FRAME: SILVER (SL)	26" x 22-1/2" 28" x 22-1/2" 32" x 22-1/2" 34-1/2" x 22-1/2"	REFERENCE FLOOR PLAN FOR SEAT ALIGNMENT	ADA SHOWER SEAT	~
	T10	ACCESS DOOR	REFERENCE MEP DRAWINGS							
	T11	SOAP DISPENSER	PROVIDED BY OWNER							
	T12	MIRROR		FRAMED MIRROR	1/4" LAMINATED GLASS MIRROR WITH 1/2" BLACK WOOD FRAME	FRAME: BLACK	170" x 42"		RESTROOM VANITIES	GC TO SOURCE AND PROVIDE
	T13	MIRROR		FRAMED MIRROR	1/4" LAMINATED GLASS MIRROR WITH 1/2" BLACK WOOD FRAME	FRAME: BLACK	84" x 42"		RESTROOM VANITIES	GC TO SOURCE AND PROVIDE
	T14	MIRROR		FRAMED MIRROR	1/4" LAMINATED GLASS MIRROR WITH 1/2" BLACK WOOD FRAME	FRAME: BLACK	48" x 42"		RESTROOM VANITIES	GC TO SOURCE AND PROVIDE
	T15.1	SHOWER CURTAIN ROD	BOBRICK	B-207 x 36	CONCEALED MOUNTING	STAINLESS STEEL	36" X 1" DIA		SHOWER CURTAIN ROD	Amy Fehribach 317-253-5248 AMY@WMBAKERCO.COM
	T15.2	ADA SHOWER CURTAIN ROD	BOBRICK	B-207 x 60	CONCEALED MOUNTING	STAINLESS STEEL	60" X 1" DIA		SHOWER CURTAIN ROD	Amy Fehribach 317-253-5248 AMY@WMBAKERCO.COM
	T16	ROBE HOOK	BOBRICK	SURFACE MOUNTED TOWEL PIN	B-677	BRIGHT POLISHED STAINLESS STEEL	2"W X 2"H X 3 3/8"D		OUTSIDE SHOWER WALL	Amy Fehribach 317-253-5248 AMY@WMBAKERCO.COM
	T17	SHOWER SHELF	SEACHROME	FLOATING CORNER SHOWER SHELF	700-7006-PS	POLISHED STAINLESS STEEL	6.1" L x 12.8" W x 2.3" H		SHOWER CORNER SHELF	~
	T18	PAPER TOWEL DISPENSER & DISPOSAL	PROVIDED BY OWNER							
	T19	SHOWER BASE	FIAT	TERRAZZO SHOWER FLOOR	MONTEREY 36-MFT	100 WHITE PORTLAND CEMENT WITH WHITE CHIPS	36"W X 36"D		STANDARD SHOWER FLOOR BASE	~
	T20	ADA SHOWER BASE	FIAT	TERRAZZO SHOWER FLOOR	MONTEREY ADATN6036	100 WHITE PORTLAND CEMENT WITH WHITE CHIPS	60"W X 36"D	ADA SHOWER BASE TO BE ADA ACCESSIBLE AND INSTALLED FLUSH WITH FLOOR	ADA SHOWER FLOOR BASE	~
	T21	SHOWER CURTAIN HOOKS	BOBRICK	204-1	TYPE 304 STAINLESS STEEL	STAINLESS STEEL	FOR USE ON 1" & 1-1/4"	TO BE INSTALLED ON SHOWER ROD	SHOWER CURTAIN HOOKS	Amy Fehribach 317-253-5248 AMY@WMBAKERCO.COM

PLUMBING EQUIPMENT

	WC1	ADA COMPLIANT WATER CLOSET	REFERENCE PLUMBING DRAWINGS	~
	UR1	URINAL AND FLUSH VALVE	REFERENCE PLUMBING DRAWINGS	~
	KF1	KITCHEN FAUCET	REFERENCE PLUMBING DRAWINGS	~
	KS1	KITCHEN SINK	REFERENCE PLUMBING DRAWINGS	~
	LF1	LAVATORY FAUCET	REFERENCE PLUMBING DRAWINGS	~
	L1	LAVATORY	REFERENCE PLUMBING DRAWINGS	~
	SH1	RESTROOM SHOWER VALVE AND HEAD	REFERENCE PLUMBING DRAWINGS	~
	SH2	ADA SHOWER TRIM, TRANSFER VALVE AND HEAD	REFERENCE PLUMBING DRAWINGS	~

FINISH SCHEDULE

IMAGE	TAG	MATERIAL	MANUFACTURER	PRODUCT	STYLE	COLOR	SIZE	INSTALLATION	NOTE	CONTACT
	ACT1	CEILING TILE	ARMSTRONG CEILINGS	ACOUSTICAL CEILING TILE	OPTIMA TEGULAR	WHITE	2' X 4'	LAY-IN WHITE GRID	ACT1 PAIRED WITH ARMSTRONG 15/16" PRELUDE XL GRID SYSTEM	Phil Caito 317-519-2829 pjcaito@armstrongceilings.com
	ACT2	CEILING TILE	ARMSTRONG CEILINGS	KITCHENZONE	SQUARE LAY-IN	WHITE	24" X 48"	LAY-IN WHITE GRID	ACT2 PAIRED WITH ARMSTRONG 15/16" PRELUDE XL GRID SYSTEM	Phil Caito 317-519-2829 pjcaito@armstrongceilings.com
	ACT3	CEILING TILE	TURF	ACOUSTIC FELT TILE	SLICE	23 RED & 04 LIGHT GRAY RANDOM MIX	24"L X 24"W X 12"D	"A" TILE LAYOUT WITH ARMSTRONG 15/16" PRELUDE XL GRID SYSTEM. GRID TO BE BLACK. TOP OF BAFFLE INSTALLED AT 17'-0"	DRILL HALL CEILING	Kate Maron 313.600.4282 kate@greatapg.com
	BN1	BENCH	JORGENSON LOCKERS	WOOD AND METAL BENCH	MAPLE WOOD BENCH WITH FLOOR MOUNT PEDESTALS	PEDESTAL: JET BLACK 949	72"W X 18" D	TO BE BOLTED TO THE FLOOR	MEN'S LOCKER ROOM	Joshua Lowery JoshL@jorgensoncompanies.com 855.351.7860
	CB1	CEILING BAFFLE	TURF	ACOUSTIC FELT BAFFLE	STRAIGHT	04 LIGHT GREY	11.5" DEPTH SEE RCP FOR WIDTHS	CABLE SUSPENSION. CURVE TO FOLLOW ANGLE OF CEILING. SEE ELEVATIONS. LOWEST BAFFLE TO BE 11'-8" AFF	RECRUITING CEILING	Kate Maron 313.600.4282 kate@greatapg.com
	CPT1	CARPET	MILLIKEN	MAJOR FREQUENCY: ONE	VIBRATION	FLUX	9.85" x 39.4"	ASHLAR	OPEN OFFICE CARPET	Jessalyn Ayon 317-617-5057 JESSALYN.AYON@MILLIKEN.COM
	CPT2	CARPET	MILLIKEN	MAJOR FREQUENCY: ONE	DISTORTION	STATIC	9.85" x 39.4"	ASHLAR	PRIVATE OFFICE CARPET	Jessalyn Ayon 317-617-5057 JESSALYN.AYON@MILLIKEN.COM
	CPT3	CARPET	MILLIKEN	MAJOR FREQUENCY: ONE	DISTORTION	RUKUS	9.85" x 39.4"	ASHLAR	HHB & BATALLION CONFERENCE	Jessalyn Ayon 317-617-5057 JESSALYN.AYON@MILLIKEN.COM
	CON1	SEALED CONCRETE	EXISTING CONCRETE SHOULD BE CLEANED AND PREPARE TO RECEIVE CONCRETE SEALANT. SEALANT TO BE USED IS SHERWIN WILLIAMS H&C CONCRETE SEALER.						ALL EXPOSED CONCRETE FLOORS	~
	FP1	FIBERGLASS REINFORCED PANEL	FRP PANELS	SMOOTH	PROVIDE ALL TRIM PIECES AT ALL CORNERS AND EDGES	WHITE	4' X 8'		GENERAL KITCHEN WALLS, INCLUDING ALL CORNER GUARDS AND TRIMS.	~
	FR1	FRAME	LEVEL FRAMES	WOOD FRAME	BLACK MAPLE .75" THICK FRAME	BLACK	OPENING: 8"W X 10"H FRAME SIZE: 13"W X 15"H 2" WHITE MAT	TO BE ORDERED WITH SECURITY HARDWARE	CLASSROOM & CORRIDOR 100	~
	GF1	GLASS FILM	SOLYX	DUSTED CRYSTAL	SX-3140		VIF		RECRUITING CONFERENCE	Ryan Nordman 317-438-4710 SOLARTINTINGINC@GMAIL.COM
	HDW1	CABINET HARDWARE	RICHELIEU	MODERN STAINLESS STEEL PULL	2451	STAINLESS STEEL	5"		GENERAL CABINET HARDWARE	Mary Ann Lucas 317-502-5371 MALUCAS@RICHELIEU.COM
	LR1	LOCKER	JORGENSON LOCKERS	SINGLE TIER METAL LOCKER	6" LEGS WITH BASE FLAT TOP	JET BLACK 949	15" W X 21" D X 55" H	INSTALL WITH SOLID 6" BASE	MEN & WOMEN'S LOCKER ROOMS	Joshua Lowery JoshL@jorgensoncompanies.com 855.351.7860
	LR2	LOCKER	JORGENSON LOCKERS	TWO TIER METAL LOCKER	6" LEGS WITH BASE FLAT TOP	JET BLACK 949	15" W X 21" D X 55" H	INSTALL WITH SOLID 6" BASE	MEN & WOMEN'S LOCKER ROOMS	Joshua Lowery JoshL@jorgensoncompanies.com 855.351.7860
	MIR1	MIRROR		FRAMELESS MIRROR	1/4" LAMINATED GLASS MIRROR		SEE ELEVATION		FITNESS	GC TO SOURCE AND PROVIDE
	MTL1	METAL CAGING	WIRECRAFTERS	WOVEN METAL MESH CAGE	3/4" SQUARE WOVEN MESH	GRAY	#10W. & M. GAUGE WIRE	INSTALL FROM FLOOR TO ROOF DECK WITH A GAP LESS THAN 2" AT TOP AND BOTTOM. CAGING MUST BE INSTALLED TIGHTLY AROUND ALL PIPING, DUCTS, CONDUIT, AND MEP OR ARCH ITEM. ALL OPENINGS MUST BE LESS THAN 96 SQUARE INCHES.	OCIE & HHB SUPPLY	Matt Ecken info@wirecrafters.com 502-361-3857
	MTL2	METAL	ICON MODERN OR SIMILAR	HOT ROLLED STEEL PLATE		NATURAL STEEL SEALED PER MANUFACTURERS RECOMMENDATION	1/8" THICK REFERENCE ELEVATIONS AND SECTION DETAILS		VESTIBULE ENTRY & CORRIDOR MEMO BOARD	Lisa Estep 513-560-3655 LESTEP@WEGINGELL.COM
	MTL3	METAL	BANKER	M33-2		STAINLESS STEEL	SEE ELEVATIONS		VESTIBULE ENTRY & CORRIDOR MEMO BOARD	Jana Bishop 262-363-6155 jbishop@bankerwire.com
	MTL4	METAL LETTERS	ICON MODERN OR SIMILAR	BLACK POWDER COAT	ARIAL FONT	BLACK POWDER COAT	5" H X 2" W	SEE ELEVATIONS	VESTIBULE ENTRY & CLASSROOM	Lisa Estep 513-560-3655 LESTEP@WEGINGELL.COM
	MTL5	METAL LETTERS	ICON MODERN OR SIMILAR	STAINLESS STEEL	ARIAL FONT	STAINLESS STEEL	5" H X 2" W	SEE ELEVATIONS	VESTIBULE ENTRY	Lisa Estep 513-560-3655 LESTEP@WEGINGELL.COM
	MTL6	METAL PLAQUE	RIOT	ENGRAVED METAL SIGN	STAINLESS STEEL SIGN WITH BLACK POWDERCOAT	BLACK POWDER COAT	36" DIA	PROVIDE MOUNTING HARDWARE. PLAQUE TO BE MOUNTED ON STONE FAÇADE	VESTIBULE ENTRY	Ben Schoh 317-373-8242 Benjamin.Schoch@e-arc.com
	PL1	PLASTIC LAMINATE	WILSONART	LAMINATE	1595-05	SOLANO WALNUT	SEE ELEVATIONS	GRAIN TO RUN VERTICALLY	GENERAL LAMINATE. PROVIDE EDGE BANDING TO MATCH WHERE APPLICABLE	Luke Baskett 614-969-9948 luke.baskett@wilsonart.com
	PT1	PAINT	SHERWIN WILLIAMS	SW7005	FLAT	PURE WHITE			GENERAL CEILING PAINT	Karen Galvin 317-714-5610 KAREN.E.GALVIN@SHERWIN.COM
	PT2	PAINT	SHERWIN WILLIAMS	SW7005	EGG-SHELL	PURE WHITE			GENERAL WALL PAINT	Karen Galvin 317-714-5610 KAREN.E.GALVIN@SHERWIN.COM
	PT3	PAINT	SHERWIN WILLIAMS	SW7673	EGG-SHELL	PEWTER CAST			ACCENT PAINT	Karen Galvin 317-714-5610 KAREN.E.GALVIN@SHERWIN.COM
	PT4	PAINT	SHERWIN WILLIAMS	SW7582	EGG-SHELL	SALUTE			ACCENT PAINT	Karen Galvin 317-714-5610 KAREN.E.GALVIN@SHERWIN.COM
	PT5	PAINT	SHERWIN WILLIAMS	SW 6993	EGG-SHELL	BLACK OF NIGHT			ACCENT PAINT	Karen Galvin 317-714-5610 KAREN.E.GALVIN@SHERWIN.COM
	PT6	PAINT	SHERWIN WILLIAMS	SW 6993	SEMI-GLOSS	BLACK OF NIGHT			ACCENT TRIM PAINT, DOOR FRAME PAINT	Karen Galvin 317-714-5610 KAREN.E.GALVIN@SHERWIN.COM
	PT7	PAINT	SHERWIN WILLIAMS	SW 6993	FLAT	BLACK OF NIGHT			RECRUITING, CONFERENCE 102.1, DRILL HALL CEILING PAINT	Karen Galvin 317-714-5610 KAREN.E.GALVIN@SHERWIN.COM
	PT8	PAINT	SHERWIN WILLIAMS	SW7019	SEMI-GLOSS	GAUNTLET GRAY			CORRIDOR TRIM PAINT	Karen Galvin 317-714-5610 KAREN.E.GALVIN@SHERWIN.COM
	PNLG1	WOOD PANELING	VERMONT WILDWOODS	PLYWOOD	RANDOM MATCH STANDARD INTENSELY SPALTED	SEALED WITH MINWAX POLYCRYLIC PROTECTIVE SATIN FINISH	4'X8'	GRAIN DIRECTION TO BE VERTICAL.	WAR ROOM TV WALL	802.234.3121 hello@vermontwildwoods.com
	RB1	WALL BASE	JOHNSONITE	RUBBER WALL BASE	DURACOVE TOE	40 BLACK B	4"		GENERAL WALL BASE	Doug Edwards DOUG.EDWARDS@TARKETT.COM
	RF1	RUBBER/RESILIENT FLOORING	CAPRI FLOORING	FITNESS AND REC	RTL4029	CARDINAL			FITNESS	Laura Conlon 317-223-8525 LACONLON@SBCGLOBAL.NET
	SG1	SINGAGE	ASI	PLASTIC LAMINTE SIGN	FONT: ARIAL FONT COLOR: IVORY	BACKGROUND: WILSONART 1595-05 SOLANO WALNUT BAR COLOR: DUSTED ALUMINUM	VARIES BY SIGN SEE SIGNAGE SHEET ID031.1	MOUNTING TAPE & SILICONE	THROUGHOUT	Greg LeGars (317) 269-3400 GREG.LEGARS@ASISIGNAGE.COM
	SS1	QUARTZ SURFACE	MSI	QUARTZ	QSL-CALAMIRAGGIO-3CM	CALACATTA MIRAGGIO	3 CM		ALL COUNTERTOP SURFACES	Melody Wisely 317-989-3295 MELODY.WISELY@MSISURFACES.COM
	TL1	PORCELAIN TILE - FLOOR	LOUISVILLE TILE	URBAN COLLECTION	CLASSIFIED	STEEL	12" X 24"	1/3 STAGGER GROUT: MAPEI 19 PEARL GRAY	VESTIBULE & RESTROOM FLOORING	Josh Fesmire 317-373-8242 jfesmire@louisville-tile.com
	TLB1	TILE BASE	LOUISVILLE TILE	URBAN COLLECTION	CLASSIFIED	STEEL	6"H X 24"W	GROUT: MAPEI 19 PEARL GRAY	CUT FULL SIZE 12"X24 TILE TO 6"X24". CAP WITH TR1. VESTIBULE & RESTROOM TILE WALL BASE	Josh Fesmire 317-373-8242 jfesmire@louisville-tile.com
	TL2	PORCELAIN TILE - FLOOR	LOUISVILLE TILE	CROSSVILLE	NEST	JOYOUS OLIVE	6" X 36"	1/3 STAGGER AT 45 DEGREE ANGLE. SEE FINISH PLAN FOR DIRECTION. GROUT: MAPEI 34 NAVAJO BROWN	CORRIDOR & BREAKROOM FLOORING	Josh Fesmire 317-373-8242 jfesmire@louisville-tile.com
	TL3	PORCELAIN TILE - FLOOR	LOUISVILLE TILE	AMERICAN OLEAN	QUARRY REGULAR	FAWN GRAY	6" X 6"	GROUT: CUSTOM WALNUT 541	GENERAL KITCHEN FLOOR TILE	Josh Fesmire 317-373-8242 jfesmire@louisville-tile.com
	TLB3	TILE BASE	LOUISVILLE TILE	AMERICAN OLEAN	BULLNOSE	FAWN GRAY	6" X 6"	GROUT: CUSTOM WALNUT 541	GENERAL KITCHEN WALL BASE, PROVIDE INNER AND OUTER CORNER OF BULLNOSE	Josh Fesmire 317-373-8242 jfesmire@louisville-tile.com
	TL4	PORCELAIN TILE - WALL	LOUISVILLE TILE	OWEN STONE	OST02.12448LTR	BUNNY	24" X 48"	HORIZONTAL STACK BOND GROUT: MAPEI 27 SILVER	SHOWER WALLS	Josh Fesmire 317-373-8242 jfesmire@louisville-tile.com
	TLB4	TILE BASE	LOUISVILLE TILE	OWEN STONE	OST02.10424LBN	BUNNY	4" X 24"	GROUT: MAPEI 27 SILVER	RESTROOM BASE	Josh Fesmire 317-373-8242 jfesmire@louisville-tile.com
	TL5	PORCELAIN TILE - WALL	PLATFORM SURFACES	VISION COLOR	STACKED MOSAIC	BLACK	12" X 12" MOSAIC	GROUT: MAPEI 27 SILVER	FITNESS, BREAKROOM, LACTATION, RESTROOM	Tracey Kessens-Griffin tkessens@platformsurfaces.com 317.366.2835
	TL6	PORCELAIN TILE - WALL	PLATFORM SURFACES	CONCRETA		WHITE	2" X 10"	VERTICAL 1/2 STAGGER GROUT: MAPEI 47 CHARCOAL	BREAKROOM	Tracey Kessens-Griffin tkessens@platformsurfaces.com 317.366.2835
	TL7	PORCELAIN TILE - WALL	PLATFORM SURFACES	CONCRETA		COAL	2" X 10"	VERTICAL 1/2 STAGGER GROUT: MAPEI 27 SILVER	RESTROOMS	Tracey Kessens-Griffin tkessens@platformsurfaces.com 317.366.2835
	TR1	TRANSITION	LATICRETE	L-SHAPED EDGING PROFILE	TILE TRIM CAP	BRUSHED STAINLESS STEEL	VIF		WALL TILE TRIM CAP INSTALL TRIM EDGE WITH TILE FACE FLUSH. PROVIDE ALL CONNECTORS AND EDGE CAP PIECES TO INSTALL COMPLETE	Tracey Kessens-Griffin tkessens@platformsurfaces.com 317.366.2835
	TR2	TRANSITION	LATICRETE	L-SHAPED EDGING PROFILE	FLOOR TRANSITION STRIP	BRUSHED STAINLESS STEEL	VIF		FLOOR MATERIAL TRANSITIONS	Tracey Kessens-Griffin tkessens@platformsurfaces.com 317.366.2835
	TR3	TRANSITION	LATICRETE	SQUARE EDGE PROFILE	CORNER EDGE TRIM	BRUSHED STAINLESS STEEL	VIF		RESTROOM TILE OUTSIDE EDGES	Tracey Kessens-Griffin tkessens@platformsurfaces.com 317.366.2835
	TR4	TRANSITION	FRY REGLET	WALLCOVERING TRIM OUTSIDE CORNER	WCTOSC	BUFFED BRITE STAINLESS STEEL	VIF		WALLCOVERING OUTSIDE EDGES	~
	WC1	WALLCOVERING	MOMENTUM	VINYL, TYPE III	SAHARA STONE	TAZA BEDROCK	TRIMS TO 48"	REVERSE HANG, RANDOM MATCH	CORRIDOR	Misty Chandler mchandler@momtex.com 317.557.5347
	WC2	WALLCOVERING	MOMENTUM	VINYL, TYPE II	EMERSON	ESSEX	54"	REVERSE HANG, RANDOM MATCH	CORRIDOR INSET	Misty Chandler mchandler@momtex.com 317.557.5348
	WC3	WALLCOVERING	MOMENTUM	VINYL, TYPE II	DIMENSION	SILVER GATE	54"	REVERSE HANG, RANDOM MATCH	HHB & BATALLION CONFERENCE	Misty Chandler mchandler@momtex.com 317.557.5349
	WC4	WALLCOVERING	MOMENTUM	VINYL, TYPE II	GO GILDED GRAND	T2-GO-05 PUMICE	54"	NON-REVERSE HANG, STRAIGHT ACROSS MATCH	FITNESS	Misty Chandler mchandler@momtex.com 317.557.5350
	WC5	WALLCOVERING	MOMENTUM	VINYL, TYPE II	P3TEC HARDWOOD	AGED IROKO	TRIMS TO 48"	STRAIGHT RANDOM	ENTRY VESTIBULE	Misty Chandler mchandler@momtex.com 317.557.5351
	WD1	WOOD TRIM		POPLAR	PRIMED, MITERED CORNERS	PT8, SEMI-GLOSS	2"W X 2"H		CORRIDORS	GC TO SOURCE AND PROVIDE SAMPLE FOR ARCHITECTS REVIEW
	WD2	WOOD SHELVES	URBANDI	WALNUT FLOATING SHELVES	FLOATING	WALNUT	8"D X 84"L	INSTALL PER MANUFACTURERS RECOMMENDATION	CORRIDOR SHELVING	~
	WOM1	WALK-OFF MAT	MILLIKEN	OBEX TILE	FIBER	TAUPE	4'X6'	INSET INTO TILE WITH TR1 TRIM	VESTIBULE AND NORTH ENTRY WALK OFF MAT	Jessalyn Ayon 317-617-5057 JESSALYN.AYON@MILLIKEN.COM
	WT1	ROLLER WINDOW SHADES	SWF	TRUE PERFORMANCE CROSSHATCH R300 SERIES	3" OPENESS	COLOR: GREY	VIF	PROVIDE BLACK METAL VALANCE, BLACK CHAIN AND HOLD HOOK	WINDOW SHADES TROUGHOUT	John Petrovic John.Petrovic@mechoshade.com 440-725-4610
	WT2	MOTORIZED WINDOW SHADES	SWF	AC LINE VOLTAGE SONESSE DIGITAL MOTOR CROSSHATCH R300 SERIES	3" OPENESS	COLOR: GREY	VIF	MOTORIZED SHADES CONTROLLED BY WALL SWITCH. PROVIDE BLACK METAL VALANCE	WINDOW SHADES IN CLERESTORY WINDOWS ABOVE S2, S3, S6 OFFICES & RECRUITING	John Petrovic John.Petrovic@mechoshade.com 440-725-4610

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Consultant Information

BLOOMINGTON READINESS CENTER MODERNIZATION

3380 S. Walnut St.
Bloomington, IN 47401

Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON REGISTERED AR 11400112 STATE OF INDIANA ARCHITECT

Bid Documents

5.23.2024

23043

Project Status

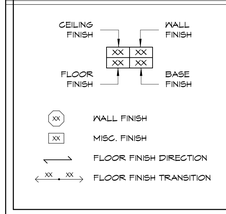
Finish Schedule

Base Bid

ID001

1 ID101.1 ABI 1 - First Floor Finish Plan
SCALE: 1/8" = 1'-0"

FINISH PLAN LEGEND



GENERAL FINISH NOTES

1. Any discrepancies or missing information on plans should be addressed to the architect for clarification.
2. See Finish Schedule for finish designations.
3. Contractor to verify extent of floor finishes prior to installation.
4. Contractor to verify extent of floor finishes prior to installation, and coordinate with floor contractor(s). Verify areas open under counters (example - sink cabinets with removable base, open spaces between base cabinets, etc.).
5. Contractor is responsible for all necessary patching and leveling to ensure proper substrate for floor finishes. Variance not to exceed 1/4" per 10'-0" run.
6. Floors throughout to receive finishes as indicated, direct - glue installation, unless noted otherwise.
7. Installer to provide floor finish installation plan to designer for approval.
8. Finish transitions between floor finishes to be at the center of closed doors, unless noted otherwise.
9. All walls to receive PT2 unless noted otherwise.
10. Door frames to receive pt-xx unless noted otherwise.
11. All fire alarm boxes, access panels, fire alarm strobe cover plates, fire extinguisher cabinets, door closers, metal grilles, speakers in ceilings, light fixture trim, and any other miscellaneous wall or ceiling mounted items to be painted to match the surface on which they occur, unless noted otherwise.
12. All hollow metal door frames to be painted PT6, unless noted otherwise.
13. Goods supplied from more than one dye lot must not be seamed adjacent to one another or installed in the same area.
14. The contractor is responsible for verifying lead times and availability of all material, ensuring that materials are on site when ready for installation. The re-selection of material because of long lead time will not be permitted.
15. Submit draw-downs and samples of all finishes for approval prior to application.
16. Flame spread ratings for all materials shall conform to applicable regulatory codes.
17. Floor surface preparation: clean surfaces to be covered. Prior to installing floor covering, fill and smooth all cracks, uneven, and/or rough surfaces in substrate where floor covering is to be installed. Level floor is defined as a floor area not varying more than 1/4" within a 10'-0" radius.
18. All carpet, wall base and installation shall be provided by the contractor. Entire space shall be field measured prior to order placement.
19. Joints in vinyl base shall not occur closer than 6" from a corner and shall be butted tightly together.
20. Wall surface should be properly prepared, skim coated, spackled, sanded etc. To provide a single smooth surface ready for finishes.
21. "General" surfaces to be prepared as follows: all necessary filling of nail holes, cracks and blemishes shall be done before priming. All knots and sap spots shall be shellacked before finishing with paint. All metal surfaces to be painted shall be washed with mineral spirits to remove all oil and/or grease. Sand or wire brush all rusted or scaled areas. Galvanized metal shall be treated with approved pre-testing solution. Existing surfaces to be painted shall be thoroughly cleaned. Only smooth, unblemished surfaces will be accepted. The application of paint or finish shall signify acceptance of surface to be finished. The contractor shall be responsible for finished product.
22. Paint shall be applied as follows: all coats shall be dry before applying succeeding coats, sand lightly between coats on smooth surfaces to assure adhesion of subsequent coats. Paint prior to final installation of fixtures, plates, grille covers, hardware, etc.
23. All exposed ceilings to be PT1, unless noted otherwise.
24. Verify all apliance clearances with cabinets and walls.
25. Provide finished end panels at all exposed cabinet ends.

Finish Plan Key Notes

1. TV LOCATION. PROVIDE POWER AND DATA. PROVIDE BLOCKING. REF DETAIL #4 ON SHEET T502.
2. WT1 WINDOW TREATMENT TO BE APPLIED ON ALL WINDOWS U.O.N. SEE FINISH SCHEDULE
3. TV TO BE MOUNTED 5'-6" AFF
4. BN1 BENCH TO BE SECURED TO FLOOR
5. TL4 TO WRAP ALL SIDES OF INTERIOR SHOWER WALL AND OUTSIDE SHOWER WALL. USE TR3 TRIM ON ALL OUTSIDE CORNERS WHERE TILE AND TILE MEET. SEE ELEVATIONS.
6. TOP AND/OR SIDE OF EXPOSED TILE TO BE CAPPED WITH TR1 TRIM.
7. TR4 TO BE USED AT OUTSIDE WALLCOVERING CORNERS
8. NOM1 INSET INTO TILE WITH TR1 ON ALL SIDES
9. EXIT ROUTE SIGN LOCATION. REF ID301.1/4 FOR MOUNTING HEIGHTS
10. DO NOT APPLY TLB1 WHERE TL4 IS ADJACENT ON THE WALL
11. CLERESTORY WINDOW TO HAVE MOTORIZED WT2 WINDOW TREATMENTS

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BLOOMINGTON READINESS CENTER MODERNIZATION

3380 S. Walnut St.
Bloomington, IN 47401

Project Information

#	DESCRIPTION	DATE
1	Addendum 02	6/20/2024

Revisions

MICHAEL JOHNSON ARCHITECT — STATE OF INDIANA — AR 11512

Bid Documents

5.23.2024
23043

Project Status

First Floor Finish Plan

ABI 1

ID101.1

5 ID301.1 INTERIOR SIGNAGE - DIRECTORY - CALLOUT
SCALE: 3" = 1'-0"

4 ID301.1 INTERIOR SIGNAGE - DIRECTORY
SCALE: 1/2" = 1'-0"

3 ID301.1 TYPICAL SIGNAGE WITH INSERT
SCALE: 3" = 1'-0"

2 ID301.1 TYPICAL SIGNAGE WITH ROOM NAME
SCALE: 3" = 1'-0"

1 ID301.1 TYPICAL SIGNAGE PLACEMENT
SCALE: 1/2" = 1'-0"

6 ID301.1 INTERIOR SIGNAGE - EXIT ROUTE - CALLOUT
SCALE: 3" = 1'-0"

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Revisions

MICHAEL JOHNSON REGISTERED 29111 12 STATE OF INDIANA ARCHITECT

Bid Documents

5.23.2024
23043

Project Status

Interior Signage Details

Base Bid

ID301.1

FAN COIL UNIT SCHEDULE - ABI1

NOTES:

UNIT ID	CONFIGURATION	SUPPLY FAN DATA						HYDRONIC HEATING COIL SELECTION DATA								HYDRONIC COOLING COIL SELECTION DATA										FILTER	ELECTRICAL DATA						MANUFACTURER WITH MODEL NUMBER	NOTES
		SUPPLY CFM	OA CFM	ESP	DRIVE TYPE	MOTOR TYPE	FAN SPEED	TOTAL MBH	EAT	LAT	ROWS	APD	EWT	LWT	GPM	MAX WPD	TOTAL MBH	SENS MBH	EAT		LAT		ROWS	APD	EWT	LWT	GPM	MAX WPD	EFFICIENCY	HP	MOCP	MCA	VOLTS	PH		
																			DB	WB	DB	WB														
FCU-17-	HORIZONTAL	750	25	0.20	DIRECT	ECM	1320	35.4	67.0 °F	111.7 °F	2	0.07	140 °F	120 °F	3.6	2.36	30.8	19.9	79.0 °F	67.0 °F	53.5 °F	52.9 °F	4	0.17	42 °F	52 °F	6.20	2.12	MERV 8	(2) 1/4	15 A	2.25 A	208	1	KRUEGER KHFP-A10	
FCU-18-	HORIZONTAL	800	80	0.20	DIRECT	ECM	1358	37.6	66.0 °F	110.3 °F	2	0.08	140 °F	120 °F	3.8	2.68	29.9	19.9	77.5 °F	66.0 °F	53.7 °F	53.1 °F	4	0.18	42 °F	52 °F	6.00	2.00	MERV 8	(2) 1/4	15 A	2.25 A	208	1	KRUEGER KHFP-A10	
FCU-19-	HORIZONTAL	545	70	0.20	DIRECT	ECM	1197	25.6	67.0 °F	111.4 °F	2	0.07	140 °F	120 °F	2.6	0.94	21.2	13.9	80.0 °F	67.0 °F	55.5 °F	53.7 °F	3	0.12	42 °F	52 °F	4.30	12.36	MERV 8	(1) 1/4	15 A	1.50 A	208	1	KRUEGER KHFP-A08	
FCU-20-	HORIZONTAL	570	95	0.20	DIRECT	ECM	1222	26.9	66.0 °F	110.6 °F	2	0.07	140 °F	120 °F	2.7	1.06	17.3	11.8	76.0 °F	65.0 °F	56.2 °F	54.6 °F	3	0.12	42 °F	52 °F	3.50	3.44	MERV 8	(1) 1/4	15 A	1.50 A	208	1	KRUEGER KHFP-A08	
FCU-21-	HORIZONTAL	300	80	0.20	DIRECT	ECM	1086	17.3	64.0 °F	118.1 °F	2	0.03	140 °F	120 °F	1.7	2.85	8.8	5.9	74.0 °F	64.0 °F	55.2 °F	53.8 °F	2	0.05	42 °F	52 °F	1.80	4.24	MERV 8	(1) 1/4	15 A	1.50 A	208	1	KRUEGER KHFP-A06	
FCU-22-	HORIZONTAL	820	120	0.20	DIRECT	ECM	1373	38.3	66.0 °F	110.0 °F	2	0.08	140 °F	120 °F	3.8	2.81	28.1	19.8	77.0 °F	65.1 °F	53.9 °F	53.1 °F	4	0.18	42 °F	52 °F	5.70	1.75	MERV 8	(2) 1/4	15 A	2.25 A	208	1	KRUEGER KHFP-A10	
FCU-23-	HORIZONTAL	350	40	0.20	DIRECT	ECM	1168	17.6	66.0 °F	113.3 °F	2	0.04	140 °F	120 °F	1.8	0.39	12.6	8.1	77.0 °F	66.0 °F	55.0 °F	53.6 °F	3	0.08	42 °F	52 °F	2.60	3.85	MERV 8	(1) 1/4	15 A	1.50 A	208	1	KRUEGER KHFP-A06	
FCU-24-	HORIZONTAL	580	40	0.20	DIRECT	ECM	1232	26.7	67.0 °F	110.5 °F	2	0.07	140 °F	120 °F	2.7	1.03	19.2	13.1	78.2 °F	66.1 °F	56.7 °F	54.9 °F	3	0.13	42 °F	52 °F	3.80	4.18	MERV 8	(1) 1/4	15 A	1.50 A	208	1	KRUEGER KHFP-A08	

DIFFUSERS & GRILLES SCHEDULE - ABI1

NOTES:

UNIT ID	MAX CFM	DIMENSIONAL DATA		CONN. SIZE	THROW DATA		MOUNT	PRESS DROP (IN. WG)	MAX NC SOUND LEVEL	ACCESSORIES			MANUFACTURER WITH MODEL NUMBER
		FACE SIZE	SLOT INFO		DIRECTION	DISTANCE @ NOM. CFM				BALANCE DAMPER	PLENUM BOX	TAMPER-PROOF SCREWS	
SD-1	250	22"x4"	3-SLOT	8"	2-WAY	5-8-15	CEILING	0.1	20	NO	NO	NO	PRICE TBD?
RG-1	1000	24"x12"		22"x10"	-	-	CEILING	0.05	<20	NO	NO	NO	PRICE 80
RG-2	2000	24"x24"		22"x22"	-	-	CEILING	0.05	<20	NO	NO	NO	PRICE 80
SD-1	200	24"x24"		6" DIA	4-WAY	3-4-7	CEILING	0.06	20	NO	NO	NO	PRICE SPD
SD-2	300	24"x24"		8" DIA	4-WAY	4-6-9	CEILING	0.05	20	NO	NO	NO	PRICE SPD
SD-3	400	24"x24"		10" DIA	4-WAY	4-6-10	CEILING	0.03	20	NO	NO	NO	PRICE SPD
SD-6	200	14"X6"		12"X4"		7-9-13	WALL	0.04	<20	YES	NO	NO	PRICE 540
SD-7	750	50"X6"		48"X6"		19-23-27	WALL	0.08	29	NO	NO	NO	PRICE LBP
SD-9	310	18"X8"		16"X6"		7-11-16	WALL	0.02	<20	YES	NO	NO	PRICE 540

ELECTRIC UNIT HEATER SCHEDULE - ABI1

NOTES:

UNIT ID	CONFIGURATION	CFM	HEATING DATA		ELECTRICAL DATA			ACCESSORIES			MANUFACTURER WITH MODEL NUMBER	NOTES
			MIN. KW	MBH	AMPS	VOLTAGE	PHASE	DISCONNECT SWITCH	INTEGRAL THERMOSTAT	WALL BRACKET		
UH-2	BASEBOARD		1.25	4.3	6	208	1	NO	YES	NO	QMARK QMKC2506W	
UH-3	BASEBOARD		1.5	5	7	208	1	NO	YES	NO	QMARK QMKC2508W	
UH-4	BASEBOARD		2	6.8	10	208	1	NO	YES	NO	QMARK QMKC2508W	

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Project Information

#	DESCRIPTION	DATE
1	ADDENDUM #2	06/20/24

Revisions

KBSO #23127
OLUWASEUN ODUKOMAIYA
REGISTERED
No. 11300632
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5/23/2024

Bid Documents

05.23.2024
23043

Project Status

MECHANICAL
SCHEDULES - ABI1

ABI 1

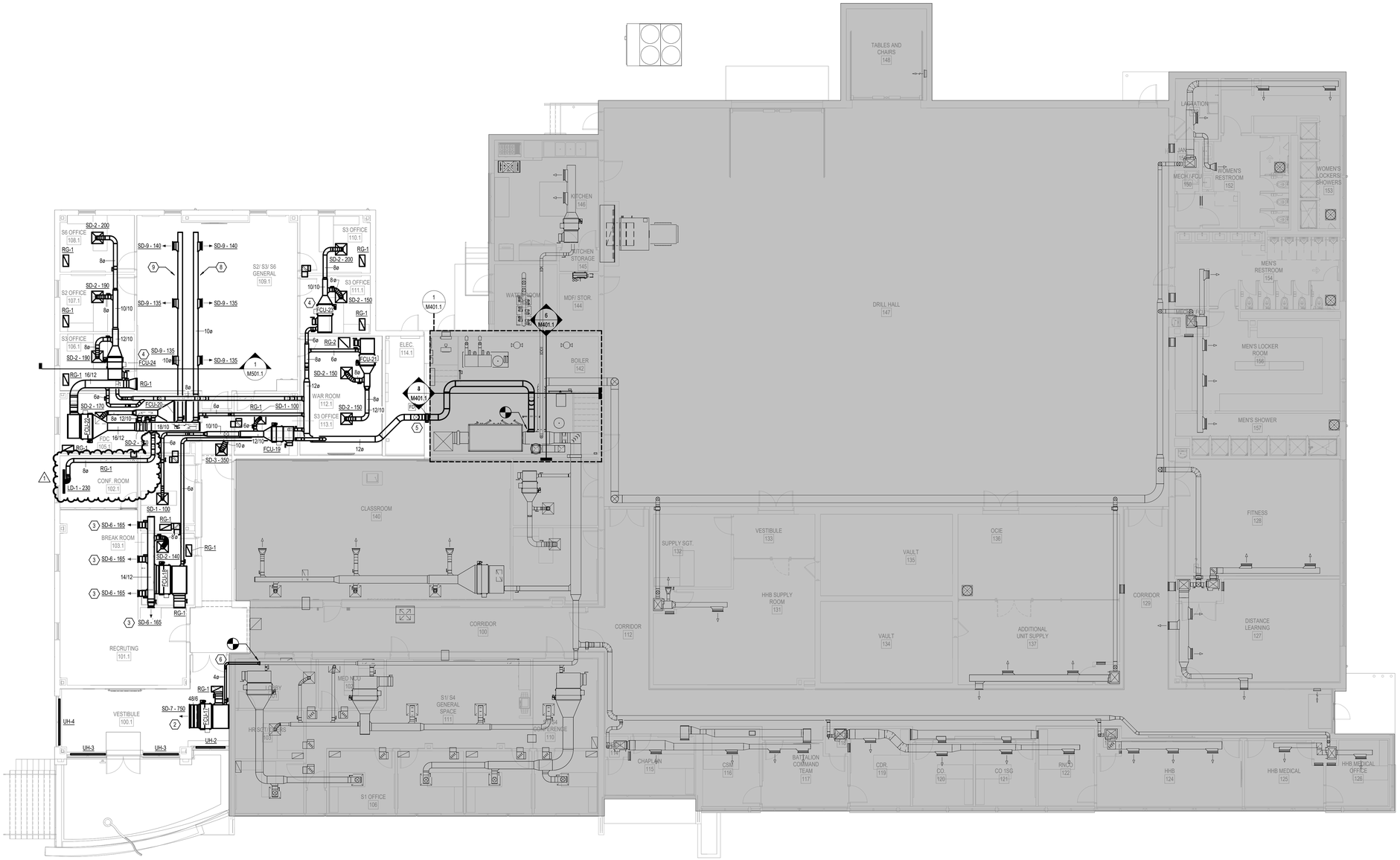
M601.1

GENERAL NOTES

A REFER TO SHEET M-000 FOR GENERAL MECHANICAL NOTES, SYMBOLS AND ABBREVIATIONS.
B REFER TO DRAWING M-500 SERIES FOR MECHANICAL DETAILS.
C REFER TO DRAWING M-600 SERIES FOR MECHANICAL SCHEDULES.
D BRANCH RETURN PIPE SIZE TO MATCH SUPPLY SIZE UNLESS OTHERWISE NOTED.
E PROVIDE PAINT GRIP FINISH ON ALL UNINSULATED EXPOSED DUCTWORK. REFER TO INTERIOR DESIGN SHEETS FOR WHAT COLOR TO PAINT DUCTWORK.
F PROVIDE PAINTABLE INSULATION ON ALL EXPOSED INSULATED DUCTWORK AND PIPING. INSULATION TO BE INSTALLED WITH A SMOOTH, VISUALLY APPEALING SURFACE; NOT OVERLY WRINKLED.

SHEET KEYNOTES

2 VESTIBULE DIFFUSER MOUNTED IN BULKHEAD.
3 SIDEWALL DIFFUSERS IN RECRUITING MOUNTED AT 10'-8" TO CENTER OF GRILLE.
4 FAN COIL UNIT INSTALLED OVER OFFICES.
5 MAIN OUTSIDE AIR FEED FOR ABI1, MAKE CONNECTION TO DOAS MAIN TRUNK IN MECHANICAL ROOM.
6 SEE MH102 IN BASE BID SET FOR CONTINUATION.
8 UNINSULATED SPIRAL DUCTWORK WITH PAINT GRIP FINISH RUN AT 11'-2" TO BOD.
9 UNINSULATED SPIRAL DUCTWORK WITH PAINT GRIP FINISH RUN AT 12' TO BOD.



N 1 LEVEL 1 MECHANICAL PLAN ABI 1
1/8" = 1'-0"

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Project Status

LEVEL 1
MECHANICAL
HVAC PLAN - ABI1

ABI 1

MH102.1

GENERAL NOTES

A COORDINATE INSTALLATION OF LIGHT FIXTURES WITH ARCHITECTURAL REFLECTED CEILING PLANS, ARCHITECTURAL ELEVATIONS, MECHANICAL EQUIPMENT, DIFFUSERS, SUPPORTS, PIPING, DUCTWORK AND STRUCTURAL PLANS PRIOR TO ROUGH-IN AND INSTALLATION OF LIGHT FIXTURES.

B ALL MOUNTING HEIGHTS NOTED ON THE PLANS ARE TO THE BOTTOM OF THE LIGHT FIXTURE UNLESS NOTED OTHERWISE.

C LOCATE CEILING MOUNTED OCCUPANCY SENSORS TO PROVIDE COMPLETE AREA COVERAGE OF THE SPACE IN WHICH THEY ARE TO BE INSTALLED. SELECT PROPER SENSOR COVERAGE PATTERN FROM MANUFACTURER'S PRODUCT DATE TO DETERMINE COVERAGE. ADDITIONAL SENSORS REQUIRED DUE TO LACK OF COVERAGE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND THE MANUFACTURER. SENSORS SHALL INCLUDE ALL POWER SUPPLIES AND RELAYS NECESSARY FOR PROPER OPERATION.

D ALL COVER PLATES FOR ELECTRICAL DEVICES SHALL BE SELECTED BY THE INTERIOR DESIGNER/ARCHITECT.

E LABEL ALL RELAYS AND POWER SUPPLIES (ON THE DEVICE OR ON THE BOX THEY ARE CONNECTED TO) WITH THE AREA THE DEVICES SERVE, THE BRANCH CIRCUIT IT CONTROLS AND THE DEVICE ADDRESS (IF APPLICABLE).

F REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONS, ROOM AND AREA FINISHES, CEILING PLANS, DOOR SWINGS, FIRE RATED PARETITIONS, CABINET AND CASEWORK AND BUILT-IN DETAILS

G REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONS, ROOM AND AREA FINISHES, CEILING PLANS, DOOR SWINGS, FIRE RATED PARETITIONS, CABINET AND CASEWORK AND BUILT-IN DETAILS

H REFER TO ARCHITECTURAL DRAWINGS FOR DESIGNATION AND LISTING OF FIRE RATED ASSEMBLIES. COORDINATE ALL DESIGN EFFORTS WITH FIRE RESISTANCE OF MATERIALS AND CONSTRUCTION.

I ALL EXPOSED SYSTEMS ARE TO BE PAINTED TO MATCH ADJACENT EXPOSED DECK/WALL. REFER TO INTERIOR DESIGN DRAWINGS FOR EXACT COLORS.

SHEET KEYNOTES

1 ASTRONOMICAL TIME CLOCK LOCATION FOR BASE BID. IF ABI-1 IS ACCEPTED, LOCATE TIMECLOCK AS SHOWN ON SHEET E201.1.

2 MOUNT LIGHT FIXTURE AT +8'-0" AFG TO BOTTOM OF LIGHT FIXTURE. COORDINATE EXACT LOCATION WITH ARCHITECTURAL BUILDING ELEVATIONS.

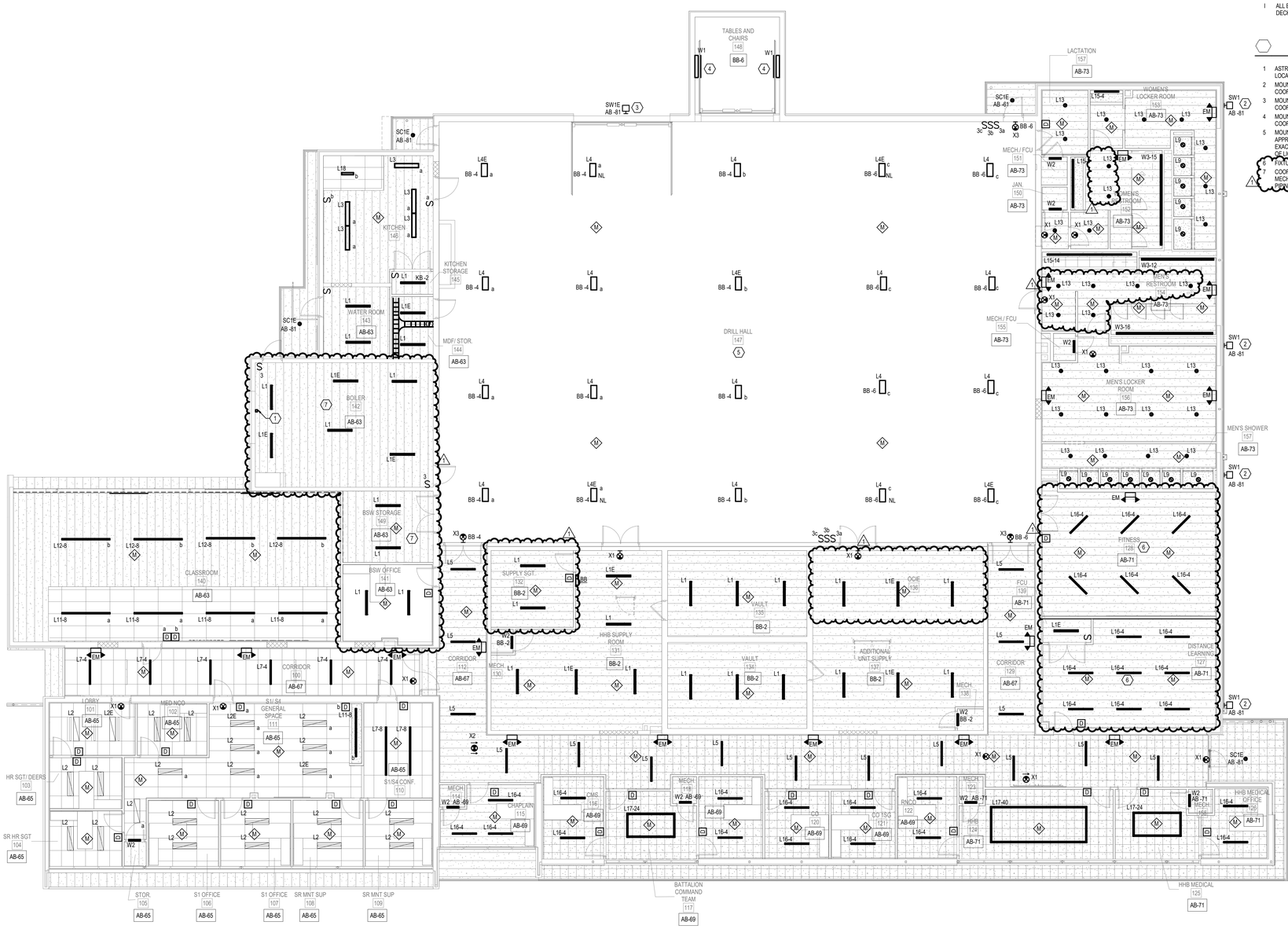
3 MOUNT LIGHT FIXTURE AT +13'-0" AFG TO BOTTOM OF LIGHT FIXTURE. COORDINATE EXACT LOCATION WITH ARCHITECTURAL BUILDING ELEVATIONS.

4 MOUNT LIGHT FIXTURE AT +6'-6" AFF TO BOTTOM OF LIGHT FIXTURE. COORDINATE EXACT LOCATION WITH ARCHITECTURAL BUILDING ELEVATIONS.

5 MOUNT LIGHT FIXTURES AND OCCUPANCY SENSORS IN THIS ROOM AT APPROXIMATELY 18'-0" AFF TO BOTTOM OF LIGHT FIXTURE. COORDINATE EXACT MOUNTING HEIGHT WITH ARCHITECTURAL/D ELEVATIONS. BOTTOM OF LIGHT FIXTURE TO BE FLUSH WITH THE BOTTOM OF ACOUSTICAL BAFFLES.

6 FIXTURE TYPE L16-4 TO BE SURFACE MOUNTED IN THIS ROOM.

7 COORDINATE LOCATION AND MOUNTING HEIGHT OF LIGHT FIXTURES WITH MECHANICAL, ELECTRICAL AND PLUMBING EQUIPMENT, DUCT, CONDUIT, PIPING ETC. IN THIS ROOM.



N 1 LEVEL 1 LIGHTING PLAN
1/8" = 1'-0"

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Project Information

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23043

Project Status

LEVEL 1 LIGHTING PLAN

Base Bid

E201

GENERAL NOTES

A REFER TO SHEET E000 FOR GENERAL ELECTRICAL NOTES, SYMBOLS AND ABBREVIATIONS.

B ALL EXPOSED SYSTEMS ARE TO BE PAINTED TO MATCH ADJACENT EXPOSED DECK/WALL. REFER TO INTERIOR DESIGN DRAWINGS FOR EXACT COLORS.

C USE WALLS AND COLUMNS TO FEED OFFICE FURNITURE WHERE POSSIBLE. FOR ISLAND WORK STATION LOCATIONS SAW CUT FROM NEAREST COLUMN, ROUTE CONDUIT UNDER FLOOR AND PATCH CONCRETE.

D RECEPTACLES MARKED "VO" INDICATE TV BACK BOX. PROVIDE TV BACK BOX WITH (2) DUPLEX RECEPTACLES. COORDINATE WITH LOW VOLTAGE DRAWINGS FOR A/V AND DATA CABLING REQUIREMENTS.

SHEET KEYNOTES

1 PROVIDE 20A/2P TOGGLE SWITCH FOR LOCAL DISCONNECTING MEANS OF HVAC UNIT. MOUNT TOGGLE SWITCH ADJACENT TO UNIT ELECTRICAL CONNECTION POINT ON WALL. MAINTAIN ALL HVAC UNIT MANUFACTURER CLEARANCES. CIRCUIT FOR EQUIPMENT BY 2 #12, #12 G IN 3/4" CONDUIT.

2 JUNCTION BOX SUPPLY TO STORAGE BUILDING ON NORTH WEST OF SITE. CONTRACTOR DURING CONSTRUCTION TO RUN A SUPPLY CIRCUIT FROM TEMPORARY CONSTRUCTION POWER TO JUNCTION BOX TO HAVE STORAGE BUILDING BE OPERATIONAL DURING CONSTRUCTION. ONCE PERMANENT POWER IS ESTABLISHED TRANSFER POWER TO PERMANENT SUPPLY NOTED. PRIOR TO THE START OF DEMOLITION COORDINATE ANY OUTAGES THAT THIS CIRCUIT WILL FACE WITH THE OWNER.

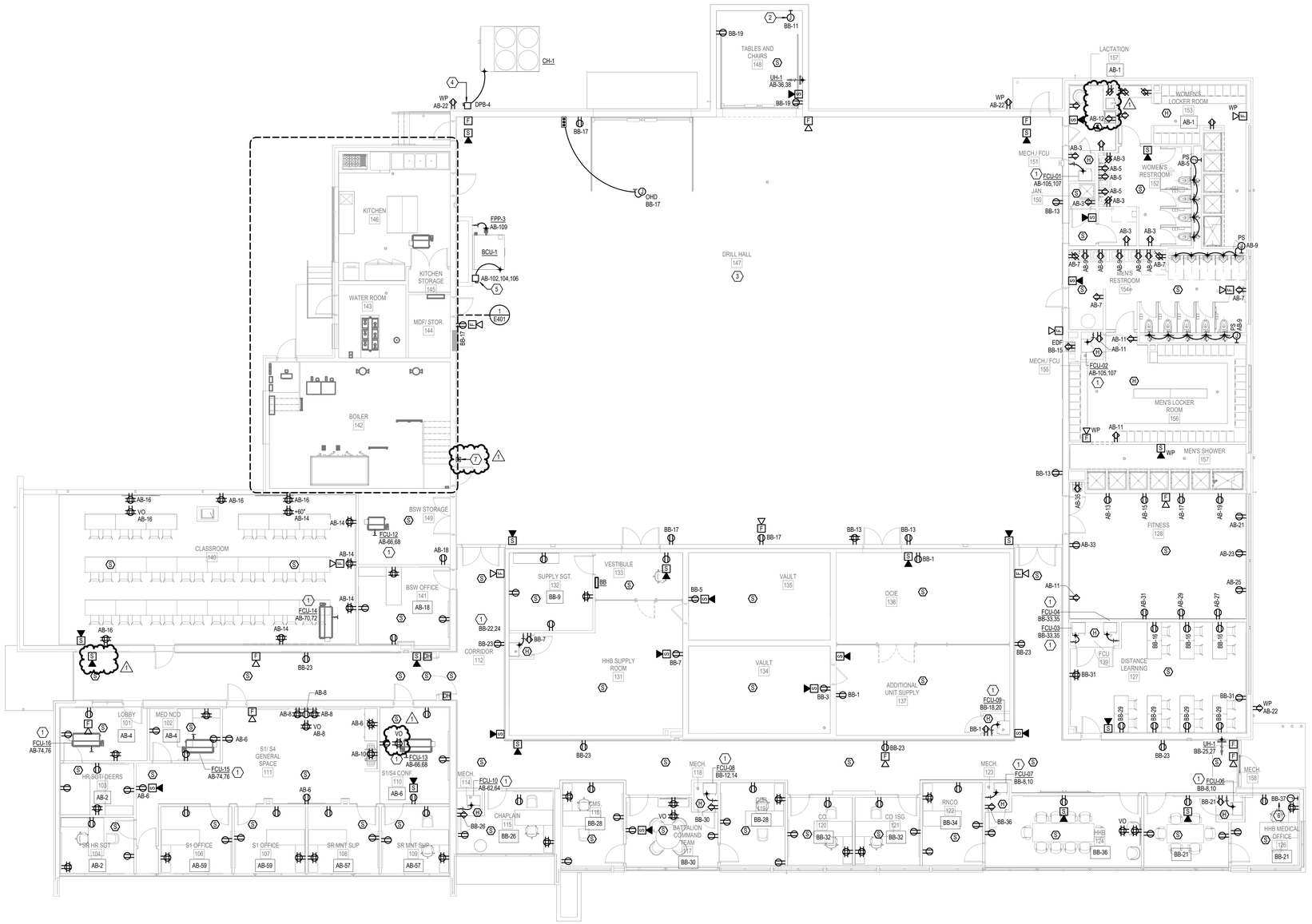
3 ALL ELECTRICAL DEVICES WITHIN DRILL HALL ARE TO BE PROVIDED AS NEW WHILE USING EXISTING BACKBOX AND CONDUIT PATH.

4 PROVIDE 400A/3P/NEMA 3R NON FUSED DISCONNECT AS LOCAL DISCONNECTING MEANS FOR HVAC UNIT INDICATED BY WIRING ANNOTATION. CIRCUIT TO EQUIPMENT BY 3 #500KCMIL, #3 G IN 4" CONDUIT.

5 PROVIDE 30A/3P/NEMA 3R NON-FUSED DISCONNECT SWITCH FOR LOCAL DISCONNECTING MEANS OF HVAC EQUIPMENT.

6 PROVIDE ROUGH-IN FOR ACCESS CONTROL PANEL. COORDINATE EXACT

7 PROVIDE EPO BUTTON WHEN ACTIVATED SHUTS OFF ALL GAS SUPPLIES WITHIN BOILER ROOM.



N 1 LEVEL 1 ELECTRICAL PLAN

1/8" = 1'-0"

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Project Information

#	DESCRIPTION	DATE
1	ADDENDUM #2	06/20/24

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KBSO #23127 OLUWASEUN ODUKOMAIYA REGISTERED No. 11300632 STATE OF INDIANA PROFESSIONAL ENGINEER 5/23/2024

Bloomington Readiness Center Modernization

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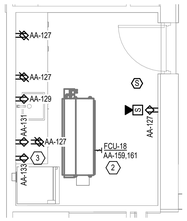
23043

Project Status

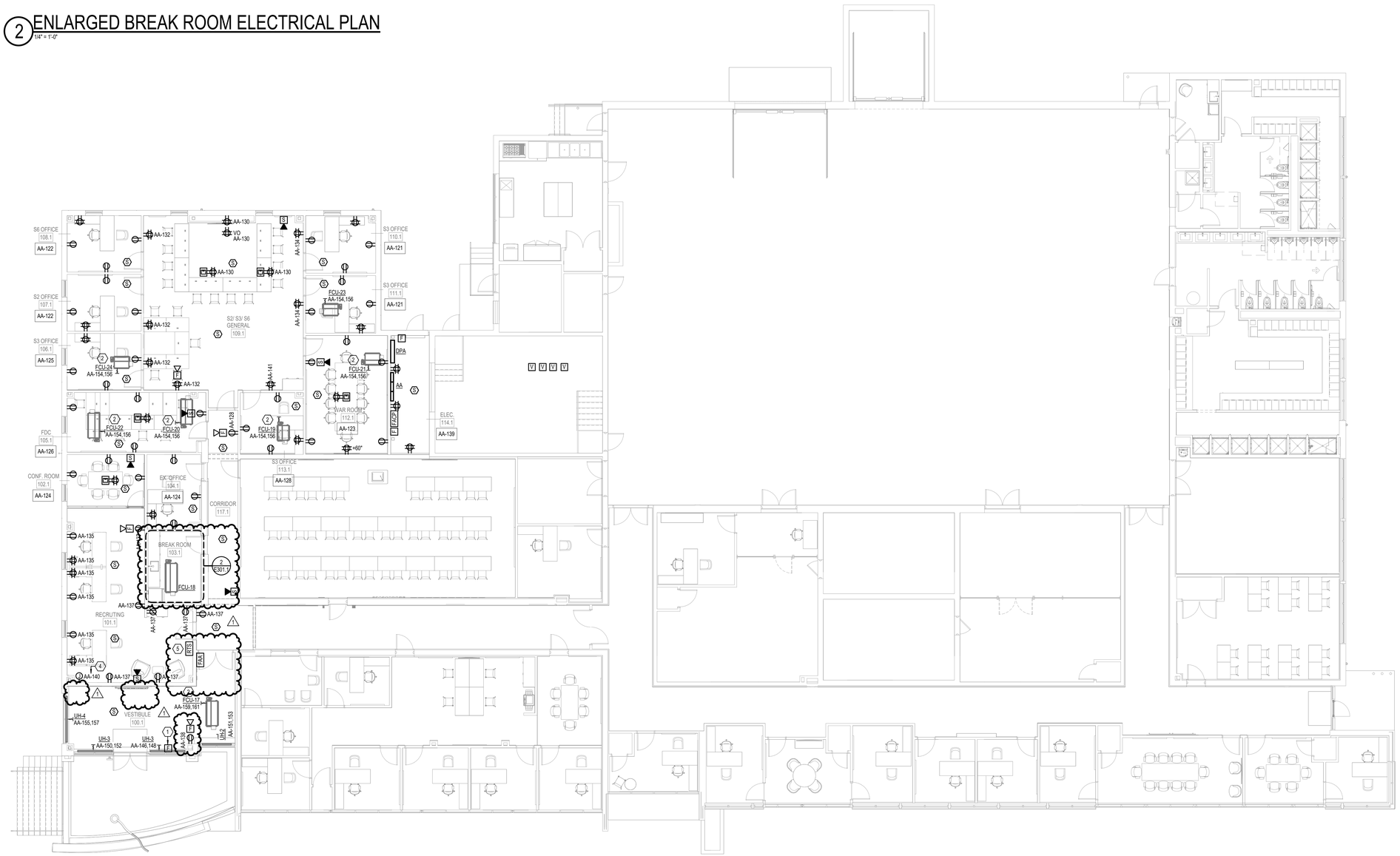
LEVEL 1 ELECTRICAL PLAN

Base Bid

E301



2 ENLARGED BREAK ROOM ELECTRICAL PLAN
1/4" = 1'-0"



1 LEVEL 1 ELECTRICAL PLAN ABI 1
1/8" = 1'-0"

GENERAL NOTES

A REFER TO SHEET E000 FOR GENERAL ELECTRICAL NOTES, SYMBOLS AND ABBREVIATIONS.

B ALL EXPOSED SYSTEMS ARE TO BE PAINTED TO MATCH ADJACENT EXPOSED DECK/WALL. REFER TO INTERIOR DESIGN DRAWINGS FOR EXACT COLORS.

C USE WALLS AND COLUMNS TO FEED OFFICE FURNITURE WHERE POSSIBLE. FOR ISLAND WORK STATION LOCATIONS SAW CUT FROM NEAREST COLUMN, ROUTE CONDUIT UNDER FLOOR AND PATCH CONCRETE.

D RECEPTACLES MARKED "VO" INDICATE TV BACK BOX. PROVIDE TV BACK BOX WITH (2) DUPLEX RECEPTACLES. COORDINATE WITH LOW VOLTAGE DRAWINGS FOR A/V AND DATA CABLING REQUIREMENTS.

SHEET KEYNOTES

1 PROVIDE MULLION MOUNT FIRE ALARM DEVICE. COORDINATE INSTALLATION WITH STOREFRONT MANUFACTURER. ALL WIRING AND CONDUIT TO BE CONCEALED WITHIN STOREFRONT.

2 PROVIDE 20A/2P TOGGLE SWITCH FOR MECHANICAL EQUIPMENT AS LOCAL DISCONNECTING MEANS. MOUNT SWITCH PER MANUFACTURER INSTRUCTIONS OR IN A MANNER WHICH DOES NOT INTERFERE WITH UNIT OPERATION OR PERFORMANCE.

3 PROVIDE RECEPTACLE FOR FRIDGE IN CABINET ADJACENT TO FRIDGE. PROVIDE GROMETED HOLE AT 6" AFF THROUGH CASEWORK TO FRIDGE SPACE FOR CORD AND PLUG CONNECTION.

4 PROVIDE ROUGH-IN FOR ACCESS CONTROL PANEL. COORDINATE EXACT LOCATION WITH DOOR HARDWARE SUPPLIER AND OWNER.

1 5 PROVIDE REMOTE TEST STATION FOR SMOKE DETECTORS ABOVE BAFFLES.

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Project Information

#	DESCRIPTION	DATE
1	ADDENDUM #2	06/20/24

Revisions

KBSO #23127
OLUWASEUN ODUKOMAIYA
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No. 11300632
STATE OF INDIANA
PROFESSIONAL ENGINEER
5/23/2024

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05.23.2024
23043

Project Status

LEVEL 1
ELECTRICAL PLAN

ABI 1

E301.1

SHEET KEYNOTES

1 PROVIDE 30A/3P/NEMA 1 NON-FUSED DISCONNECT SWITCH FOR LOCAL DISCONNECTING MEANS OF HVAC EQUIPMENT. MOUNT DISCONNECT TO 4' TALL TWO POST UNISTRUT RACK SYSTEM WITHIN LINE OF SIGHT OF UNIT ELECTRICAL CONNECTION POINT. MAINTAIN ALL HVAC UNIT MANUFACTURER CLEARANCES. CIRCUIT FOR EQUIPMENT BY 3#12, #12 G IN 1" CONDUIT.

2 PROVIDE 20A/1P TOGGLE SWITCH FOR LOCAL DISCONNECTING MEANS OF GAS FED HVAC EQUIPMENT. MOUNT DISCONNECT TO 4' TALL TWO POST UNISTRUT RACK SYSTEM WITHIN LINE OF SIGHT OF UNIT ELECTRICAL CONNECTION POINT. MAINTAIN ALL HVAC UNIT MANUFACTURER CLEARANCES.

3 INSTALL MECHANICAL CONTRACTOR FURNISHED VFD FOR MECHANICAL PUMP ON 4' TALL TWO POST UNISTRUT RACK SYSTEM WITHIN LINE OF SIGHT OF UNIT ELECTRICAL CONNECTION POINT. MAINTAIN ALL MANUFACTURER CLEARANCES. CIRCUIT FOR EQUIPMENT BY 3 #8, #10 G. IN 1" CONDUIT.

4 PROVIDE 20A/1P TOGGLE SWITCH FOR LOCAL DISCONNECTING MEANS OF PLUMBING EQUIPMENT. MOUNT TOGGLE SWITCH TO ADJACENT WALL WITHIN LINE OF SIGHT OF UNIT ELECTRICAL CONNECTION POINT. MAINTAIN ALL PLUMBING EQUIPMENT MANUFACTURER CLEARANCES.

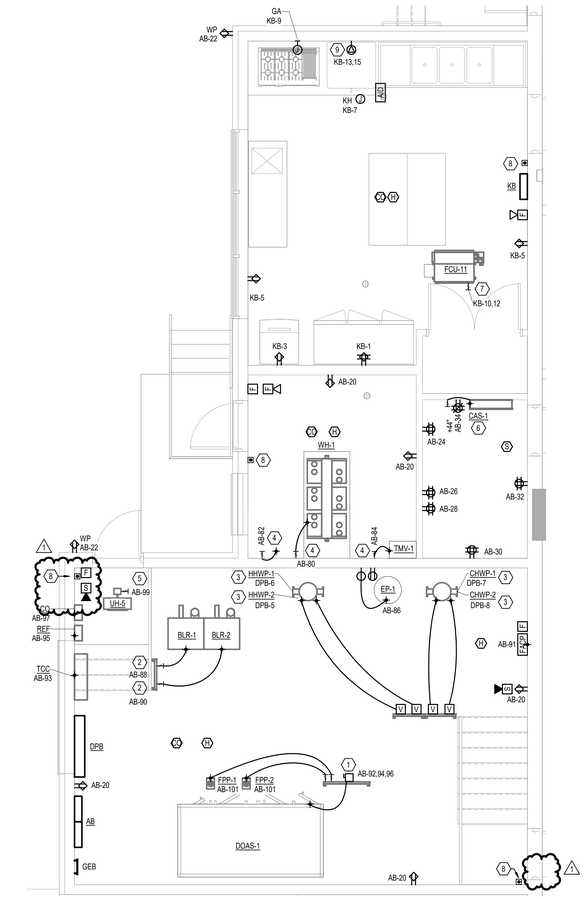
5 PROVIDE 20A/1P TOGGLE SWITCH FOR LOCAL DISCONNECTING MEANS OF HYDRONIC UNIT HEATER.

6 PROVIDE 20A/2P TOGGLE SWITCH FOR LOCAL DISCONNECTING MEANS OF INDOOR SPLIT SYSTEM UNIT. MOUNT TOGGLE SWITCH ADJACENT TO UNIT ELECTRICAL CONNECTION POINT ON WALL. MAINTAIN ALL HVAC UNIT MANUFACTURER CLEARANCES. CIRCUIT FOR EQUIPMENT TO BE FROM ROOF MOUNTED OUTDOOR UNIT BY 2 #12, #12 G IN 3/4" CONDUIT.

7 PROVIDE 20A/2P TOGGLE SWITCH FOR LOCAL DISCONNECTING MEANS OF HVAC UNIT. MOUNT TOGGLE SWITCH ADJACENT TO UNIT ELECTRICAL CONNECTION POINT ON WALL. MAINTAIN ALL HVAC UNIT MANUFACTURER CLEARANCES. CIRCUIT FOR EQUIPMENT BY 2 #12, #12 G IN 3/4" CONDUIT.

8 PROVIDE EPO BUTTON WHEN ACTIVATED SHUTS OFF ALL GAS SUPPLIES WITHIN ROOM.

9 PROVIDE 14-50 RECEPTACLE FOR KITCHEN APPLANCE. CIRCUIT BY 3 #6, #8 G. IN 1" CONDUIT.



1 ENLARGED BOILER / WATER / IDF / KITCHEN RMS
1/4" = 1'-0"

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Project Status

ENLARGED ELECTRICAL PLANS

Base Bid

E401

Branch Panel: AB

Location:
Supply From: DPB
Mounting: SURFACE
Enclosure: NEMA 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 30,000 A
Mains Type: MLO
Mains Rating: 250 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPT: LACTATION, W LOCKERS	20 A	1	1260	1620					1	20 A	RECEPT: SR HR SGT	2
3	RECEPT: W RESTROOM	20 A	1			1080	1620			1	20 A	RECEPT: LOBBY MED NCO	4
5	RECEPT: PLUMBING SENSORS WOMEN	20 A	1					720	1800	1	20 A	RECEPT: S1/S4 GENERAL, S1/S4 CONF.	6
7	RECEPT: M RESTROOM	20 A	1	720	1260								
9	RECEPT: PLUMBING SENSORS MEN	20 A	1			1260	360			1	20 A	RECEPT: S1/S4 GENERAL PRINTER	10
11	RECEPT: M LOCKER, M SHOWER	20 A	1					720	1500				
13	RECEPT: FITNESS	20 A	1	180	1800					1	20 A	RECEPT: CLASSROOM	14
15	RECEPT: FITNESS	20 A	1			180	1800			1	20 A	RECEPT: CLASSROOM	16
17	RECEPT: FITNESS	20 A	1					180	1080	1	20 A	RECEPT: BSW	18
19	RECEPT: FITNESS	20 A	1	180	900					1	20 A	RECEPT: MECHANICAL, WATER ROOM	20
21	RECEPT: FITNESS	20 A	1			180	900			1	20 A	RECEPT: EXTERIOR	22
23	RECEPT: FITNESS	20 A	1					180	360	1	20 A	RECEPT: MDF	24
25	RECEPT: FITNESS	20 A	1	180	360					1	20 A	RECEPT: MDF	26
27	RECEPT: FITNESS	20 A	1			180	360			1	20 A	RECEPT: MDF	28
29	RECEPT: FITNESS	20 A	1					180	360	1	20 A	RECEPT: MDF	30
31	RECEPT: FITNESS	20 A	1	180	360					1	20 A	RECEPT: MDF	32
33	RECEPT: FITNESS	20 A	1			180	180			1	20 A	RECEPT: MDF	34
35	RECEPT: FITNESS DRINKING FOUNTIAN	20 A	1					180	750	2	20 A	UH-1	36
37	SPARE	20 A	1	0	750								38
39	SPARE	20 A	1			0	0			1	20 A	SPARE	40
41	SPARE	20 A	1					0	0	1	20 A	SPARE	42
43	SPARE	20 A	1	0	0					1	20 A	SPARE	44
45	SPARE	20 A	1			0	0			1	20 A	SPARE	46
47	SPARE	20 A	1					0	0	1	20 A	SPARE	48
49	SPARE	20 A	1	0	0					1	20 A	SPARE	50
51	SPARE	20 A	1			0	0			1	20 A	SPARE	52
53	SPARE	20 A	1					0	0	1	20 A	SPARE	54
55	SPARE	20 A	1	0	0					1	20 A	SPARE	56
57	RECEPT: SR MNT SUP	20 A	1			1440	0			1	20 A	SPARE	58
59	RECEPT: S1 OFFICES	20 A	1					1440	0	1	20 A	SPARE	60
		Total Load:		23255 VA		23089 VA		22535 VA					
		Total Amps:		194 A		193 A		188 A					

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	28044 VA	100.00%	28044 VA		
LIGHTING	3606 VA	125.00%	4508 VA	**Total Conn. Load:**	68880 VA
Motor	3444 VA	107.26%	3694 VA	**Total Est. Demand:**	61231 VA
Other	5436 VA	100.00%	5436 VA	**Total Conn.:**	191 A
RECEPT	27600 VA	68.12%	18800 VA	**Total Est. Demand:**	170 A
Miscellaneous Power	750 VA	100.00%	750 VA		

Notes:

Branch Panel: BB

Location:
Supply From: DPB
Mounting: SURFACE
Enclosure: NEMA 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 30,000 A
Mains Type: MLO
Mains Rating: 250 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	RECEPT: OCIE	20 A	1	540	842					1	20 A	LTG: VAULTS, SUPPLY	2
3	RECEPT: VAULT	20 A	1			180	1574			1	20 A	LTG: DRILL HALL	4
5	RECEPT: VAULT	20 A	1					180	1136	1	20 A	LTG: DRILL HALL	6
7	RECEPT: HHB SUPPLY ROOM	20 A	1	540	1040					2	20 A	HVAC: FCU-06, 07	8
9	RECEPT: SUPPLY SGT.	20 A	1			900	1040						10
11	RECEPT: STORAGE BUILDING LIGHTING	20 A	1					1500	702	2	15 A	HVAC: FCU-08	12
13	RECEPT: DRILL HALL	20 A	1	720	702								14
15	RECEPT: ELECTRIC DRINKING FOUNTAIN	20 A	1			180	540			1	20 A	RECEPT: DISTANCE LEARNING	16
17	RECEPT: DRILL HALL, OHD	20 A	1					900	403	2	15 A	HVAC: FCU-05	18
19	RECEPT: TABLES AND CHAIRS	20 A	1	360	403								20
21	RECEPT: HBB MEDICAL	20 A	1			1440	702			2	15 A	HVAC: FCU-09	22
23	RECEPT: CORRIDOR	20 A	1					1080	702				24
25	UH-1	20 A	2	750	900					1	20 A	RECEPT: CHAPLAIN	26
27						750	1800			1	20 A	RECEPT: CMS, COMMAND	28
29	RECEPT: DISTANCE LEARNING	20 A	1					720	1260	1	20 A	RECEPT: BATALLION COMMAND	30
31	RECEPT: DISTANCE LEARNING	20 A	1	540	1440					1	20 A	RECEPT: CO, CO 1SG	32
33	HVAC: FCU-03, 04	20 A	2			916	900			1	20 A	RECEPT: RNCO	34
35								916	1260	1	20 A	RECEPT: HBB	36
37	RECEPT	20 A	1	180	0					3	30 A	TYPE 2 SPD	38
39	SPARE	20 A	1			0	0						40
41	SPARE	20 A	1					0	0				42
		Total Load:		8957 VA		10922 VA		10759 VA					
		Total Amps:		75 A		93 A		92 A					

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	9025 VA	100.00%	9025 VA		
LIGHTING	5052 VA	125.00%	6315 VA	**Total Conn. Load:**	30637 VA
Motor	0 VA	0.00%	0 VA	**Total Est. Demand:**	28620 VA
RECEPT	16560 VA	80.19%	13280 VA	**Total Conn.:**	85 A
Miscellaneous Power	0 VA	0.00%	0 VA	**Total Est. Demand:**	79 A

Notes:

Branch Panel: KB

Location:
Supply From: DPB
Mounting: SURFACE
Enclosure: NEMA 1 SS

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 30,000 A
Mains Type: MLO
Mains Rating: 150 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	KITCHEN: REFRIGERATOR	20 A	1	360	1102					1	20 A	LTG: KITCHEN	2
3	KITCHEN: ICE MAKER	20 A	1			180	416						4
5	KITCHEN: KITCHEN	20 A	1					360	416	3	15 A	HVAC: KMAU-1	6
7	KITCHEN: HOOD	20 A	1	180	416								8
9	KITCHEN: GAS STOVETOP	20 A	1			180	780			2	15 A	HVAC: FCU-11	10
11	SHUNT TRIP	--	1					--	780				12
13	KITCHEN: OVEN	50 A	2	3120	864					1	20 A	KEF	14
15						3120	0			1	20 A	SPARE	16
17	SHUNT TRIP	--	1					--	0	1	20 A	SPARE	18
19	SPARE	20 A	1	0	0					1	20 A	SPARE	20
21	SPARE	20 A	1			0	0			1	20 A	SPARE	22
23	SPARE	20 A	1					0	0	1	20 A	SPARE	24
25	SPARE	20 A	1	0	0					3	30 A	TYPE 2 SPD	26
27	SPARE	20 A	1			0	0						28
29	SPARE	20 A	1					0	0				30
		Total Load:		6042 VA		4676 VA		1556 VA					
		Total Amps:		54 A		43 A		13 A					

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	2808 VA	100.00%	2808 VA		
LIGHTING	42 VA	125.00%	53 VA	**Total Conn. Load:**	12274 VA
Motor	180 VA	125.00%	225 VA	**Total Est. Demand:**	12330 VA
Other	1060 VA	100.00%	1060 VA	**Total Conn.:**	34 A
RECEPT	6600 VA	100.00%	6600 VA	**Total Est. Demand:**	34 A
FRACTIONAL HP MOTOR	864 VA	100.00%	864 VA		
Kitchen	720 VA	100.00%	720 VA		

Notes:

Branch Panel: AB

Location:
Supply From: AB
Mounting: SURFACE
Enclosure: NEMA 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 30,000 A
Mains Type: MLO
Mains Rating: 250 A

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
61	LTG: EXTERIOR	20 A	1	25	884					2	20 A	HVAC: FCU-10	62
63	LTG: CLASSROOM, BOILER, MDF, WATER	20 A	1			940	884						64
65	LTG: OFFICES	20 A	1					1144	936	2	20 A	HVAC: FCU-12, 13	66
67	LTG: CORRIDOR	20 A	1	740	936								68
69	LTG: STOREFRONT OFFICES	20 A	1			680	514			2	15 A	HVAC: FCU-14	70
71	LTG: FITNESS , DIS. LEARNING, HHB	20 A	1					1067	514				72
73	LTG: SHOWERS, RESTROOMS	20 A	1	1181	936					2	20 A	HVAC: FCU-15, 16	74
75	LTG: ELEC, WAR, SD, CORR.	20 A	1			556	936						76
77	LTG: VEST., REC, CONF , FDC, OFFICE,...	20 A	1					1082	0	1	20 A	SPARE	78
79	LTG: OFFICES, S2/S3/S6 GEN.	20 A	1	1122	1620					1	20 A	HVAC: WH-1	80
81	LTG: EXTERIOR BLDG. MNT.	20 A	1			505	1180			1	20 A	MTR: CP-1	82
83	HVAC	20 A	1					528	180	1	15 A	HVAC: TMV-1	84
85	EF-6	20 A	1	528	0					1	20 A	HVAC: BLR-1 **	86
87	SPARE	20 A	1			0	1560			1	20 A	HVAC: BLR-1 **	88
89	SPARE	20 A	1					0	1560	1	20 A	HVAC: BLR-2 **	90
91	FACP	20 A	1	750	1487								92
93	TEMP CNTRL PANEL	20 A	1			500	1487			3	20 A	HVAC: DOAS-1	94
95	REF. MONITOR PNL	20 A	1					500	1487				96
97	CO MONITOR PANEL	20 A	1	500	624					2	30 A	HVAC: MDF SPLIT SYSTEM	98
99	UH-5	20 A	1			500	624						100
101	FPP-1/FPP-2	20 A	1					1056	935				102
103	RECEPT - ROOF	20 A	1	180	935					3	15 A	HVAC: BCU-1	104
105	HVAC: FCU-01,02	20 A	2			1040	935						106
107								1040	528	1	15 A	HVAC: EF-1	108
109	FPP-3	20 A	1	528	528					1	15 A	HVAC: EF-2	110
111							528			1	15 A	HVAC: EF-3	112
113									528	1	15 A	HVAC: EF-4	114
115						0							116
117							0			3	30 A	TYPE 2 SPD	118
119									0				120
		Total Load:		13505 VA		13369 VA		13085 VA					
		Total Amps:		113 A		112 A		109 A					

Notes:
** - PROVIDE SHUNT TRIP BREAKER FOR BOILERS.

Switchboard: DPB

Location: Room 5
Supply From: UTILITY TRANSFORMER
Mounting: SURFACE
Enclosure: NEMA 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 42,000 A
Mains Type: MCB
Mains Rating: 1200 A
MCB Rating: 1000 A

Notes:

CKT	Circuit Description	# of Poles	Trip Rating	Load	Remarks
1	PANEL AB	3	250 A	68880 VA	
2	PANEL BB	3	250 A	30637 VA	
3	PANEL KB	3	150 A	12274 VA	
4	HVAC: CH-1	3	400 A	134380 VA	
5	MTR: HHWP-1	3	35 A	17992 VA	
6	MTR: HHWP-2	3	35 A	8996 VA	
7	MTR: CHWP-1	3	35 A	8996 VA	
8	MTR: CHWP-2	3	35 A	8996 VA	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20	TYPE 1 SPD	3	60 A	0 VA	
				291151 VA	
				808 A	

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	174257 VA	100.00%	174257 VA		
LIGHTING	8700 VA	125.00%	10875 VA	**Total Conn. Load:**	291151 VA
Motor	48604 VA	104.63%	50853 VA	**Total Est. Demand:**	275195 VA
Other	6496 VA	100.00%	6496 VA	**Total Conn.:**	808 A
RECEPT	50760 VA	59.85%	30380 VA	**Total Est. Demand:**	764 A
Miscellaneous Power	750 VA	100.00%	750 VA		
FRACTIONAL HP MOTOR	864 VA	100.00%	864 VA		
Kitchen	720 VA	100.00%	720 VA		

Notes:
** - PROVIDE SHUNT TRIP BREAKER FOR AIR COOLED CHILLER.

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Consultant Information

Consultant Information

Bloomington Readiness Center Modernization

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Bloomington, IN 47401

Project Information

#	DESCRIPTION	DATE
1	ADDENDUM #2	06/20/24

Revisions

KBSO #23127 OLUWASEUN ODUKOMAIYA REGISTERED No. 11300632 STATE OF INDIANA PROFESSIONAL ENGINEER 5/23/2024

Bid Documents

05.23.2024
23043

Project Status

ELECTRICAL SCHEDULES

Base Bid

E602

Branch Panel: AA

Location: ELEC. 3
Supply From: DPA
Mounting: SURFACE
Enclosure: NEMA 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 42,000 A
Mains Type: MLO
Mains Rating: 400 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
1										2
3										4
5	REFER TO THE PANEL AB (1-60) SCHEDULE FOR CIRCUITS SERVED BY PANEL AA (1-60)									6
7										8
9										10
11										12
13										14
15										16
17										18
19										20
21										22
23										24
25										26
27										28
29										30
31										32
33										34
35										36
37										38
39										40
41										42
43										44
45										46
47										48
49										50
51										52
53										54
55										56
57										58
59										60

Total Load: 38797 VA | 38348 VA | 36062 VA
Total Amps: 326 A | 322 A | 301 A

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	47902 VA	100.00%	47902 VA		
LIGHTING	3606 VA	125.00%	4508 VA	**Total Conn. Load:**	113206 VA
Motor	3972 VA	106.29%	4222 VA	**Total Est. Demand:**	93588 VA
Other	5436 VA	100.00%	5436 VA	**Total Conn.:**	314 A
RECEPT	51540 VA	59.70%	30770 VA	**Total Est. Demand:**	260 A
Miscellaneous Power	750 VA	100.00%	750 VA		

Notes:

Branch Panel: AA

Location: ELEC. 3
Supply From: AA
Mounting: SURFACE
Enclosure: NEMA 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 42,000 A
Mains Type: MLO
Mains Rating: 400 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
61										62
63										64
65	REFER TO THE PANEL AB (61-120) SCHEDULE FOR CIRCUITS SERVED BY PANEL AA (61-120)									66
67										68
69										70
71										72
73										74
75										76
77										78
79										80
81										82
83										84
85										86
87										88
89										90
91										92
93										94
95										96
97										98
99										100
101										102
103										104
105										106
107										108
109										110
111										112
113										114
115										116
117										118
119										120

Total Load: 29047 VA | 28628 VA | 26612 VA
Total Amps: 245 A | 241 A | 222 A

Notes:

Branch Panel: AA

Location: ELEC. 3
Supply From: AA
Mounting: SURFACE
Enclosure: NEMA 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 42,000 A
Mains Type: MLO
Mains Rating: 400 A

CKT	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	CKT
121	RECEPT: S3 OFFICES	20 A	1	1800 1800			1	20 A	RECEPT: S2/S6 OFFICES	122
123	RECEPT: WAR ROOM	20 A	1		1620 1800		1	20 A	RECEPT: CONF. ROOM, EX. OFFICE	124
125	RECEPT: S3 OFFICE	20 A	1			900 1080	1	20 A	RECEPT: FDC	126
127	RECEPT: BREAK ROOM	20 A	1	720 1080			1	20 A	RECEPT: S3 OFFICE, CORRIDOR	128
129	DISPOSAL: BREAK ROOM	20 A	1		1500 1440		1	20 A	RECEPT: S2/S3/S6 GENERAL	130
131	MICROWAVE: BREAK ROOM	20 A	1			1500 1440	1	20 A	RECEPT: S2/S3/S6 GENERAL	132
133	REFRIGERATOR: BREAK ROOM	20 A	1	1500 720			1	20 A	RECEPT: S2/S3/S6 GENERAL	134
135	RECEPT: RECRUITING	20 A	1		1620 0		1	20 A	SPARE	136
137	RECEPT: RECRUITING	20 A	1			1440 360	1	20 A	ACCESS CONTROL PANEL	138
139	RECEPT: ELEC	20 A	1	1080 180			1	20 A	ACCESS CONTROL PANEL	140
141	RECEPT - PRINTER	20 A	1		360 0		1	20 A	SPARE	142
143	SPARE	20 A	1			0 0	1	20 A	SPARE	144
145	SPARE	20 A	1	0 728			2	15 A	HVAC: UH-3	146
147	FPP-4	20 A	1		528 728					148
149						728	2	15 A	HVAC: UH-3	150
151	HVAC: UH-2	15 A	2	624 728						152
153					624 1028		2	15 A	HVAC: FCU-19, 20, 21, 22, 23, 24	154
155	HVAC: UH-4	20 A	2			1040 1028				156
157				1040 3543						158
159	HVAC: FCU-17, 18	15 A	2		468 3543		3	30 A	HVAC: AHU-1 (ABI-2 ONLY)	160
161						468 3543				162

Total Load: 15543 VA | 15258 VA | 13526 VA
Total Amps: 132 A | 129 A | 113 A

Notes:

Switchboard: DPA

Location: ELEC. 3
Supply From: UTILITY TRANSFORMER
Mounting: SURFACE
Enclosure: NEMA 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 42,000 A
Mains Type: MCB
Mains Rating: 1200 A
MCB Rating: 1200 A

Notes:

CKT	Circuit Description	# of Poles	Trip Rating	Load	Remarks
1	PANEL AA	3	400 A	113206 VA	
2	PANEL BB	3	250 A	30637 VA	
3	PANEL KP	3	400 A	134280 VA	
4	HVAC: CH-1 **	3	400 A	134280 VA	
5	HVAC: CH-2 **	3	400 A	134280 VA	
6	MTR: HHWP-2	3	35 A	6300 VA	
7	MTR: CHWP-1	3	35 A	6300 VA	
8	MTR: CHWP-2	3	35 A	6300 VA	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20	TYPE 1 SPD	3	60 A	0 VA	
				315597 VA	
				876 A	

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	194015 VA	100.00%	194015 VA		
LIGHTING	8700 VA	125.00%	10875 VA	**Total Conn. Load:**	315597 VA
Motor	29352 VA	105.37%	30927 VA	**Total Est. Demand:**	286997 VA
Other	6496 VA	100.00%	6496 VA	**Total Conn.:**	876 A
RECEPT	74700 VA	56.69%	42350 VA	**Total Est. Demand:**	797 A
Miscellaneous Power	750 VA	100.00%	750 VA		
FRACTIONAL HP MOTOR	864 VA	100.00%	864 VA		
Kitchen	720 VA	100.00%	720 VA		

Notes:
** - PROVIDE SHUNT TRIP BREAKER FOR AIR COOLED CHILLER.

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Project Information

#	DESCRIPTION	DATE
1	ADDENDUM #2	06/20/24

Revisions

KBSO #23127
OLUWASEUN ODUKOMAIYA
REGISTERED
No. 11300632
STATE OF
INDIANA
PROFESSIONAL ENGINEER
5/23/2024

Bid Documents

05.23.2024
23043

Project Status

ELECTRICAL
SCHEDULES

ABI 1

E602.1

GENERAL NOTES

A AVOID ALL CONFLICTS BETWEEN PLUMBING SYSTEMS AND CONDUIT, DUCT, EQUIPMENT, PIPING, STRUCTURAL MEMBERS, AND ANDY OTHER OBSTRUCTIONS ENCOUNTERED. PIPING LAYOUTS ARE DIAGRAMMATIC AND SHOW SYSTEM INTENT. PIPING MAY REQUIRE ADDITONAL OFFSETS, DROPS, RISERS, AND FITTINGS, ETC.

B REFER TO THE 'PLUMBING FIXTURE ROUGH-IN SCHEDULE' ON DRAWING P002 TO SIZE BRANCH LINES SERVING INDIVIDUAL PLUMBING FIXTURES.

C PROVIDE AN ACCESS PANEL WHERE SHUT-OFF VALVES ARE LOCATED ABOVE INACCESSIBLE CEILINGS.

D SAW CUT FLOOR AND EXCAVATE TRENCH TO INSTALL NEW UNDERGROUND PIPING. PROVIDE APPROPRIATE PIPE BEDDING PER ASTM D2321. BACKFILL AND PATCH FLOOR.

E SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR INSTRUCTIONS FOR PATCHING WALLS, CEILINGS, AND FLOORS.

F CONTRACTOR SHALL COORDINATE NEW PIPE ROUTES WITH EXISTING STRUCTURAL CONDITIONS. ROUTE THROUGH EXISTING FOUNDATION WALL PENETRATIONS WHERE POSSIBLE. ROUTE AROUND FOOTINGS WHERE POSSIBLE.

G ALL EXPOSED PIPING IS TO BE PAINTED TO MATCH ADJACENT EXPOSED DECK, UNLESS OTHERWISE NOTED. REFER TO INTERIOR DESIGN DRAWINGS FOR EXACT COLORS.

H FMS BUILDING SHALL REMAIN IN OPERATION THROUGHOUT THE DURATION OF WORK. WHEN FMS BUILDING SERVICES ARE FED FROM THIS PROJECT, AND SERVICES ARE BEING DISCONNECTED OR RELOCATED, SHUTDOWN OF SERVICES IS TO BE COORDINATED WITH OWNER AND 72 HOURS NOTICE PROVIDED. DOWNTIME SHALL BE KEPT TO A MINIMUM.

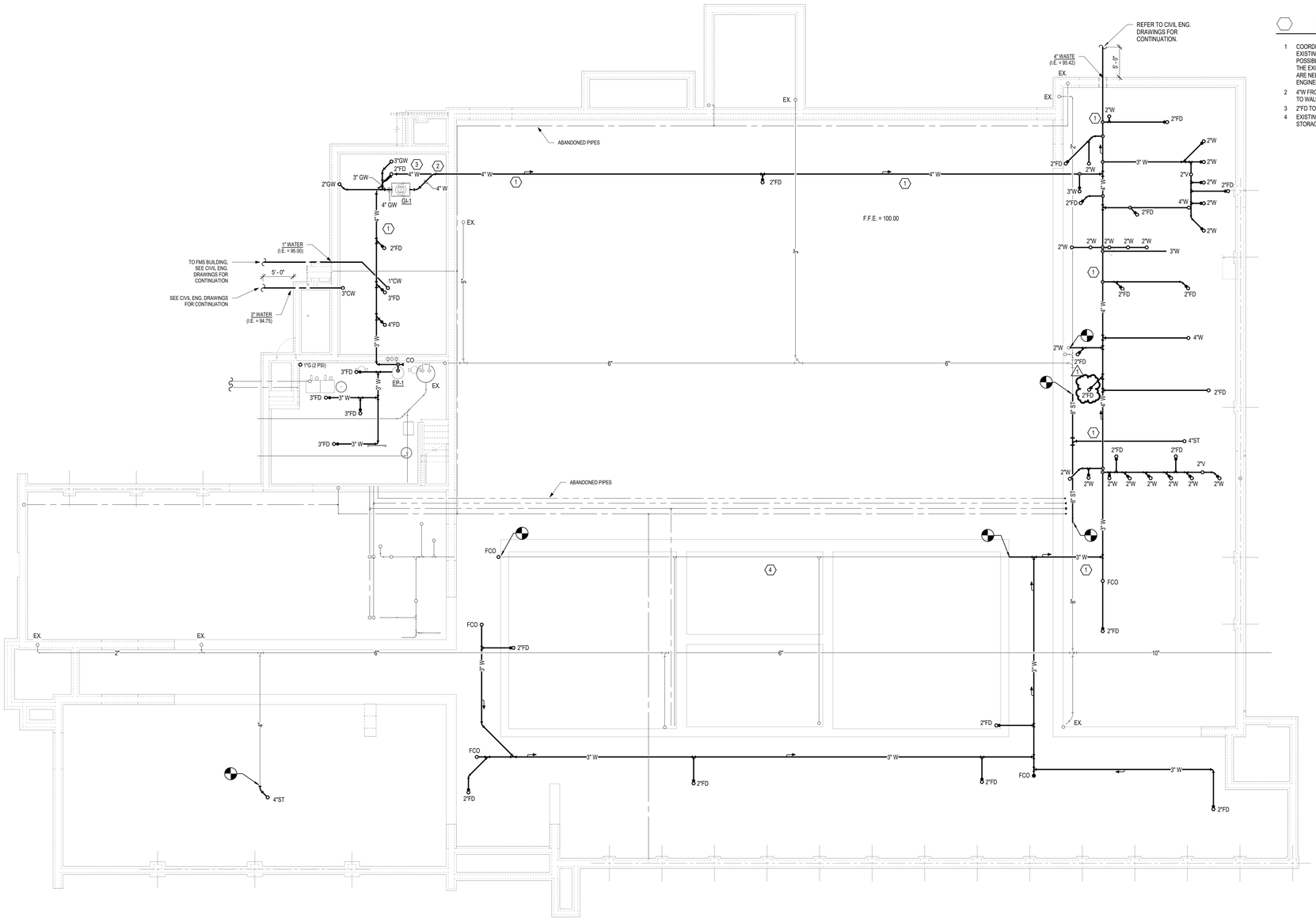
SHEET KEYNOTES

1 COORDINATE NEW SANITARY WASTE PIPING BELOW THE FLOOR WITH EXISTING STRUCTURAL FOUNDATION PENETRATIONS AS CLOSELY AS POSSIBLE. THE NEW SANITARY WASTE PIPING HAS BEEN LAID OUT TO UTILIZE THE EXISTING ROUTE AS MUCH AS POSSIBLE. WHERE NEW PENETRATIONS ARE NEEDED IN THE FOUNDATION WALL, COORDINATE WITH STRUCTURAL ENGINEER PRIOR TO ROUTING NEW PIPE OR MAKING NEW PENETRATIONS.

2 4"W FROM GREASE INTERCEPTOR TO 45° DOWN INTO TOP OF 4"W MAIN PRIOR TO WALL PENETRATION.

3 2"FD TO TIE INTO GREASE WASTE TO GREASE INTERCEPTOR.

4 EXISTING SANITARY WASTE PIPING BELOW THE VAULT TO REMAIN. THE STORAGE BLOCK SHALL REMAIN UNDISTURBED AS MUCH AS POSSIBLE.



N 1 LEVEL 0 PLUMBING PLAN
1/8" = 1'-0"

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Project Information

#	DESCRIPTION	DATE
1	ADDENDUM #2	05/15/24

Revisions

KBSO #23127
OLUWASEUN ODUKOMAIYA
REGISTERED
No. 11300632
STATE OF INDIANA
PROFESSIONAL ENGINEER
5/23/2024

Bid Documents

05.23.2024
23043

Project Status

LEVEL 0
PLUMBING PLAN

Base Bid

P101

GENERAL NOTES

A AVOID ALL CONFLICTS BETWEEN PLUMBING SYSTEMS AND CONDUIT, DUCT, EQUIPMENT, PIPING, STRUCTURAL MEMBERS, AND ANDY OTHER OBSTRUCTIONS ENCOUNTERED. PIPING LAYOUTS ARE DIAGRAMMATIC AND SHOW SYSTEM INTENT. PIPING MAY REQUIRE ADDITONAL OFFSETS, DROPS, RISERS, AND FITTINGS, ETC.

B REFER TO THE 'PLUMBING FIXTURE ROUGH-IN SCHEDULE' ON DRAWING P602 TO SIZE BRANCH LINES SERVING INDIVIDUAL PLUMBING FIXTURES.

C PROVIDE AN ACCESS PANEL WHERE SHUT-OFF VALVES ARE LOCATED ABOVE INACCESSIBLE CEILINGS.

D SAW CUT FLOOR AND EXCAVATE TRENCH TO INSTALL NEW UNDERGROUND PIPING. PROVIDE APPROPRIATE PIPE BEDDING PER ASTM D2321. BACKFILL AND PATCH FLOOR.

E SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR INSTRUCTIONS FOR PATCHING WALLS, CEILINGS, AND FLOORS.

F CONTRACTOR SHALL COORDINATE NEW PIPE ROUTES WITH EXISTING STRUCTURAL CONDITIONS. ROUTE THROUGH EXISTING FOUNDATION WALL PENETRATIONS WHERE POSSIBLE. ROUTE AROUND FOOTINGS WHERE POSSIBLE.

G ALL EXPOSED PIPING IS TO BE PAINTED TO MATCH ADJACENT EXPOSED DECK, UNLESS OTHERWISE NOTED. REFER TO INTERIOR DESIGN DRAWINGS FOR EXACT COLORS.

H FMS BUILDING SHALL REMAIN IN OPERATION THROUGHOUT THE DURATION OF WORK. WHEN FMS BUILDING SERVICES ARE FED FROM THIS PROJECT, AND SERVICES ARE BEING DISCONNECTED OR RELOCATED, SHUTDOWN OF SERVICES IS TO BE COORDINATED WITH OWNER AND 72 HOURS NOTICE PROVIDED. DOWNTIME SHALL BE KEPT TO A MINIMUM.

SHEET KEYNOTES

1 COORDINATE PENETRATION THROUGH EXISTING CINDERBLOCK WALL WITH ARCHITECTURAL PLANS PRIOR TO DEMOLITION WORK.

2 2"CW DN INTO PLUMBING CHASE. EXTEND FULL SIZE CW PIPE THROUGH CHASE TO FEED WATER CLOSETS. PROVIDE WATER HAMMER ARRESTOR PRIOR TO LAST FLUSH VALVE. LOCATE CW ISOLATION VALVE BEHIND ACCESS PANEL.

3 1-1/2"CW DN INTO PLUMBING CHASE. EXTEND FULL SIZE CW PIPE THROUGH CHASE TO FEED URINALS. PROVIDE WATER HAMMER ARRESTOR PRIOR TO LAST FLUSH VALVE. LOCATE CW ISOLATION VALVE BEHIND ACCESS PANEL.

4 LAVATORIES TO BE WET VENTED WITHIN WALL. 2"W DROP AT PLAN NORTH LAVATORY, VENTED AT PLAN SOUTH LAVATORY AS SHOWN.

5 1"G UP TO MAKEUP AIR UNIT ON ROOF.

6 3/4"CW AND 3/4"HW (140°F) DOWN SURFACE OF WALL TO FEED SINK FROM BELOW. SINK HAS (3) FAUCETS, EACH REQUIRING A 1/2"CW AND 1/2"HW CONNECTION. RUN FULL SIZE BRANCHES ALONG WALL BELOW SINK TO SERVE EACH FAUCET.

7 RE-ROUTE 4" STORM PIPE FROM BELOW ROOF STRUCTURE TO SLAB, IN THE WALL AS SHOWN.

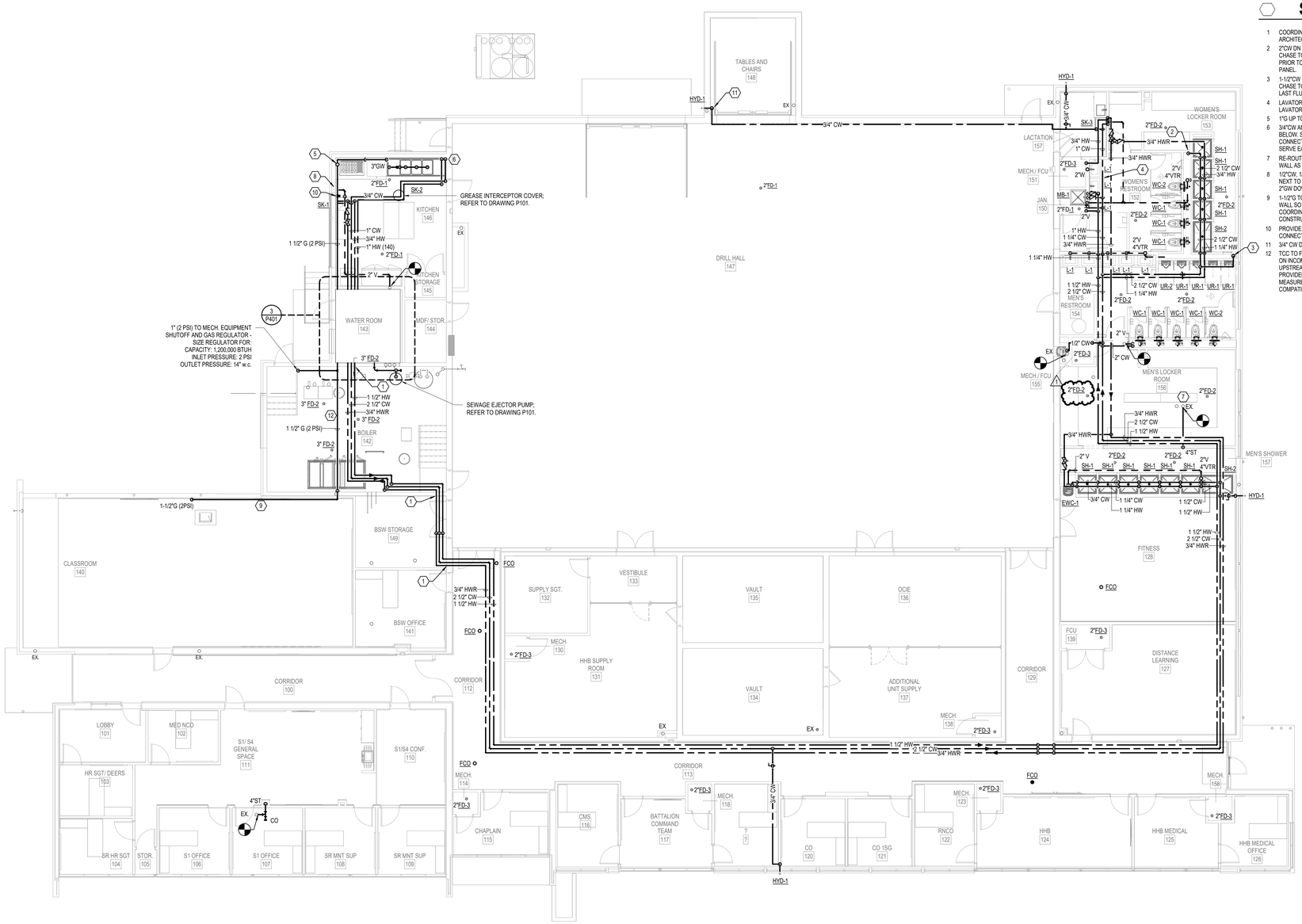
8 1/2"CW, 1/2"HW ACROSS WALL ABOVE WINDOW. CONTINUTE DOWN THE WALL NEXT TO THE WINDOW. ROUTE PIPES BELOW WINDO TO FEED SINK BELOW. 2"GW DOWN AND 2"V UP BESIDE WINDOW.

9 1-1/2"G TO BE RUN TIGHT TO ROOF STRUCTURE ACROSS THE CLASSROOM WALL SO AS NOT TO BE AN OBSTRUCTION. PAINT PIPE TO MATCH WALL; COORDINATE PAINT COLOR WITH ARCHITECTURAL/INTERIORS CONSTRUCTION DOCUMENTS.

10 PROVIDE EMERGENCY SOLENOID SHUTOFF VALVE ON GAS SUPPLY LINE AND CONNECT TO SWITCH ON WALL NEXT TO RANGE.

11 3/4" CW DOWN WALL TO HYD-1. BALL VALVE ON VERTICAL.

12 TCC TO FURNISH AND PC TO INSTALL NATURAL GAS VOLUME TRANSMITTER ON INCOMING NATURAL GAS LINE, DOWNSTREAM OF UTILITY METER AND UPSTREAM OF FIRST BRANCH TO EQUIPMENT. NATURAL GAS METER IS TO BE PROVIDED WITH ALL NECESSARY ACCESSORIES TO ACHIEVE COMPLETE MEASUREMENT AND RECORDING OF NATURAL GAS CONSUMPTION AND FULL COMPATIBILITY WITH BMS SYSTEM.



N 1 LEVEL 1 PLUMBING PLAN
1/8" = 1'-0"

STUDIO M
ARCHITECTURE & PLANNING
275 Veterans Way
Carmel, Indiana 46032
317.810.1502

Architect / Structural Engineer

Indiana Army National Guard
711 North Pennsylvania St.
Tyndall Armory
Indianapolis, IN 46204

Client Information

kbso CONSULTING
275 Veterans Way
Carmel, Indiana 46032
317.344.2044

Consultant Information

Consultant Information

Bloomington Readiness Center Modernization

3380 S. Walnut St.
Bloomington, IN 47401

Project Information

#	DESCRIPTION	DATE
1	ADDENDUM #2	05/15/24

Revisions

KBSO #23127 OLUWASEUN ODUKOMAIYA REGISTERED No. 11300632 STATE OF INDIANA PROFESSIONAL ENGINEER 5/23/2024

Bid Documents

05.23.2024
23043

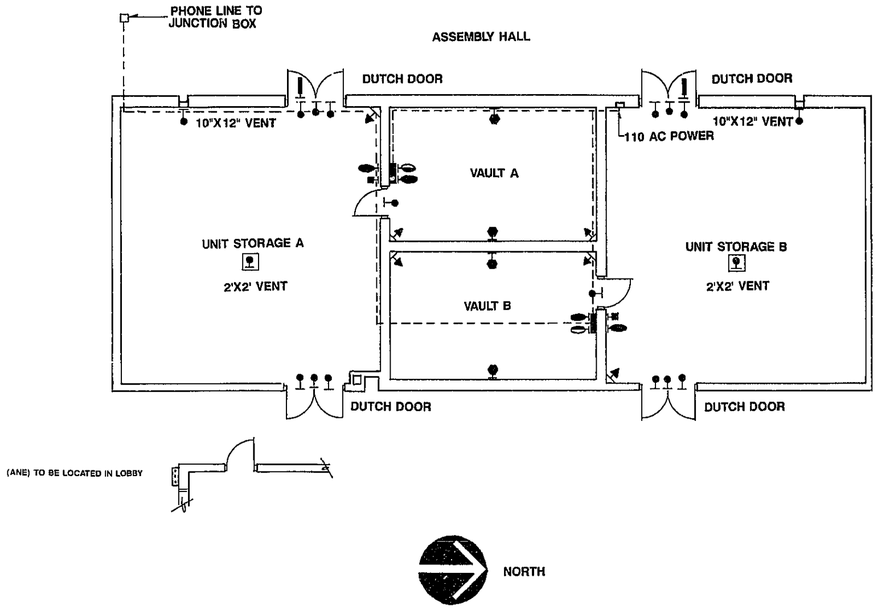
Project Status

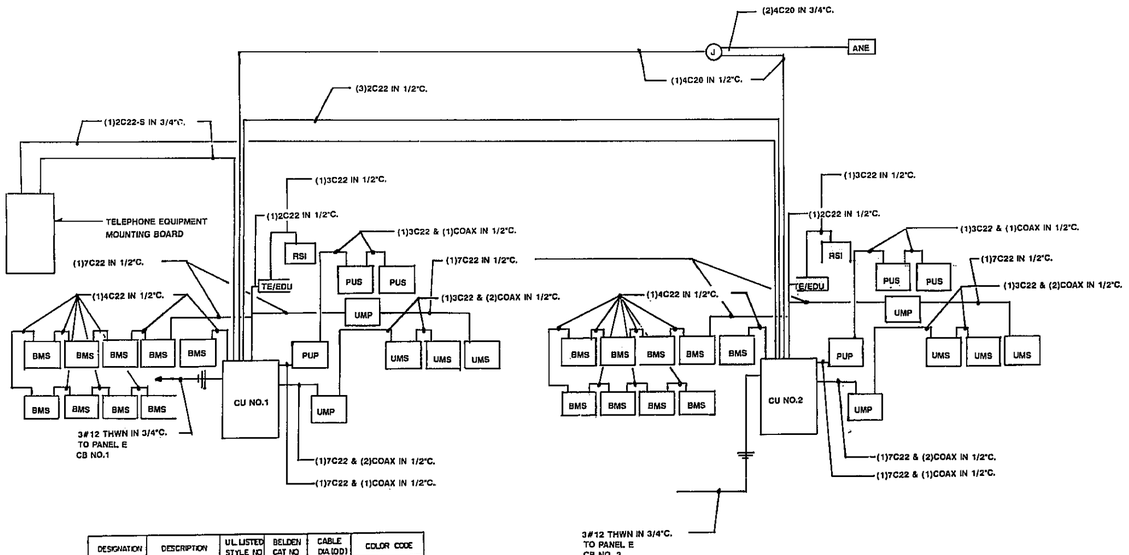
LEVEL 1
PLUMBING PLAN

Base Bid

P102

SYMBOL	ITEM/COMPONENT	ABBREVIATION
■	CONTROL UNIT	(CU)
⊢●	BALANCED MAGNETIC SWITCH	(BMS)
⊢⬬	ULTRASONIC MOTION PROCESSOR	(UMP)
⊢▶	ULTRASONIC MOTION SENSOR	(UMS)
⊢⬢	PASSIVE ULTRASONIC SENSOR	(PUS)
⊢◠	PASSIVE ULTRASONIC PROCESSOR	(PUP)
▪▪	AREA NOTIFICATION EQUIPMENT	(ANE)
⊢■	TIME ENTRY/EXIT DELAY UNIT	(TE/EDU)





DESIGNATION	DESCRIPTION	UL LISTED STYLE NO	BELDEN CAT NO	CABLE DIA (OD)	COLOR CODE
2C22-S	2/C 22 SHIELDED	2464	9462	0174	BLACK, RED
2C22	2/C 22	2508	8442	0 165	LACK, RED
3C22	3/C 22	2576	8443	0.160	BLACK, WHITE, RED
4C22	4/C 22	2576	8444	0.178	BLACK, WHITE, RED, GREEN
4C20	4/C 20	2464	9444	0.208	BLACK, WHITE, RED, GREEN
7C22	7/C 22	2576	9430	0.210	BLACK, WHITE, RED, GREEN, BLUE BROWN, ORANGE
COAX	RG59/U	1354	9310	0206	–

J-SIIDS WIRING SCHEDULE

BLOOMINGTON, IN
ARMORY

SHEET TITLE:

NO	REVISIONS DATE

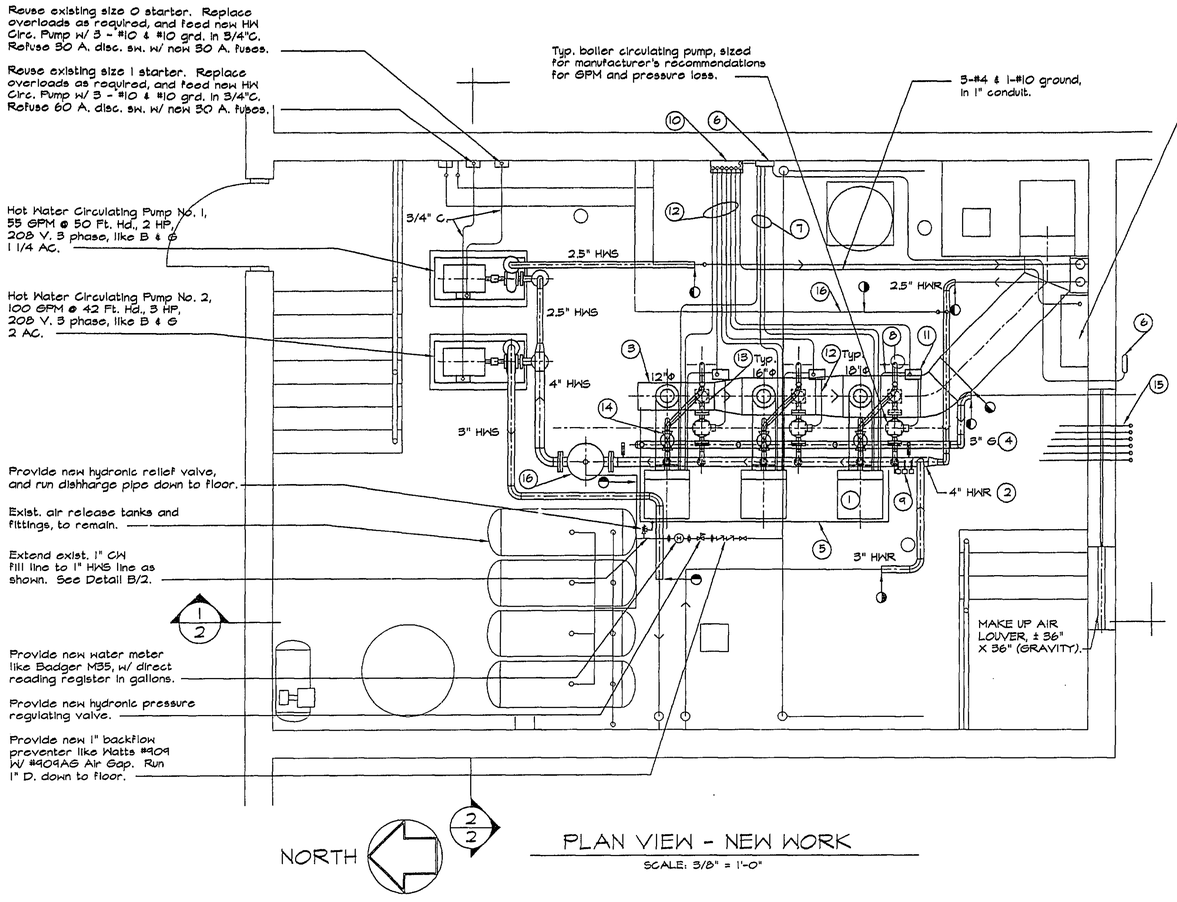
DATE 24 SEPT 1991
SCALE N/A
PROJ NO.
DRAWN BY TJR
CHECKED BY
APPROVED BY
JOB NO.

MILITARY DEPARTMENT OF INDIANA
DIRECTOR OF FACILITIES AND ENGINEERING
2002 SOUTH HOLT ROAD INDIANAPOLIS, INDIANA 46241 - 0326 (317) 247-3253
ENGINEER CONTRACTOR

JSIIDS INSTALLATION

CERTIFIED BY:

SHEET NUMBER 1
OF
1 SHEETS



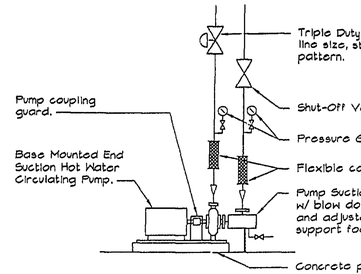
PLAN VIEW - NEW WORK

SCALE: 3/8" = 1'-0"

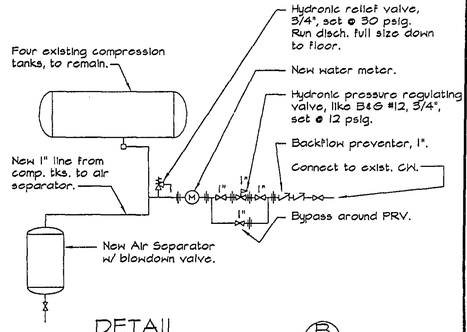
Replace 30 A., 3 pole C.B. for boiler with new 60 Amp, 2 pole circuit breaker in 208/120 Volt three phase, 225 Amp panel. This new C.B. to feed new sub-panel for new boilers.

PLAN NOTES - NEW WORK

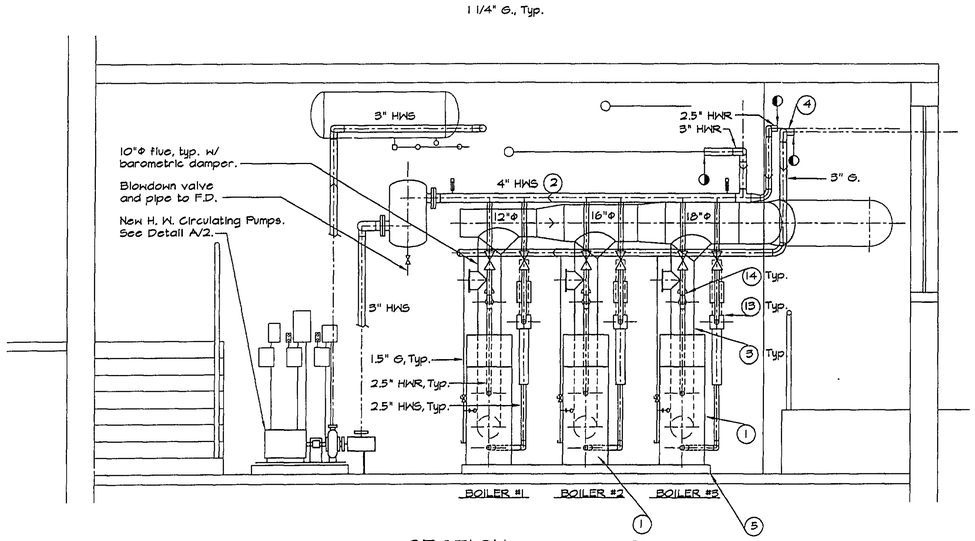
1. Provide new Three Boiler Modular Gas Fired Heating Plant. Total capacity of units to be 2,295,000 BTUH net output.
2. Provide HWS and HWR header and 2.5" branch connections to individual boilers.
3. Provide new insulated 10 gage steel flues from boilers to exist. breeching.
4. Extend gas piping to new boilers, and provide required vent piping to outdoors.
5. Provide new 4" high concrete pad. Size of pad to be as required for boilers being supplied; size: 9'-8" x 5'-8".
6. Provide new outdoor temperature sensor, and connect to common system panel.
7. Provide interconnecting control wiring from common control panel to each boiler panel.
8. Provide required interconnecting control wiring between boiler and circulating pump.
9. Provide flow switches, return header temperature sensor, low limit sensor and control wiring, as required. Final configuration and location of controls to be determined by Contractor.
10. Provide new Load Center, 2 pole main C.B., 100 Amp. 2 pole, surface mounted, w/ door, 1 phase, 3 wire, 120/240 volt A.C., copper buss bars, w/ separate neutral and ground buss bars, bolt on breakers, 10,000 A.I.C., NEMA 1, top feed and exit, 12 space w/ 6-20 Amp, 1 pole C.B and 1-15 Amp, 1 pole C.B. by Square-D, Seimens or Westinghouse.
11. Provide fusible switch type combination magnetic starter, NEMA 1, sized for circulating pump requirements, by Allen-Bradley, Square-D or Westinghouse.
12. 2-#12 & 1-#12 ground in 3/4" conduit.
13. Provide filters on each boiler, like Lesac 50 micron basket filter, w/ 2" connections, drain valve and pipe, with removable and cleanable basket. Housing to be teflon impregnated cast aluminum with stainless steel basket and cleanable polyester felt bag, sized for particular system requirements.
14. Provide Triple Duty or Multi-purpose valve like Taco, Model MPV or B&G, Series 3DS.
15. Provide vent lines from all boiler gas train devices requiring vents. Run lines full size to the outside. Seal around lines at wall penetrations.
16. Provide Air Separator with blow down valve and pipe.



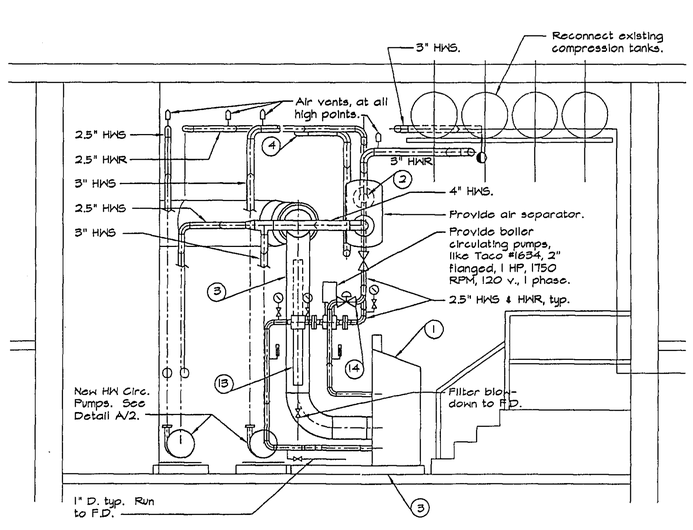
DETAIL A/2 — No Scale



DETAIL B/2 — No Scale



SECTION 1/2 — SCALE: 3/8" = 1'-0"



SECTION 2/2 — SCALE: 3/8" = 1'-0"

RECORD DRAWING
JUNE 13, 1997

MAURICE L. KELSEY & ASSOCIATES, INC.
CONSULTING ENGINEERS
6835 FOX LAKE CT., INDIANAPOLIS, IN 46278 - (317) 872-6832

MAURICE L. KELSEY REGISTERED № 11643 STATE OF INDIANA PROFESSIONAL ENGINEER

CERTIFIED BY

Installation of New Hot Water Boilers

ISSUED / REVISED
ISSUED FOR BIDS APRIL 12, 1996

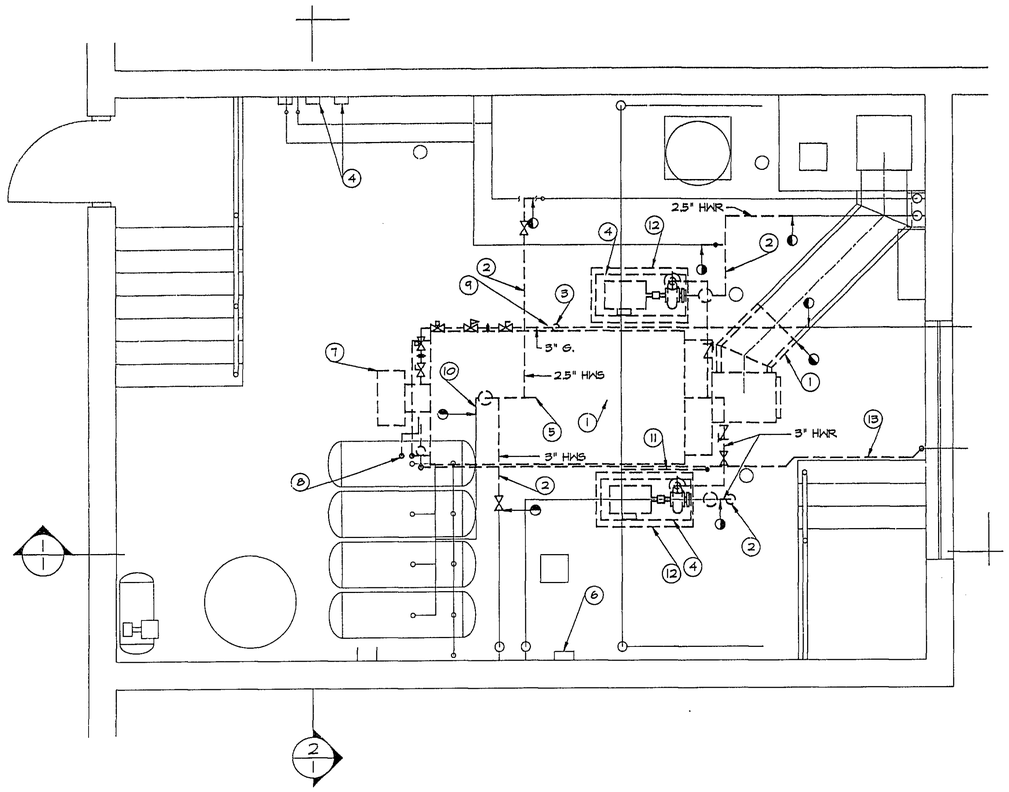
New Work

NATIONAL GUARD ARMORY
3380 S. State Highway 37
Bloomington, Indiana, 47401

DRAWN BY	CHECKED BY
DWD	MLK

PROJECT NUMBER
A6-401

SHEET NUMBER
2



PLAN VIEW - DEMOLITION

SCALE: 3/8" = 1'-0"

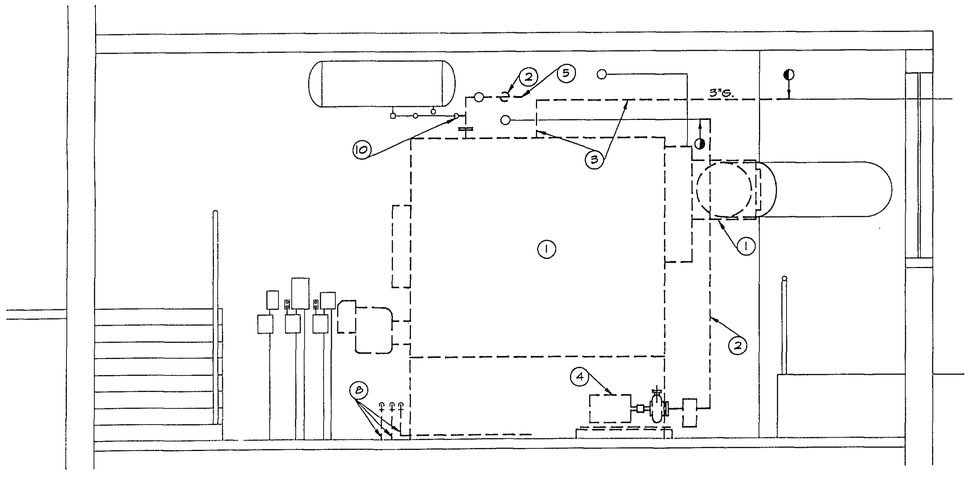
NORTH

PLAN NOTES - DEMOLITION

1. DISCONNECT BOILER FROM HOT WATER SUPPLY AND RETURN, EXPANSION TANKS, ELECTRIC POWER, GAS SUPPLY, AND VENT CONNECTION. REMOVE PORTION OF BREECHING AS SHOWN. REMOVE BOILER AND DISPOSE OF LEGALLY OFF JOB SITE. BURNER IS TO REMAIN THE PROPERTY OF THE OWNER.
2. DISCONNECT AND REMOVE HOT WATER SUPPLY AND RETURN PIPING FROM BOILER.
3. DISCONNECT AND REMOVE REQUIRED PORTION OF 3" G.
4. REMOVE HOT WATER CIRCULATING PUMPS. REMOVE WIRING BACK TO STARTERS.
5. REMOVE SENSOR BULB IN HWS.
6. REMOVE HOT WATER TEMPERATURE CONTROLLER AND ASSOCIATED ITEMS.
7. DISCONNECT AND REMOVE CABLE AND CONDUIT FEEDING BOILER AND BOILER COLTROLS.
8. DISCONNECT AND CAP OIL LINES AT FLOOR LEVEL.
9. DISCONNECT AND REMOVE GAS VENT LINE.
10. DISCONNECT AIR RELEASE LINE FROM BOILER.
11. DISCONNECT AND REROUTE CITY WATER LINE AS SHOWN ON SHEET NO. 2.
12. REMOVE CONCRETE PUMP BASES.
13. REMOVE OIL LINE TO WALL AND CAP.

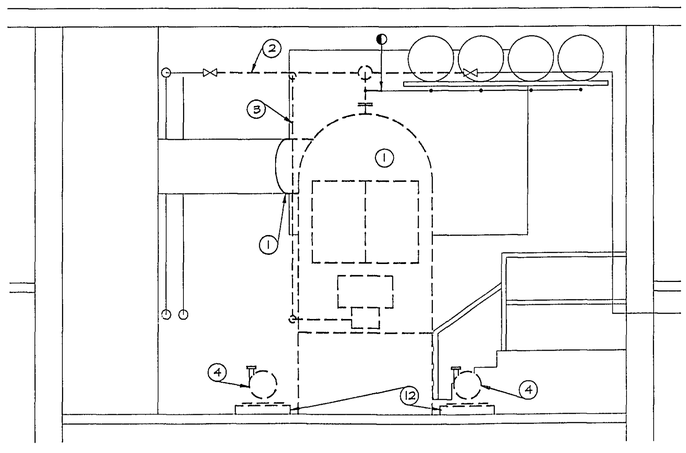
SYMBOLS & ABBREVIATIONS

- SHUT OFF VALVE
- BALANCING VALVE
- CHECK VALVE
- PRESSURE REDUCING VALVE
- CONTROL VALVE
- GAS VALVE
- SAFETY VALVE
- ELECTRIC VALVE
- STRAINER
- DIRECTION OF FLOW
- UNION
- FLANGED CONNECTION
- PITCH LINE DOWN IN DIRECTION OF ARROW
- PRESSURE GAUGE
- THERMOMETER
- THERMOSTAT
- # NUMBER OR PSIG
- CONCENTRIC PIPE REDUCTION
- ECCENTRIC PIPE REDUCTION
- ø DIAMETER
- HWS HOT WATER SUPPLY
- HWR HOT WATER RETURN
- D. DRAIN
- V. VENT
- C.A. COMPRESSED AIR
- G. GAS
- CW CITY WATER
- CSW COLD SOFT WATER
- F.D. FLOOR DRAIN
- VTR VENT THRU ROOF
- AFF ABOVE FINISHED FLOOR
- CF CHEMICAL FEED
- NEW WORK STARTS HERE
- EXISTING WORK STARTS HERE
- FOS FUEL OIL SUPPLY
- FOR FUEL OIL RETURN



SECTION

SCALE: 3/8" = 1'-0"



SECTION

SCALE: 3/8" = 1'-0"

RECORD DRAWING
JUNE 13, 1997

MAURICE L. KELSEY & ASSOCIATES, INC.
CONSULTING ENGINEERS
5835 FOX LAKE CT. INDIANAPOLIS, IN 46278 - (317) 872-6832

MAURICE L. KELSEY
REGISTERED
№ 11643
STATE OF INDIANA
PROFESSIONAL ENGINEER
Maurice L. Kelsey
CERTIFIED BY

Installation of New
Hot Water Boilers

ISSUED / REVISED
ISSUED FOR BIDS APRIL 12, 1996

Removals

NATIONAL GUARD ARMORY
3380 S. State Highway 37
Bloomington, Indiana 47401

DRAWN BY	CHECKED BY
DWD	MLK

PROJECT NUMBER
A6-401

SHEET NUMBER
1

STATE OF INDIANA

DEPARTMENT OF ADMINISTRATION

PROJECT REQUEST NO. A6-401

INSTALLATION OF NEW HOT WATER BOILERS & ACCESSORIES

NATIONAL GUARD ARMORY

BLOOMINGTON, INDIANA

HONORABLE EVAN BAYH, GOVERNOR

DRAWING INDEX

1 REMOVALS

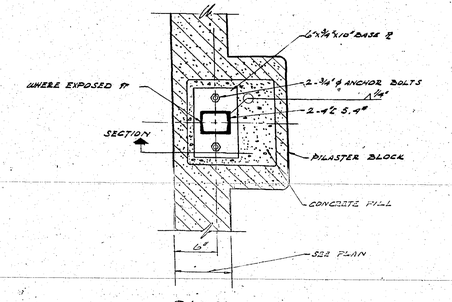
2 NEW WORK

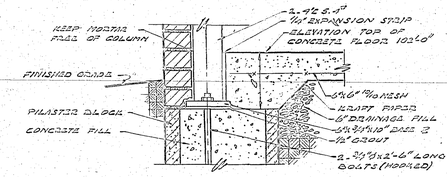
MAURICE L. KELSEY & ASSOC., INC.

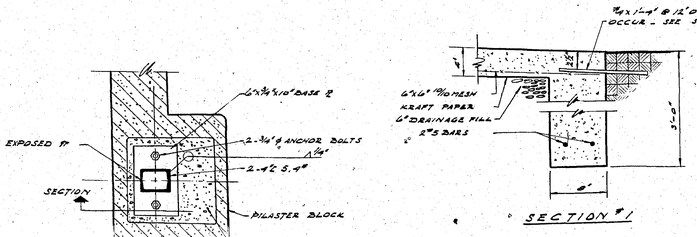
CONSULTING ENGINEERS
6835 FOX LAKE CT.
INDIANAPOLIS, INDIANA 46278
(317) 872-6832

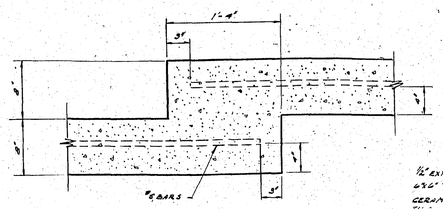
RECORD DRAWING
JUNE 13, 1997

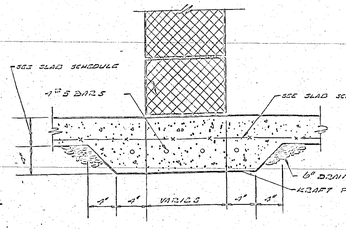
SET NO.

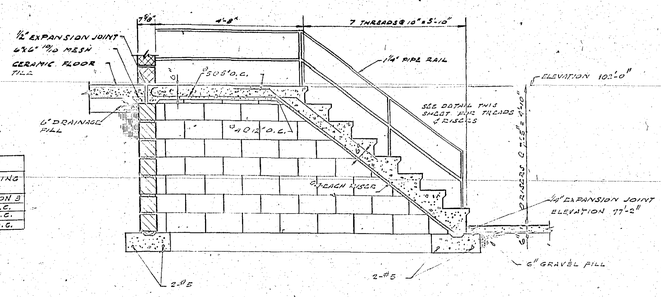


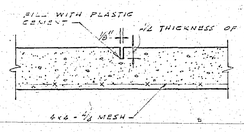


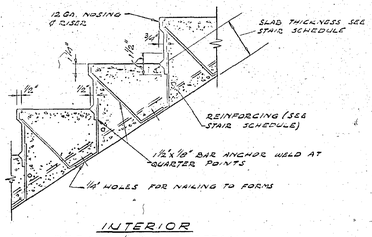


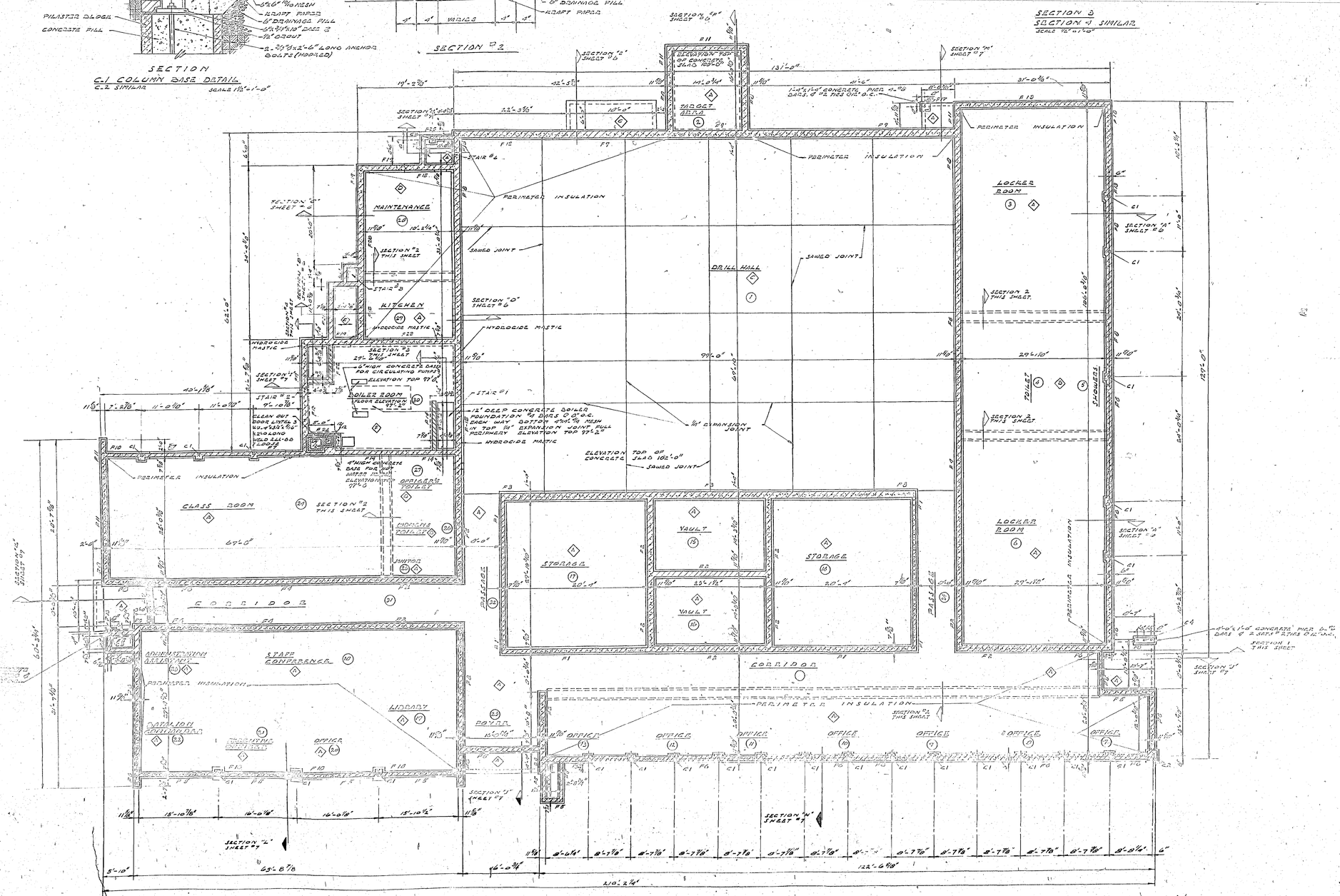












PLAN

SECTION #1

TYPICAL FOOTING STEP

STAIR SCHEDULE						
STAIR NUMBER	RISER		TREAD		SLAB THICKNESS	REINFORCING
	NUMBER	HEIGHT	NUMBER	WIDTH		
1	8	7.25"	7	10"	6"	SEE SECTION 3
2	3	7.25	2	10"	4"	#4 @ 8" O.C.
3	5	6"	4	10"	4"	#4 @ 8" O.C.
4	3	6"	2	10"	4"	#4 @ 8" O.C.

NOTE: PROVIDE 1-#4 BAR EACH RISER FOR TEMPERATURE REINFORCEMENT.

FLOOR SLAB SCHEDULE				
MARK	THICK	REINFORCING	LOCATION	REMARKS
A	4"	6x6"-10/10 MESH		6" DRAINAGE FILL
B	4"	6x6"-10/10 MESH	TOILETS & SHOWERS	6" DRAINAGE FILL DEPRESS FOR 1¼" CERAMIC TILE
C	5"	4x4"-4/4 MESH	DRILL HALL	6" DRAINAGE FILL
D	6"	4x4"-4/4 MESH	MAINTENANCE	6" DRAINAGE FILL
E	6"	#5 @ 8" O.C. 6x6"-10/10 MESH	PLATFORM	
F	6"	4x4"-4/4 MESH	BOILER ROOM	6" DRAINAGE FILL

FOOTING SCHEDULE						
MARK	WIDTH	DEPTH	LENGTH	REINFORCING	TOP OF FOOTING BELOW 102'-0"	ELEVATION BOTTOM OF FOOTING
F1	1'-4"	8"		2-#5 CONTINUOUS	8"	100.67
F2	1'-8"	8"		2-#5 CONTINUOUS	8"	100.67
F3	2'-0"	8"		3-#5 CONTINUOUS	8"	100.67
F4	1'-8"	8"		2-#5 CONTINUOUS	1'-4"	100.00
F5	1'-4"	8"		2-#5 CONTINUOUS	2'-8"	98.67
F6	1'-8"	8"		2-#5 CONTINUOUS	2'-8	98.67
F7	1'-4"	8"		2-#5 CONTINUOUS	3'-4"	98.00
F8	1'-8"	8"		2-#5 CONTINUOUS	3'-4"	98.00
F9	2'-0"	8"		3-#5 CONTINUOUS	3'-4"	98.00
F10	1'-4"	8"		2-#5 CONTINUOUS	4'-0"	97.33
F11	1'-8"	8"		2-#5 CONTINUOUS	4'-0"	97.33
F12	2'-0"	8"		3-#5 CONTINUOUS	4'-8"	96.67
F13	1'-8"	8"		2-#5 CONTINUOUS	4'-8"	96.67
F14	1'-4"	8"		2-#5 CONTINUOUS	5'-4"	96.00
F15	1'-8"	8"		2-#5 CONTINUOUS	5'-4"	96.00
F16	2'-0"	8"	2'-0"	6-#4 ½ EACH WAY	2'-8"	98.67
F17	2'-0"	8"	2'-0"	6-#4 ½ EACH WAY	3'-4"	98.00
F18	2'-6"	8"	2'-6"	8-#4 ½ EACH WAY	2'-8"	98.67
F19	1'-8"	8"		2-#5 CONTINUOUS	6'-0"	95.33
F20	1'-8"	8"		2-#5 CONTINUOUS	6'-8"	94.67
F21	1'-4"	8"		2-#5 CONTINUOUS	6'-8"	94.67
F22	1'-4"	8"		2-#5 CONTINUOUS	6'-0"	95.33
F23	1'-4"	8"		2-#5 CONTINUOUS	[illegible]	98.00
F24	4'-8"	8"	6'-8"	14-#4 LONG WAY	4'-8"	96.67
F25	1'-4"	8"		2-#5 CONTINUOUS	4'-8"	96.67

SECTION
C-1 COLUMN BASE DETAIL
C-2 SIMILAR
SCALE 1½"=1'-0"

SECTION #2

SECTION 3
SECTION 4 SIMILAR
SCALE ½"=1'-0"

SAWED JOINT DETAIL
NO SCALE

INTERIOR
TREAD & RISER DETAIL
SCALE 1½"=1'-0"

FOUNDATION NOTES

1. FOOTINGS ARE DESIGNED FOR A SOIL BEARING CAPACITY OF 4000 POUNDS PER SQUARE FOOT & SHALL REST ON UNDISTURBED SOIL OF A SAFE BEARING CAPACITY AS REQUIRED
2. FILL ALL CORES OF PILASTER BLOCKS WITH CONCRETE CONCRETE FULL HEIGHT OF FOUNDATION.
3. TOP COURSE OF ALL CONCRETE BLOCK FOUNDATION WALLS SHALL BE SOLID BLOCK.
4. PROVIDE DUR-O-WALL REINFORCING IN ALL CONCRETE BLOCK FOUNDATION WALLS EVERY TWO COURSES
5. INTERIOR & EXTERIOR FILL SHALL BE CARRIED ON SIMULTANEOUSLY.
6. PROVIDE EXPANSION STRIP FULL DEPTH OF SLAB AT ALL INTERSECTIONS OF FLOOR SLABS WITH VERTICAL SURFACES BOTH EXTERIOR & INTERIOR
7. WELDING SYMBOLS ARE AS DEVELOPED BY THE AMERICAN WELDING SOCIETY
8. PROVIDE ½" GROUT BELOW ALL COLUMN BASE PLATES.
9. WATERPROOF TYPE CONCRETE SHALL BE USED FOR CONCRETE FLOOR SLABS RESTING ON DRAINAGE FILL
10. ALL FOOTINGS & CONCRETE PIERS SHALL BE 3000 P.S.I. CONCRETE
11. PROVIDE 2'-0" HIGH 2" THICK VERTICAL PERIMETER INSULATION FOR ALL EXTERIOR FOUNDATION WALLS EXCEPT BOILER ROOM.
12. DUR-O-WALL SHALL RUN CONTINUOUS THRU PILASTER & LAP AT ALL WALL INTERSECTIONS.

FOUNDATION & FIRST FLOOR FRAMING PLAN
SCALE 1/8"=1'-0"

MATERIAL INDICATIONS

░	CONCRETE
▨	CONCRETE BLOCK
▩	LIGHTWEIGHT BLOCK
▧	BRICK

EVERETT I. BROWN COMPANY ARCHITECTS & ENGINEERS
901 ILLINOIS BUILDING
INDIANAPOLIS INDIANA

SHEET 3 OF 13

BLOOMINGTON TWO UNIT ARMORY

ROOM FINISH SCHEDULE

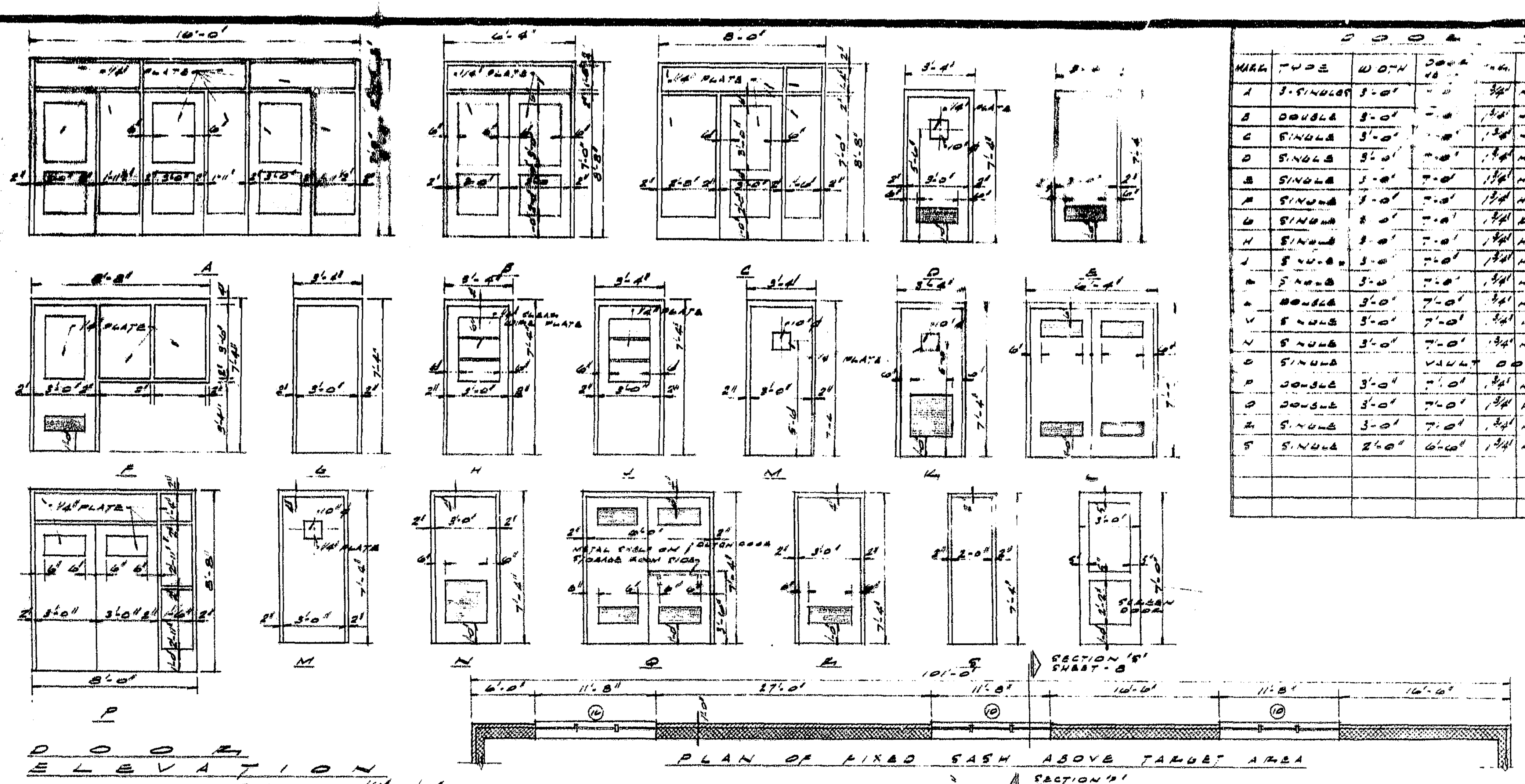
NO.	NAME	FLOOR	[illegible]	BASE	HGT.	WAINSCOT	HGT.	WALL FINISH	CEILING FINISH	HGT.	WINDOW STOOL	CEILING MOLD	REMARKS
1	DRILL HALL	CONCRETE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED [illegible]	[illegible]	SLATE	NO	
2	TARGET AREA	CONCRETE	—	NONE			—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	11'-4"	—	NO	TANK RILL
3-6	LOCKER ROOMS	CONCRETE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	8'-6"	SLATE	YES	OMIT BEHIND LOCKERS
4	TOILET	CERAMIC TILE	—	FACING TILE COVE	5 3/8"	FACING TILE	—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	8'-6"	—	YES	
5	SHOWER	CERAMIC TILE	—	FACING TILE COVE	5 3/8"	FACING TILE	—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	8'-6"	SLATE	YES	
13	INSTRUCTOR	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	8'-8"	SLATE	YES	
7-8-9-10 11-12	OFFICES	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	8'-8"	SLATE	YES	
14-17	UNIT STORAGE	CONCRETE	—	RUBBER	4"*		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	8'-6"	—	YES	*OMIT BEHIND SHELVING
15-16	VAULTS	CONCRETE	—	NONE	—		—	EXPOSED BRICK	EXPOSED UNIT SLAB	8'-8"	—	YES	
18	STAFF CONFERENCE	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	YES	
19	LIBRARY	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	YES	
20	OFFICE	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	YES	
21	EXECUTIVE OFFICER	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	YES	
22	BATTALION COMMANDER	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	YES	
23	ADMINISTRATIVE ASSISTANT	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	YES	
24	CLASS ROOM	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	YES	
25	JANITOR'S CLOSET	CONCRETE	—	NONE	—		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	NO	
26	WOMEN'S TOILET	CERAMIC TILE	—	FACING TILE COVE	5 3/8"	FACING TILE	—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	YES	
27	OFFICER'S TOILET	CERAMIC TILE	—	FACING TILE COVE	5 3/8"	FACING TILE	—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	YES	
28	MAINTENANCE	CONCRETE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	—	YES	
29	KITCHEN	GREASEPROOF ASPHALT TILE	—	RUBBER	2 1/2"	FACING TILE		LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	9'-4"	SLATE	YES	
30	BOILER ROOM	CONCRETE	CONCRETE	NONE	—		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	14'-2"	CONCRETE	YES	
31-34	CORRIDORS	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	8'-8"	—	YES	
32-35	PASSAGES	ASPHALT TILE	—	NONE			—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	8'-8"*	—	YES	*#31 - 9'-4"
33	FOYER	ASPHALT TILE	—	RUBBER	4"		—	LIGHTWEIGHT BLOCK	EXPOSED UNIT SLAB	8'-8"	—	YES	

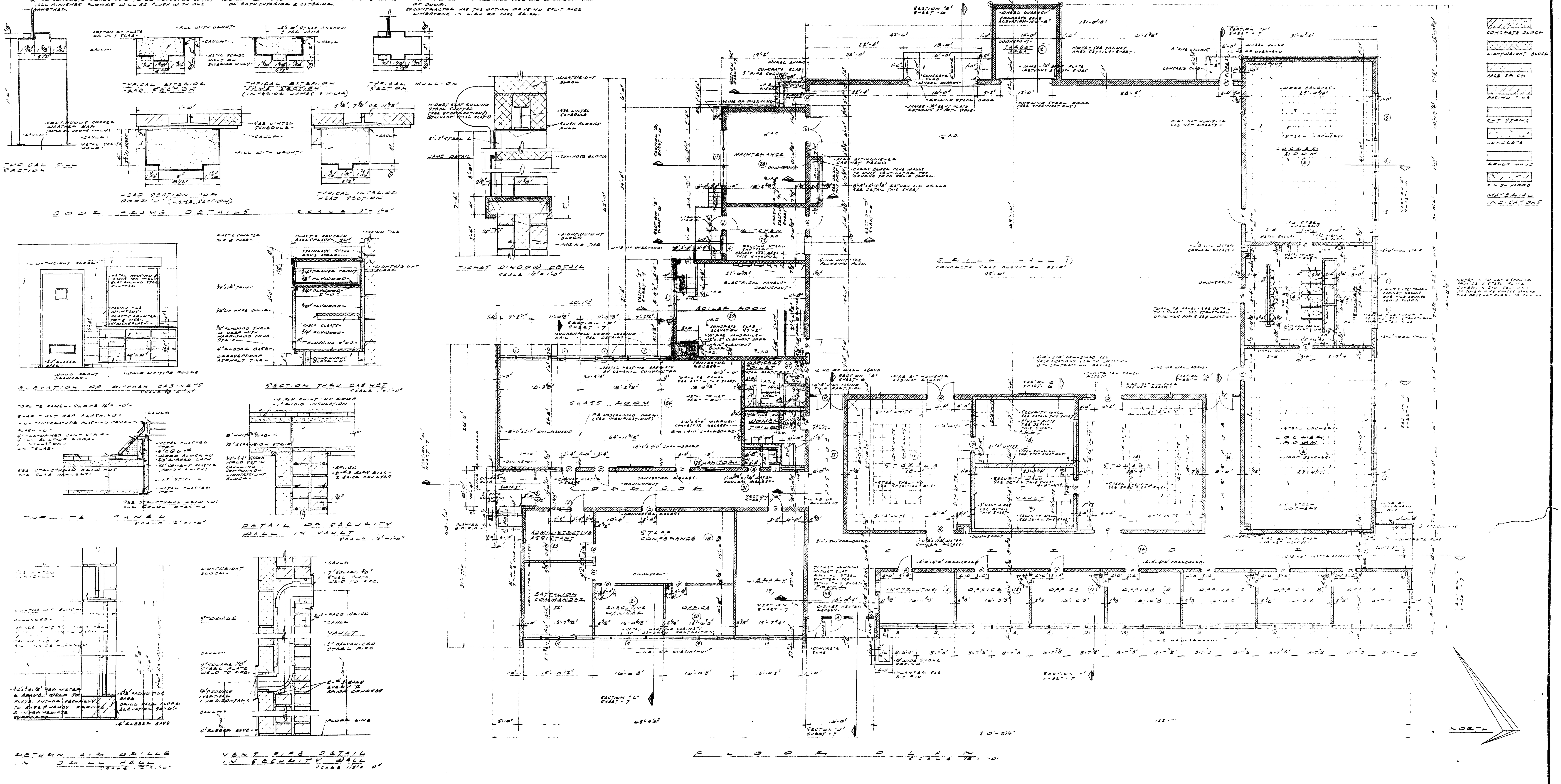
GENERAL NOTES -

1. 3 COURSES OF BRICK PLUS 3 JOINTS = 8". 1 COURSE OF BLOCK PLUS 1 JOINT = 8". 3 COURSES OF FACING TILE PLUS 3 JOINTS = 16".
2. DIMENSIONS ON FLOOR PLAN ARE ROUGH WALL DIMENSIONS ABOVE WAINSCOT.
3. KEEP MASONRY & MORTAR FREE FROM THE WEBS & FLANGES OF ALL STEEL BEAMS, COLUMNS & LINTELS.
4. RETURN ASPHALT TILE INTO RECESSES AND TO CENTER LINE OF ALL DOORS LEADING TO ROOMS NOT HAVING ASPHALT TILE FLOOR FINISHES.
5. RETURN CERAMIC TILE INTO RECESSES AND TO CENTER LINE OF ALL DOORS LEADING TO ROOMS NOT HAVING CERAMIC TILE FLOOR FINISHES.
6. THE CONCRETE SLABS ARE TO BE ADJUSTED SO THAT ALL FINISHED FLOORS WILL BE FLUSH WITH ONE ANOTHER.
7. FOR BEAM, JOIST & LINTEL BEARING IN ALL BLOCK WALLS, FILL CORES OF BLOCK WITH MORTAR, 3 COURSES DEEP.
8. ALL EXPOSED BLOCK TO BE OF A UNIFORM TEXTURE AS APPROVED BY THE CONTRACTING OFFICER.
9. PROVIDE DUR-O-WAL REINFORCING EVERY 2 COURSES OF BLOCK, AND EVERY 6 COURSES OF BRICK, INCLUDING FOUNDATION WALLS.
10. ALL 'OUTSIDE' CORNERS, INCLUDING DOOR & WINDOW JAMBS TO BE BULLNOSE BLOCK OR TILE.
11. ROOMS WITH EXPOSED ROOF SLABS ARE TO HAVE 3/4" x 3/4" CEILING MOLD SET IN CAULKING COMPOUND AROUND THE PERIMETER OF THE ROOM UNLESS OTHERWISE NOTED.
12. CAULK EXPOSED LONGITUDINAL UNIT SLAB JOINTS ON BOTH INTERIOR & EXTERIOR.
13. THE CONTRACTOR SHALL VERIFY SIZE & LOCATION OF ALL CABINET HEATER, CONVECTOR & FIRE EXTINGUISHER CABINETS RECESSES WITH THE EQUIPMENT SUPPLIER.
14. ALL CABINET HEATER & CONVECTOR RECESSES TO BE LOCATED ONE MASONRY COURSE ABOVE LINE.
15. HEADS OF WATER COOLER RECESSES TO BE 3/8" STEEL PLATE LOCATE 7'-4" FROM FLOOR, 1/2" PLYWOOD SOFFIT.
16. ALL FIRE EXTINGUISHER AND ELECTRICAL CABINETS TO BE 5'-4" FROM FLOOR TO HEAD OF CABINET.
17. PROVIDE SCREENS FOR ALL OPERABLE SASH, SEE SPECIFICATIONS.
18. INSTALL GLAZED TILE RECESSED SOAP DISH IN SHOWER ROOMS, ONE PER SHOWER HEAD.
19. METAL DOOR FRAME OF DOOR Q TO BE SET BACK 1" FROM FACE OF WALL ON DRILL HALL SIDE AND CORRIDOR SIDE OF DOOR.
20. CONTRACTOR HAS THE OPTION OF USING SPLIT FACE LIMESTONE IN LIEU OF FACE BRICK.

DOOR SCHEDULE

MARK	TYPE	WIDTH	DOOR HEIGHT	THK.	MATERIAL	FINISH	GLAZED	GLASS: DOOR	GLASS: SIDELIGHT	LOUVER	REMARKS
A	3-SINGLES	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	YES	1/4" PLATE	1/4" PLATE *		* TRANSOM
B	DOUBLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	YES	1/4" PLATE *			* TRANSOM
C	SINGLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	YES	1/4" PLATE	1/4" PLATE *		* TRANSOM
D	SINGLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	YES	1/4" PLATE		24" x [illegible]	
E	SINGLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	NO			24" x 8 3/8"	
F	SINGLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	YES	1/4" PLATE	1/4" PLATE *	24" x 8 3/8"	
G	SINGLE	3'-0"	7'-0"	1 3/4"	KALAMEIN *	PAINTED	NO				* [illegible]
H	SINGLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	YES	1/4" [illegible]			
J	SINGLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	YES	1/4" PLATE			* [illegible]
K	SINGLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	YES	1/4" PLATE		24" x 24 3/8"	
L	DOUBLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	NO			24" x 8 3/8"	TOP & BOTTOM
M	SINGLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	YES	1/4" PLATE			
N	SINGLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	NO			24" x 24 3/8"	
O	SINGLE		VAULT DOOR - SEE SPECIFICATIONS								
P	DOUBLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	YES	1/4" PLATE	1/4" PLATE *		* TRANSOM
Q	DOUBLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	NO			24" x 8 3/8" *	* TOP & BOTTOM
R	SINGLE	3'-0"	7'-0"	1 3/4"	HOLLOW METAL	PAINTED	NO			24" x 8 3/8"	
S	SINGLE	2'-0"	6'-0"	1 3/4"	HOLLOW METAL	PAINTED	NO				





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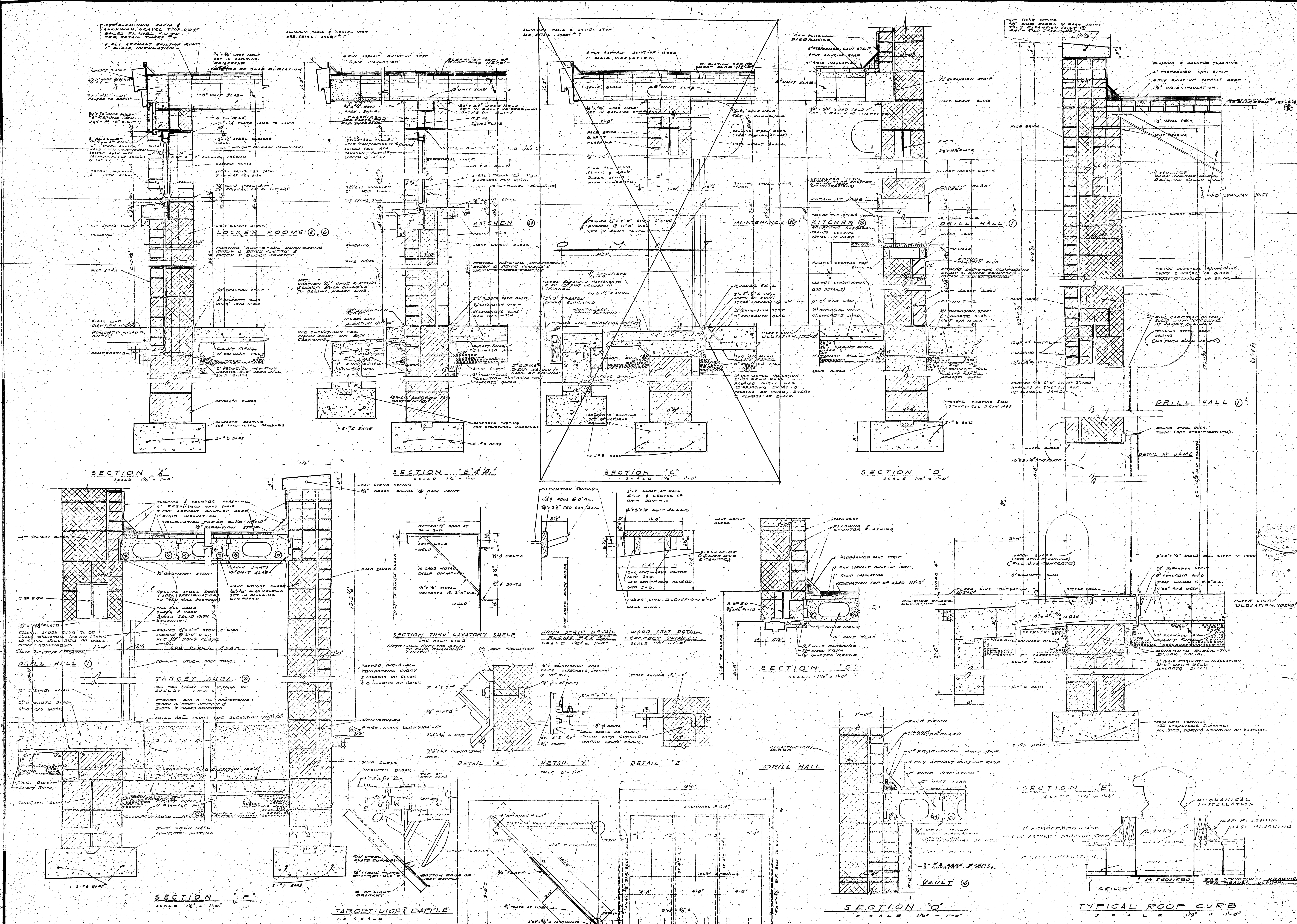
INDIANAPOLIS INDIANA

SHEET 4 OF 13

BLOOMINGTON TWO UNIT ARMORY



WALL SECTIONS - DETAILS

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SHEET 6 of 13.

BLOOMINGTON TWO UNIT ARMORY

SECTION "H"
SCALE: 1/2"=1'-0"

SECTION "I"
SCALE: 1/2"=1'-0"

SECTION "J"
SCALE: 1/2"=1'-0"

SECTION "K"
SCALE: 1/2"=1'-0"

SECTION "L"
SCALE: 1/2"=1'-0"

SECTION "M" & "M'"
SCALE: 1/2"=1'-0"

ALUMINUM FACIA #1
SCALE: 3"=1'-0"

STOKE FACIA #2
SCALE: 3"=1'-0"

STOKE FACIA #3
SCALE: 3"=1'-0"

STOKE FACIA #4
SCALE: 3"=1'-0"

ALUMINUM EDGING
SCALE: 3"=1'-0"

SECTION "N"
SCALE: 1/2"=1'-0"

SECTION "O"
SCALE: 1/2"=1'-0"

SECTION "P"
SCALE: 1/2"=1'-0"

EXECUTIVE OFFICE (21)

BOILER ROOM (1)

DRILL HALL (1)

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INDIANAPOLIS INDIANA

SHEET 7 OF 13

BLOOMINGTON TWO UNIT ARMORY

MOTOR STARTER SCHEDULE

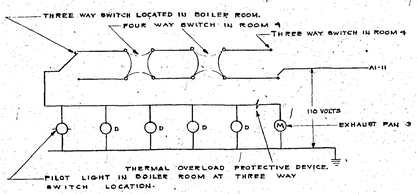
SYMBOL	DESCRIPTION	SIZE	ENCLOSURE	PHASE	OPERATING COIL VOLTS	LINE VOLTS	SYMBOL
MCC1	NF COMBINATION	ONE	NEMA 1A	3	120	208	■
MCC2	NF COMBINATION	ONE	NEMA 1A	3	120	208	■
MCC3	NF COMBINATION & SPEED NON REVERSING	ONE	NEMA 1A	3	120	208	■
MCC4	NF COMBINATION	ONE	NEMA 1A	3	120	208	■
MCC5	NF COMBINATION REVERSING	ONE	NEMA 1A RECESSED	3	120	208	■
F	FUSED DISCONNECT SWITCH	20 AMP	NEMA 1	1	120		■F
MCC6	NF COMBINATION	ONE	NEMA 1A	3	120	208	■

LIGHTING FIXTURE SCHEDULE

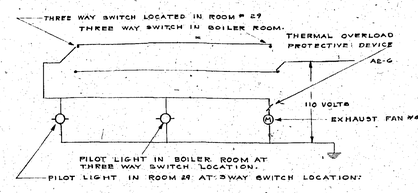
MARK	FIXTURE	WATTS PER FIXTURE	MOUNTING
A	PITTSBURGH 1-1092 L (GL)	1/250 W	
B	DAYBRITE 97203-B	2/75W	SURFACE
C	DAYBRITE 97203-H	2/40W	SURFACE
D	SOLAR LIGHT 3457	2/100W	SURFACE
E	HOLOPHANE 920	200W	10' ABOVE FLOOR
F	LIGHTOLIER 13526	2/20W	SURFACE
G	HUBBEL 3923	1/100W	SURFACE
H	MC PHILBEN 43-994	3/40W	SURFACE
I	WHEELER 1001	1/200W	SURFACE
J	MC PHILBEN 43-99-3	2/40W	SURFACE
K	HOLOPHANE 6-829	1/150W	SURFACE
L	WHEELER 2175-WITH HEAT RESISTING GLASS	1/500W	SURFACE
M	ARTMETAL 3316	1/75W	ABOVE MIRROR
P_1	GRAYBAR 5228	1/60W	BRACKET
P_2	STONCO, CLD 2172	2/150W	12' ABOVE GRADE
R	CROUSE-HINDS MUA OR EQUAL	1/500 W	AS DIRECTED

ELECTRICAL SYMBOLS

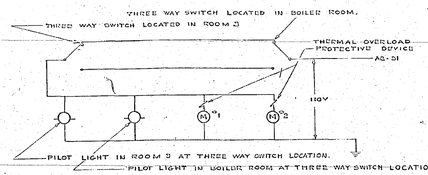
▷	TELEPHONE OUTLET
▭	POWER AND LIGHT PANELS
M	MOTOR OUTLET
P	POWER OUTLET
▭	FLUORESCENT FIXTURE
◇	CEILING FIXTURE
⊣◇	WALL FIXTURE
⊕	CONVENIENCE OUTLET
$⊕_{WP}$	WEATHERPROOF CONVENIENCE OUTLET
S_1	ONE POLE SWITCH
S_3	THREE POLE SWITCH
S_4	FOUR POLE SWITCH
H⊖	I.B.M. #77 OR EQUAL. 9"OR 15" AS INDICATED G- INDICATES GUARD
⊗	EXIT LIGHT G- INDICATES GUARD
S_2	SINGLE POLE DOUBLE THROW MOMENTARY CONTACT AUH #374 OR APPROVED EQUAL MOMENTARY START STOP PUSH BUTTON STATION
HOA	HAND OFF AUTOMATIC SWITCH
EP	ELECTRIC PNEUMATIC SWITCH
TC	7 DAY TIME SWITCH TRIPPERS ADJUSTABLE FOR EACH DAY OF WEEK PARAGON #W. 700 OR EQUAL
$⊕_3$	50 AMP, 250 VOLT, 3 POLE RECEPTACLE
▼	TELEPHONE FLOOR OUTLET
⊙	FLOOR POWER OUTLET
⊸	WALL SWITCH WITH INDICATING LIGHT
T	AQUASTAT SWITCH
DS	3 POLE, 30AMP DISCONNECT SWITCH NEMA 3 ENCLOSURE
TC #2	TIME CLOCK CONTROL - ALLEN BRADLEY 2-80 OR ROYAL



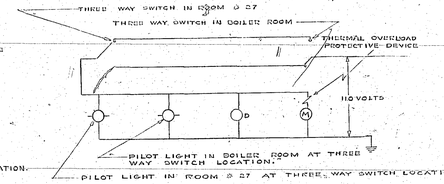
EXHAUST FAN #3 CONTROL



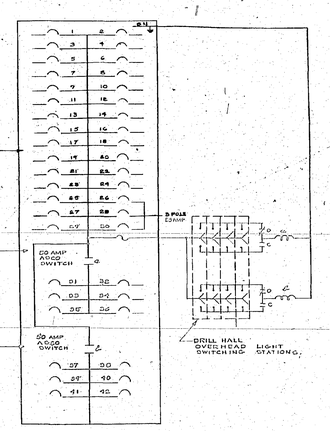
EXHAUST FAN #8 CONTROL



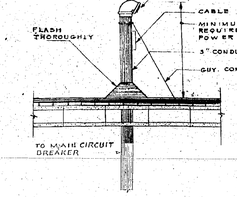
EXHAUST FAN CONTROL TYPICAL
FOR ROOMS 03 AND 04



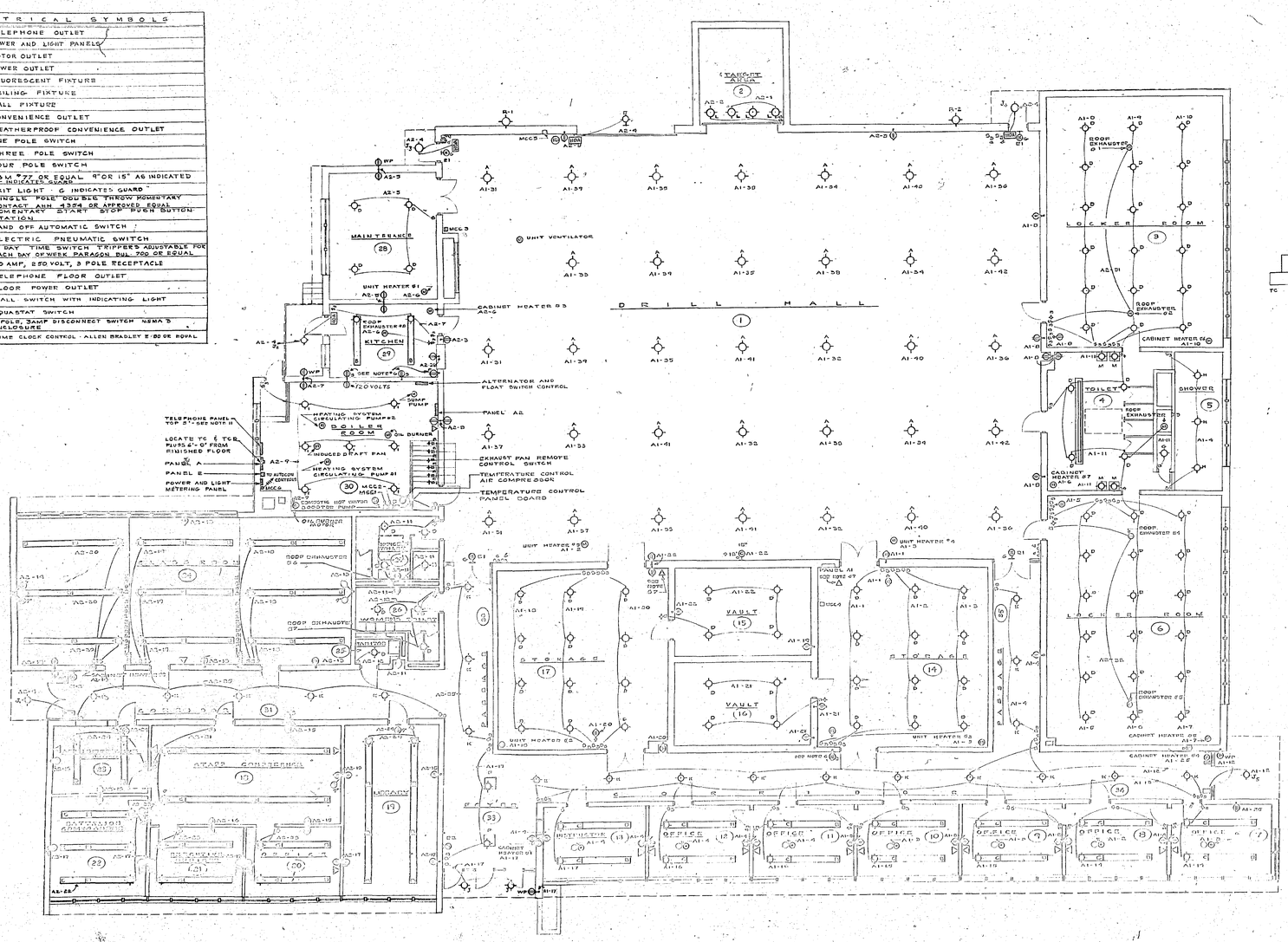
EXHAUST FAN CONTROL TYPICAL
FOR ROOMS #26 AND #27



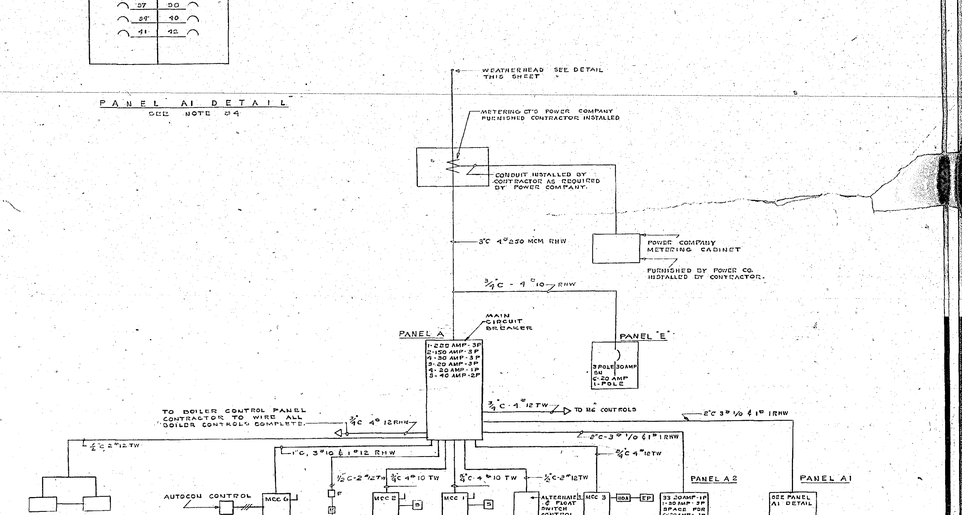
PANEL A1 DETAIL
SEE NOTE #4



ELECTRICAL ENTRANCE DETAIL
SCALE 3/4"-1'-0"

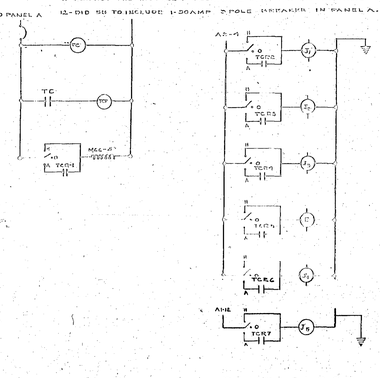


ELECTRICAL FLOOR PLAN
SCALE 1/8"-1'-0"



ELECTRICAL RISER DIAGRAM

1-ALL EXHAUST FAN SWITCHES TO HAVE PILOT LIGHT AND THERMAL OVERLOAD PROTECTIVE DEVICE.
2-LOCATE LIGHTS AS DIRECTED BY CONTRACTING OFFICER.
3-ALL FEEDER CIRCUITS FOR DRILL HALL LIGHTS SHALL BE #10. TW TYPE.
4-A.C.D.D. SWITCHES SHALL BE 3 POLE, 60AMP MECHANICALLY HELD TYPE.
5-CONDUIT FOR FIXTURES IN DRILL HALL SHALL BE MOUNTED AS DIRECTED FROM THE TOP CORD OF THE LONG SPAN JOIST.
6-CONTRACTOR TO CIRCUIT THIS OUTLET FROM 2P-20 AMP CIRCUIT BREAKER IN PANEL A USE #10 TW CONTRACTOR TO CONNECT FOR 120/240 VOLTS OR 100 VOLTS AS DIRECTED PROVIDE STANDARD FLUSH RECEPTACLE.
7-LOCATE AS DIRECTED BY CONTRACTING OFFICER.
8-CONDUIT FOR ALL CONVENIENCE OUTLETS TO BE INSTALLED IN FLOOR SLAB.
9-CONTRACTOR TO LOCATE COFFITS ON ROOF AS DIRECTED BY CONTRACTING OFFICER.
10-ALL WORK IN CONNECTION WITH WELL SYSTEM SHALL BE BID UNDER "MID #5"
11-FURNISH AND INSTALL 1" TELEPHONE RISER AND WEATHERHEAD WITHIN 5' OF POWER SERVICE RISER.
12-BID #8 TO INCLUDE 1-30AMP 3 POLE BREAKER IN PANEL A.



TIME CLOCK
CONTROL SCHEMATIC

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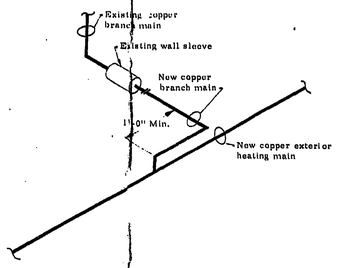
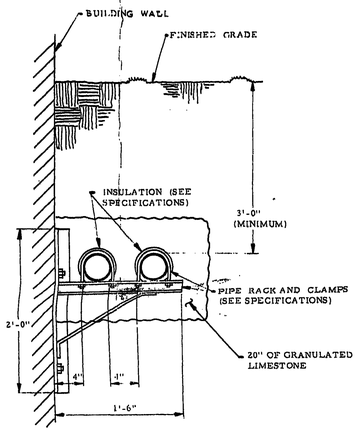
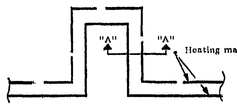
BLOOMINGTON ... ARMORY

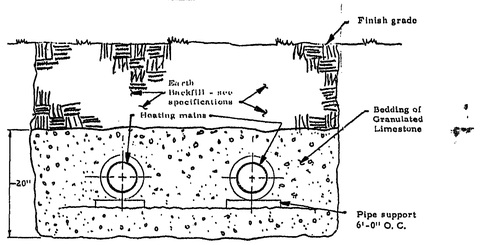


TYPICAL DETAIL OF SWING JOINT AT BRANCH TAKE-OFF FROM EXTERIOR HEATING MAIN
No Scale





PLAN



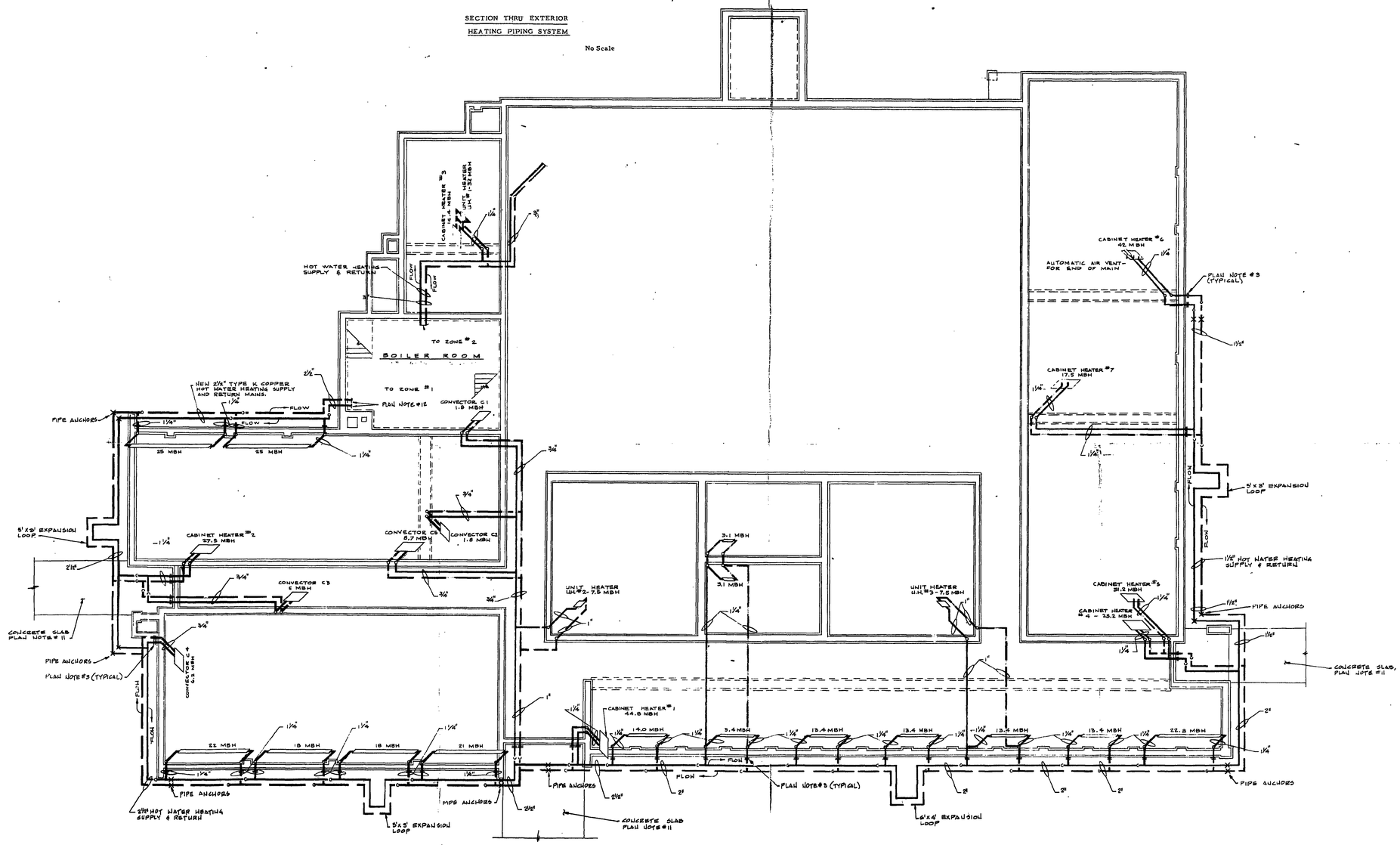
SECTION "A A"

TYPICAL EXPANSION LOOP DETAILS
No Scale

EXTERIOR PIPING NOTES

1. The Contractor shall verify all conditions at the job site.
2. All existing exterior steel heating system mains shall be removed and replaced with copper mains supported on and clamped to existing exterior pipe supports or new pipe supports as required.
3. All existing exterior steel heating system branches shall be removed and replaced with copper branches as required from mains to existing copper piping at wall.
4. Mains shall be pitched upward in the direction of supply main flow at least 1" in 40' and high points shall be vented to accessible points inside the building.
5. New pipe supports shall be 2" x 2" x 1/4" angle frames securely bolted to the wall or 12 gauge steel framework such as "Mult-A-Frame", "Unistrut", or an approved equal. The maximum distance between supports shall be 10'-0".
6. Exterior underground piping not adjacent to the foundation wall such as expansion loops or piping below the top of the footing shall be supported on concrete pads and roller supports spaced at 6'-0" intervals.
7. All piping supports shall be given a heavy coat of asphaltic paint before backfilling.
8. All existing shrubbery around perimeter of building will be removed and replaced by the Contractor.
9. All excavation, backfilling, sodding, seeding, etc. required to remove and replace existing exterior heating system piping shall be by the Contractor as called for in the specifications.
10. All new copper heating system piping and insulation shall be as called for in the specifications.
11. The Contractor shall cut existing concrete sidewalk to first score, remove and replace piping as shown, and backfill as specified. The Contractor shall replace concrete sidewalk as required.
12. The Contractor shall provide isolation fittings at connections to Boiler Room Piping.
13. ALL HEATING SYSTEM PIPING AND RADIATION NOTED ON THE PLAN INSIDE THE BUILDING IS EXISTING AND SHALL REMAIN AS IS.

SECTION THRU EXTERIOR HEATING PIPING SYSTEM
No Scale



HEATING & VENTILATING FOUNDATION PLAN
SCALE : 1/8" = 1'-0"

N

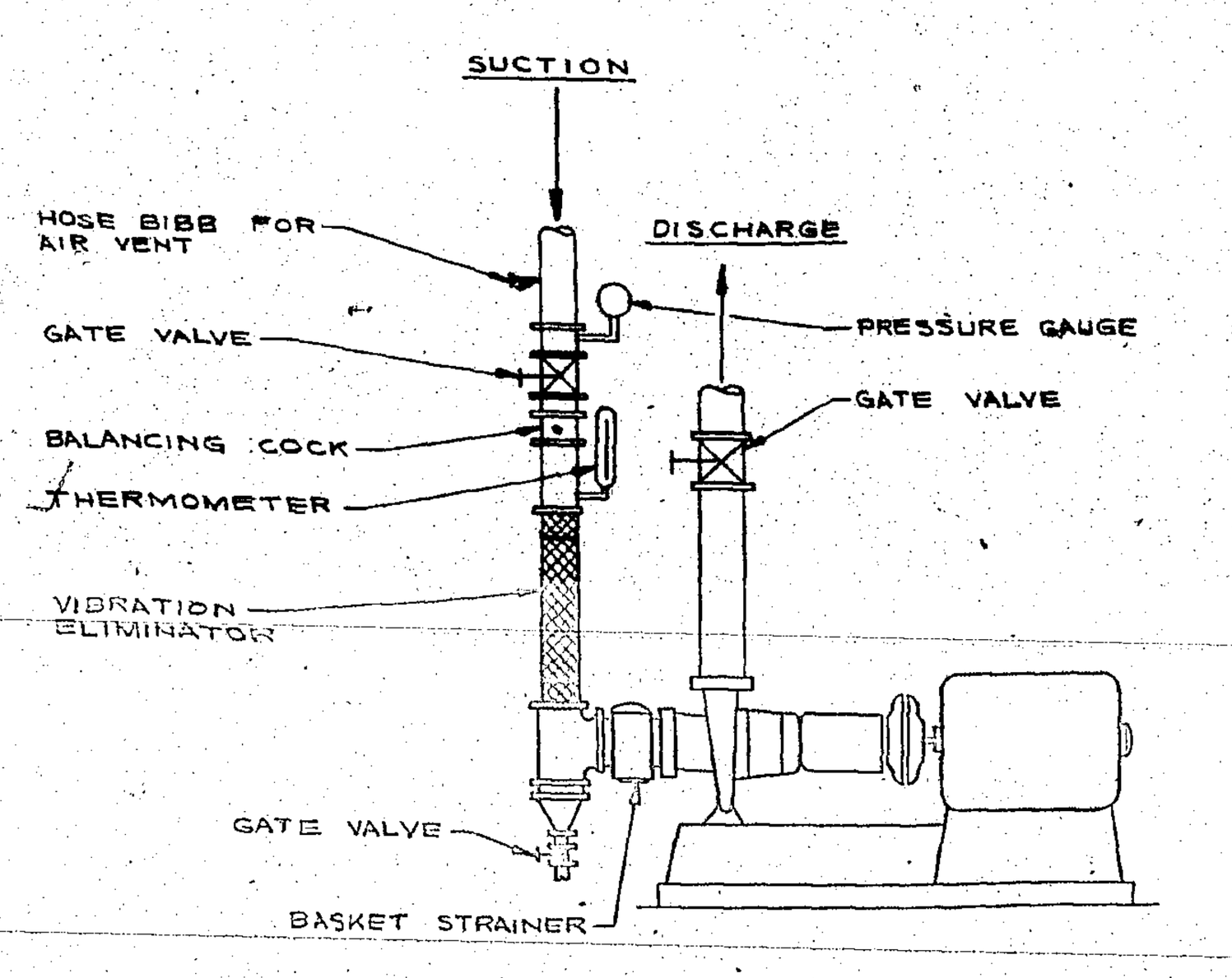
REQUISITION NO. A6-70, 23 AUG 1974
PROJECT REQUEST NO. 1, 16 JULY 1974
ADJUTANT GENERAL
STATE OF INDIANA

JAMES W. ROBERTS REGISTERED #8583 STATE OF INDIANA PROFESSIONAL ENGINEER
James W. Roberts

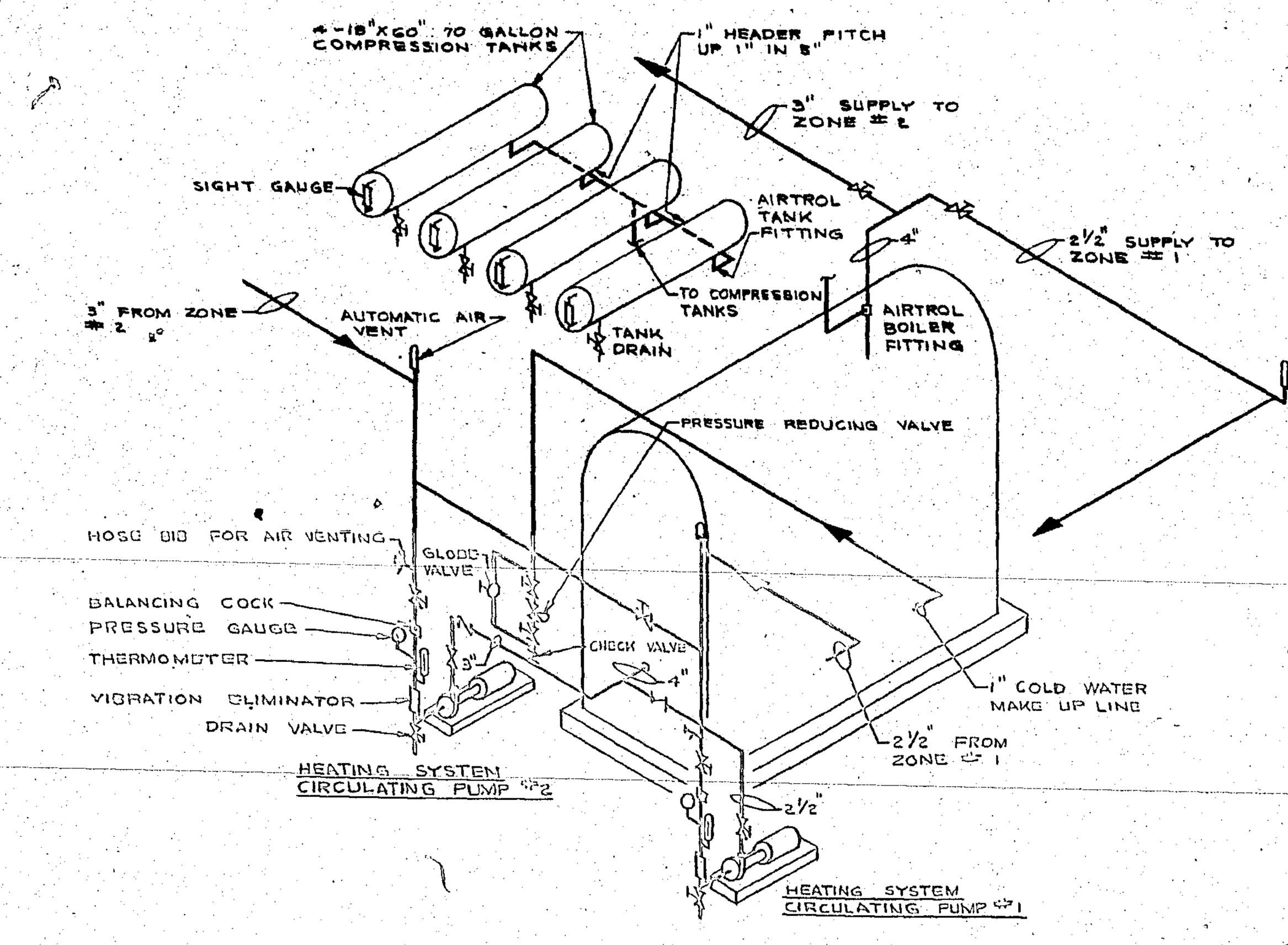
EVERETT I. BROWN COMPANY ARCHITECTS & ENGINEERS
INDIANAPOLIS INDIANA

SHEET M-1 OF 1 SHEETS

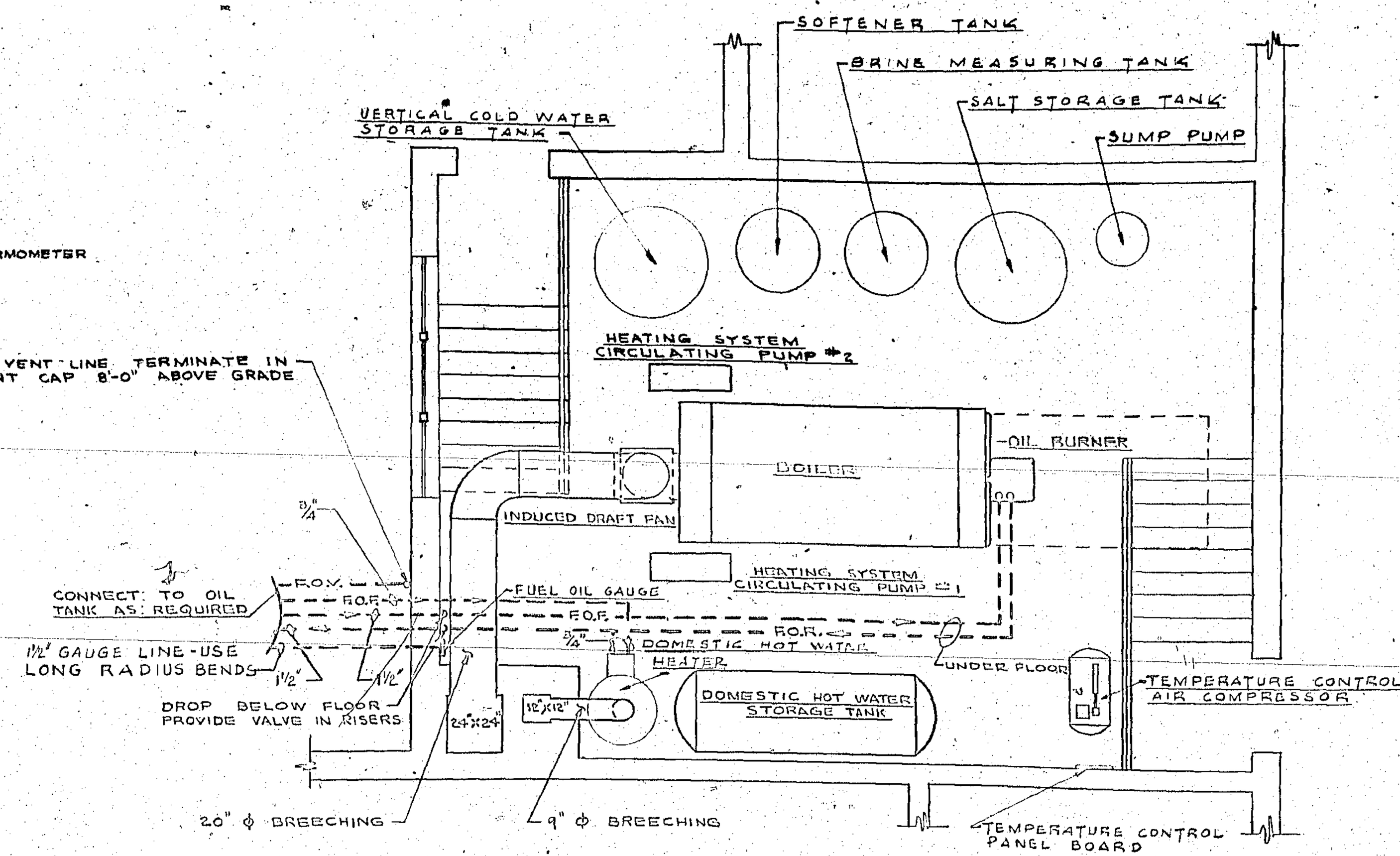
...IARD ARMORY BLOOMINGTON, INDIAN... EXTERIOR PIPING RENOVATION WOR...



TYPICAL HEATING SYSTEM CIRCULATING PUMP CONNECTIONS
NO SCALE



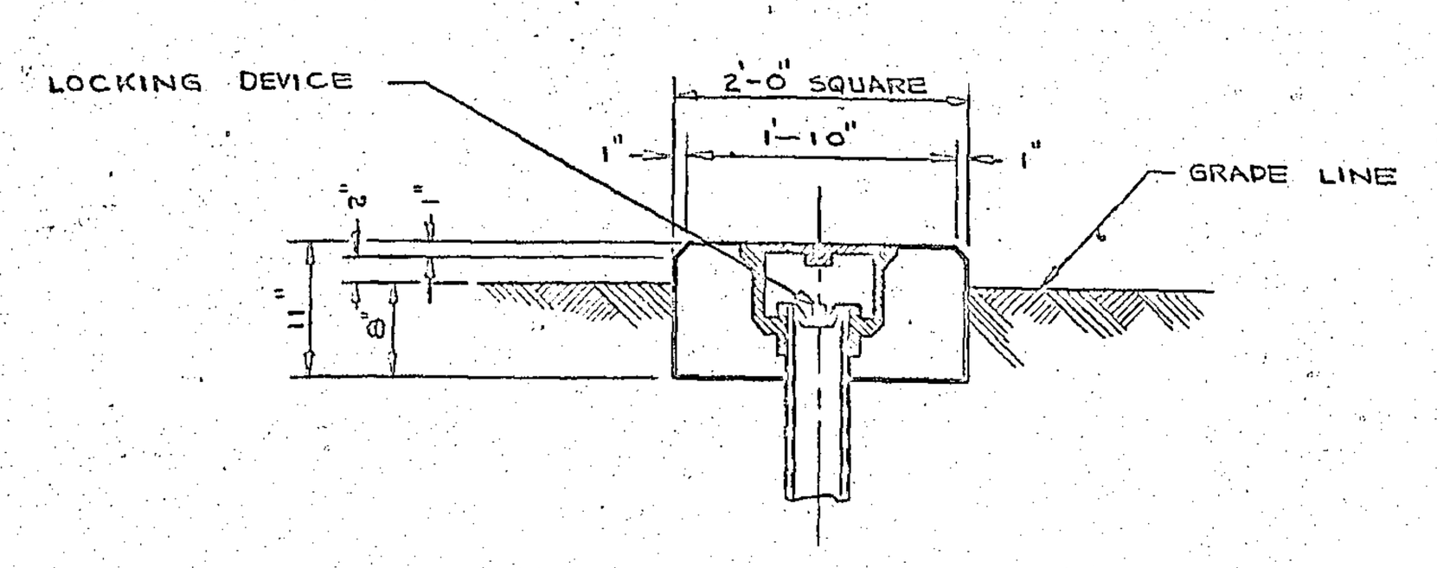
BOILER PIPING DIAGRAM
NO SCALE



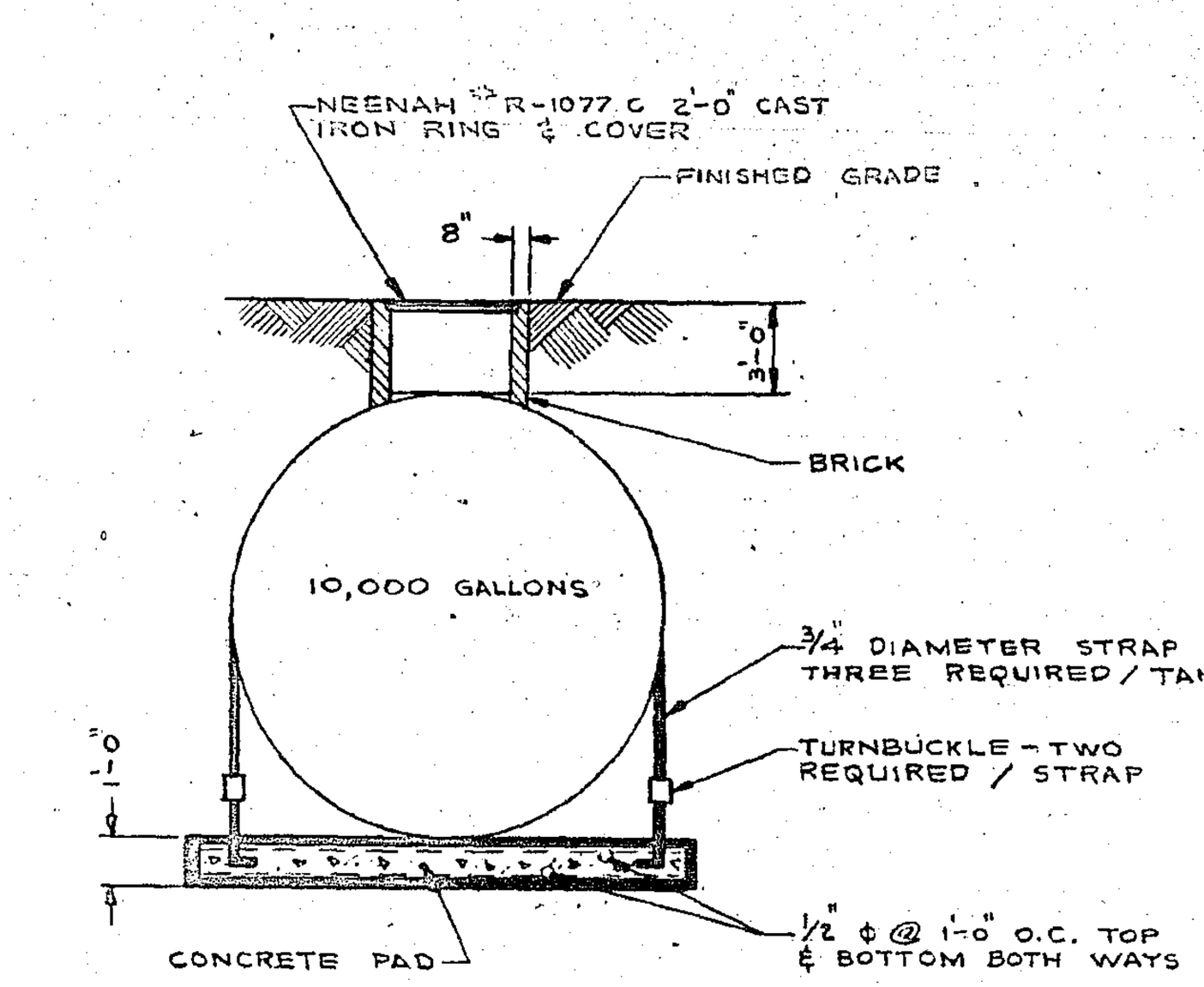
BOILER ROOM LAYOUT
SCALE : 1/4" = 1'-0"

BOILER ROOM EQUIPMENT SCHEDULE

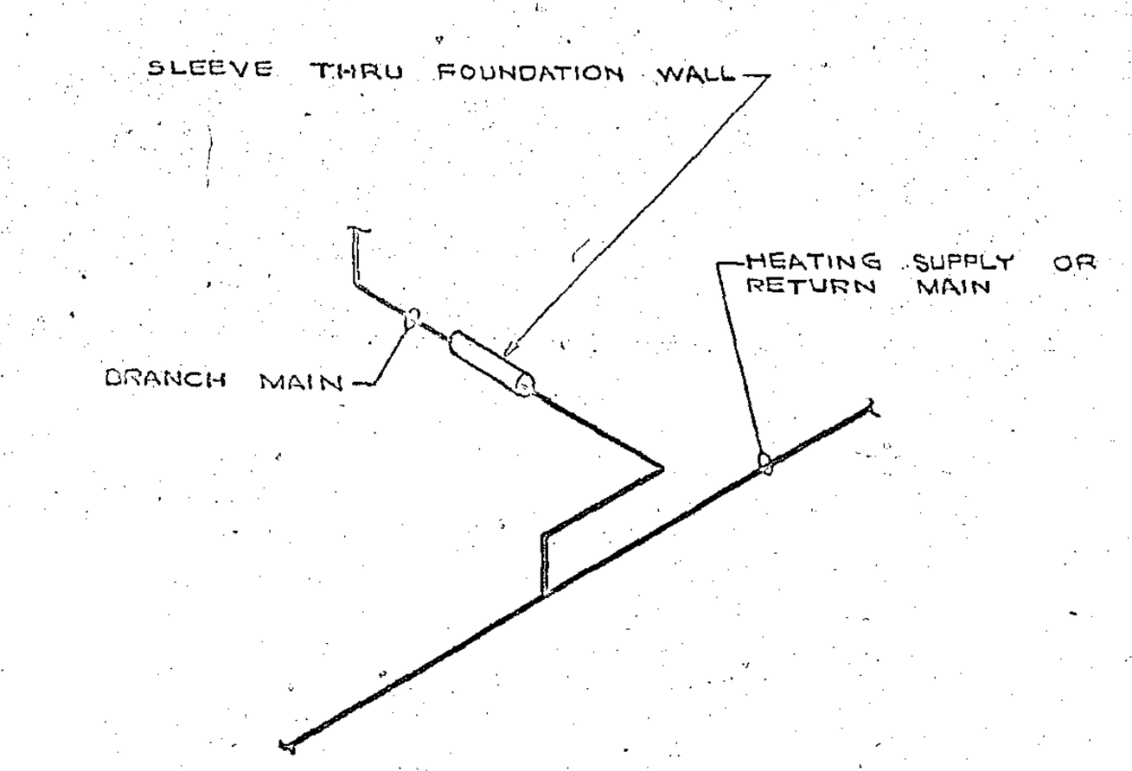
1. **BOILER**
   KEWANEE TYPE C NO. 7L83, OR EQUAL, HOT WATER SBI NET RATING 2400 MBH OUTPUT +OIL FLOW RATE 37 GPH.
2. **INDUCED DRAFT FAN**
   WING NO. 15D ¾, WHITTY OR APPROVED EQUAL, ¾ HP, 208/220 V, 3 Φ, 60 CYCLE.
3. **OIL BURNER**
   ACE MODEL DPG 35, 1 HP, 208/220 V, 3 Φ, 60 CYCLE.
4. **HEATING SYSTEM CIRCULATING PUMP #1**
   B & G MODEL UST OR APPROVED EQUAL, 55 GPM @ 50 FT. HEAD, 3 HP, 208 V, 3 Φ, 60 CYCLE.
5. **HEATING SYSTEM CIRCULATING PUMP #2**
   B & G MODEL UGT OR APPROVED EQUAL, 100 GPM @ 42 FT. HEAD, 5 HP, 208 V, 3 Φ, 60 CYCLE.
6. **COMPRESSION TANKS**
   TANK SIZE 18"X60" (STRAIGHT SHELL LENGTH) ACTUAL CAPACITY 70 GALLONS EACH. ASME CONSTRUCTION FOR 125 LB W.P.
7. **DOMESTIC HOT WATER HEATER**
   BOCK MODEL 130 E OR EQUAL, 300 GALLON PER HOUR RECOVERY @ 100° RISE - 100 GALLON STORAGE CAPACITY; OIL FIRING RATE 3 G.P.H.
8. **DOMESTIC HOT WATER STORAGE TANK**
   NOMINAL CAPACITY 500 GALLONS, TANK SIZE 3'-0"X 8'-0" (STRAIGHT SHELL LENGTH) ASME CONSTRUCTION, 100 LB. WORKING PRESSURE.
9. **DOMESTIC HOT WATER BOOSTER PUMP**
   B & G SIZE "75" 10 GPM @ 7 FT. HEAD, 1/12 HP, 115 V, 1 Φ, 60 CYCLE. PUMP SHALL START AND ON 10° VARIATION OF WATER TEMPERATURE IN RETURN MAINS.
10. **TEMPERATURE CONTROL AIR COMPRESSOR**
    ¼ HP, 120 VOLTS, 1 Φ, 60 CYCLE.
11. **SUMP PUMPS**
    (2) - CHICAGO LGL-2 OR APPROVED EQUAL, ½ HP, 50 GPM @ 20 FT HEAD, SINGLE CAST IRON BASIN 5'-0" DEEP X 3'-0" DIA. WITH DUPLEX COVER
12. **WATER SOFTENER**
    (FULLY AUTOMATIC - ONE REQUIRED), 60 GPM. MAXIMUM FLOW, 36" DIA. X 84" HIGH, (GALVANIZED), 1½" PIPE & SERVICE VALVE, 1½" WATER METER (ALARM TYPE), MAX. 12 PSI PRESSURE DROP THRU UNIT - 780,000 GRAINS SOFTENING CAPACITY.
13. **BRINE MEASURING TANK**
    (ONE REQUIRED 36" X 48") COMPLETE WITH FULL CHARGE MINERAL AND SALT - BRUNER, ELGIN OR EQUAL.
14. **SALT STORAGE TANK**
    48"X48" - ONE REQUIRED.
15. **VERTICAL COLD WATER STORAGE TANK**
    48"X120" - ONE REQUIRED, 1050 GALLONS STORAGE CAPACITY.



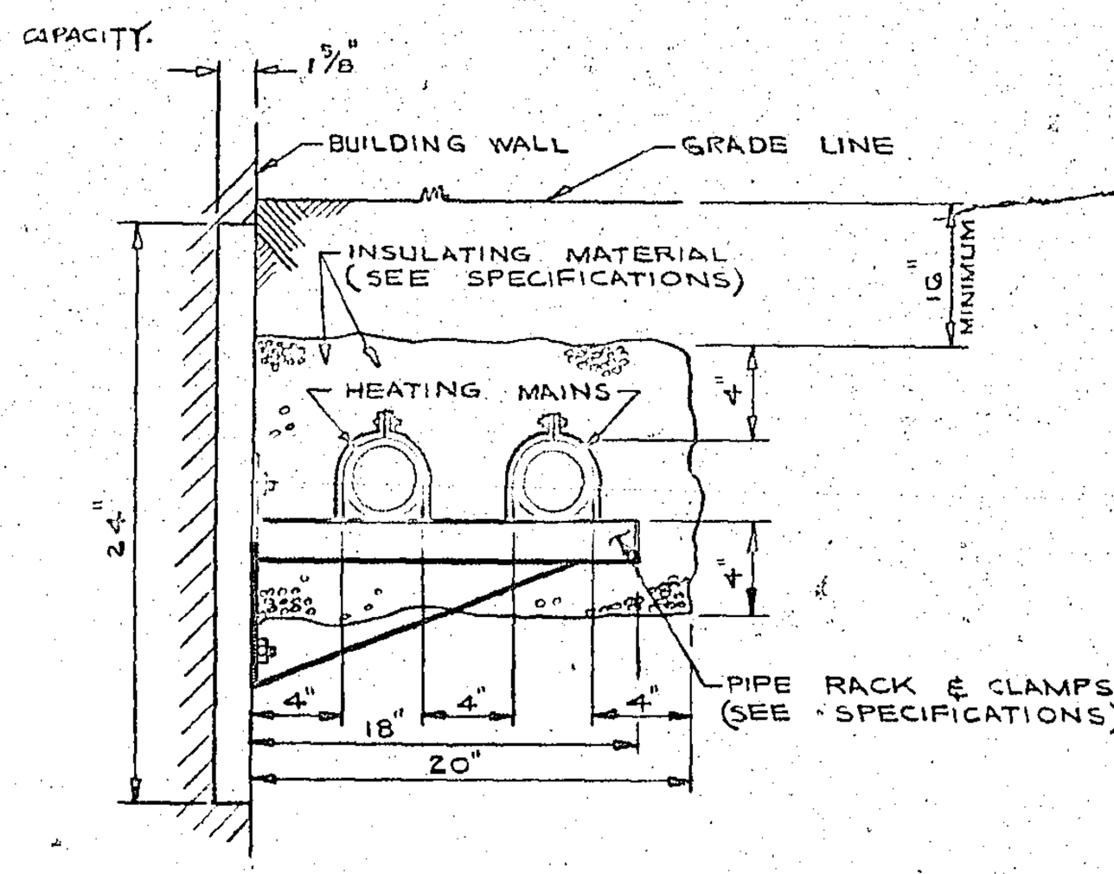
DETAIL OF OIL FILLBOX
SCALE : 3/4" = 1'-0"



DETAIL OF OIL TANK ANCHORAGE
NO SCALE



TYPICAL DETAIL OF SWING JOINT AT BRANCH TAKE-OFF FROM EXTERIOR HEATING MAINS
NO SCALE

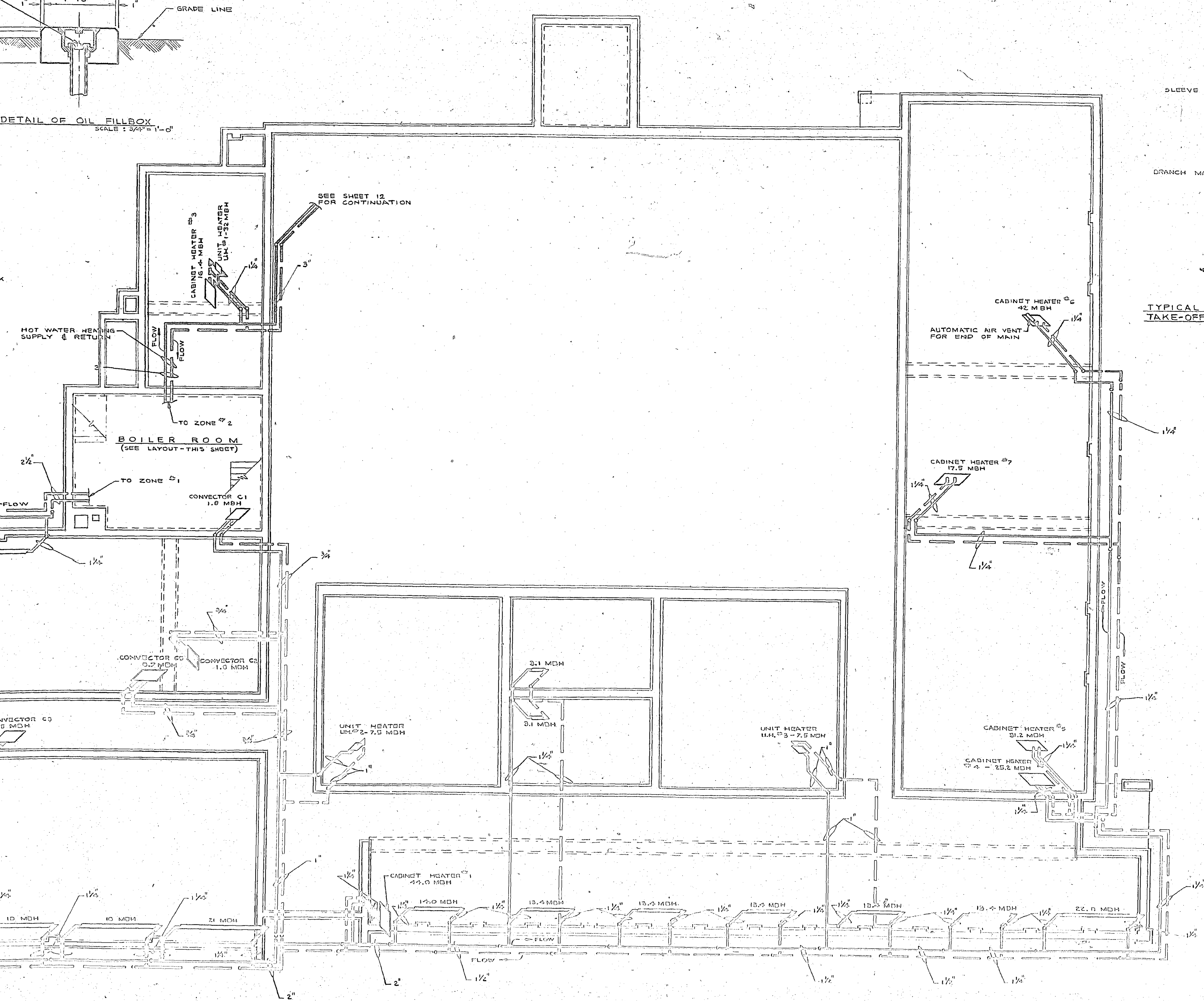
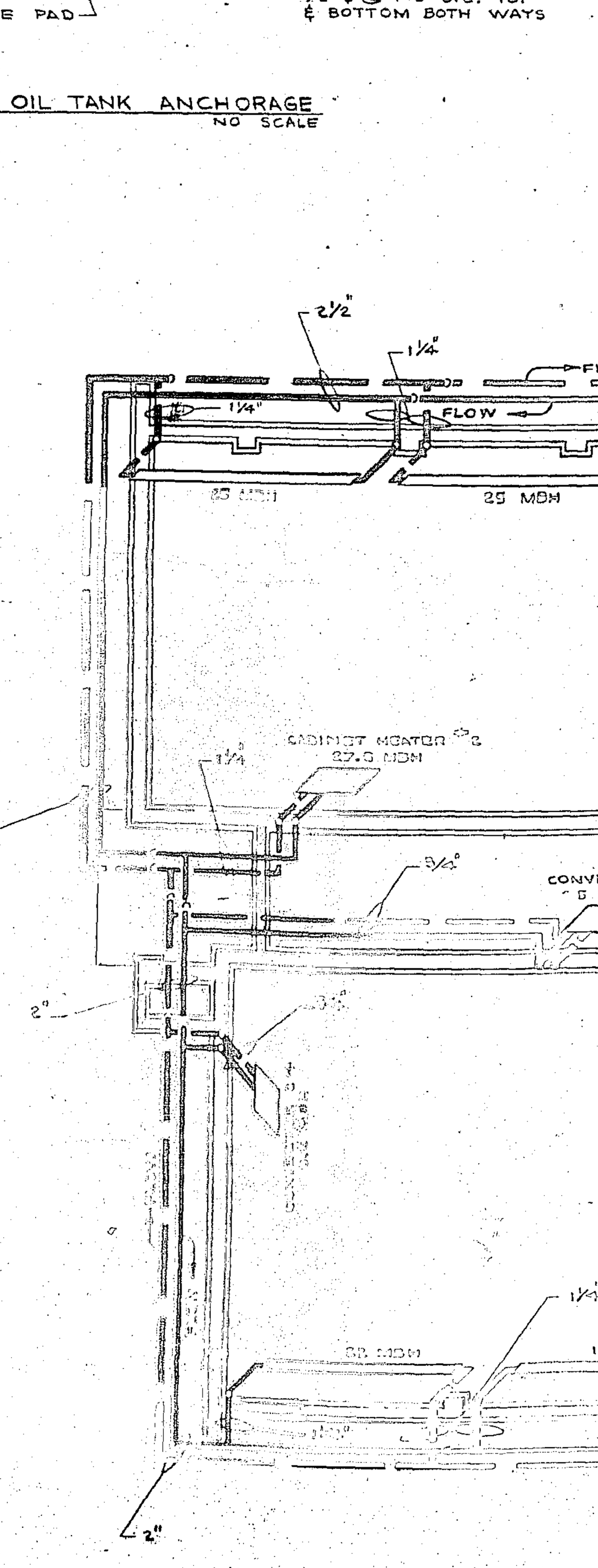


SECTION THRU EXTERIOR PIPING SYSTEM
NO SCALE

HEATING & VENTILATING

SYMBOLS & ABBREVIATIONS

NAME	SYMBOL	ABBREVIATIONS
HEATING WATER SUPPLY		S
HEATING WATER RETURN		R
FUEL OIL FLOW	— — F.O.F. — —	F.O.F.
FUEL OIL RETURN	— — F.O.R. — —	F.O.R.
FUEL OIL VENT	— — F.O.V. — —	F.O.V.
FUEL OIL GAUGE	— — F.O.G. — —	F.O.G.
GATE VALVE		G.A.V.
GLOBE VALVE		G.L.V.
CHECK VALVE	FLOW	C.K.V.
TEMPERATURE REGULATING VALVE		T.R.V.
SAFETY VALVE		S.V.
3 WAY MIXING VALVE		
HOSE BIBB		H.B.
THERMOSTAT	T	
THERMOSTAT TRACER		
AUTOMATIC AIR VENT		A.A.V.
STRAINER		S.T.R.
UNION		
BALANCING COCK		B.C.
SUPPLY AIR GRILLE	CFM 12"X8"	12"X8" GRILLE SIZE
EXHAUST AIR GRILLE	CFM 12"X8"	12"X8" GRILLE SIZE
THERMOMETER		
PRESSURE GAUGE		

HEATING & VENTILATING FOUNDATION PLAN
SCALE : 1/8" = 1'-0"

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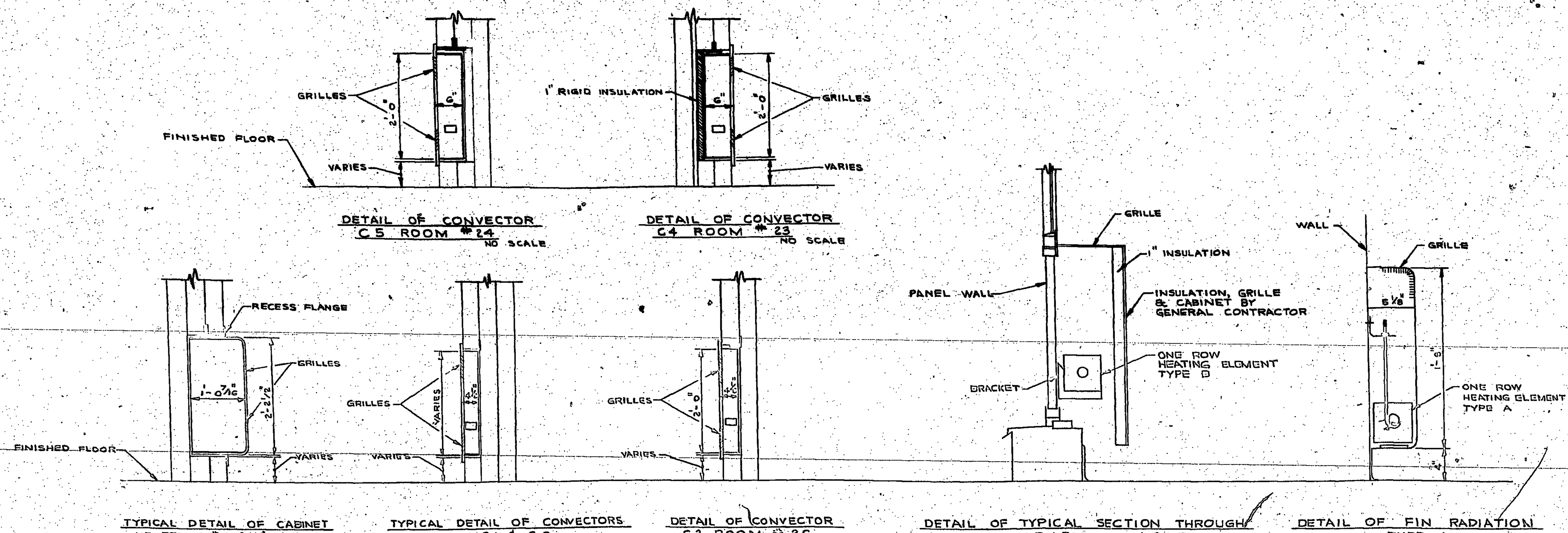
SHEET 11 OF 13

BLOOMINGTON TWO UNIT ARMORY



DETAIL OF CONVECTOR C5 ROOM # 24 NO SCALE

DETAIL OF CONVECTOR C4 ROOM # 23 NO SCALE

TYPICAL DETAIL OF CABINET HEATERS # 1, 2, & 4 NO SCALE

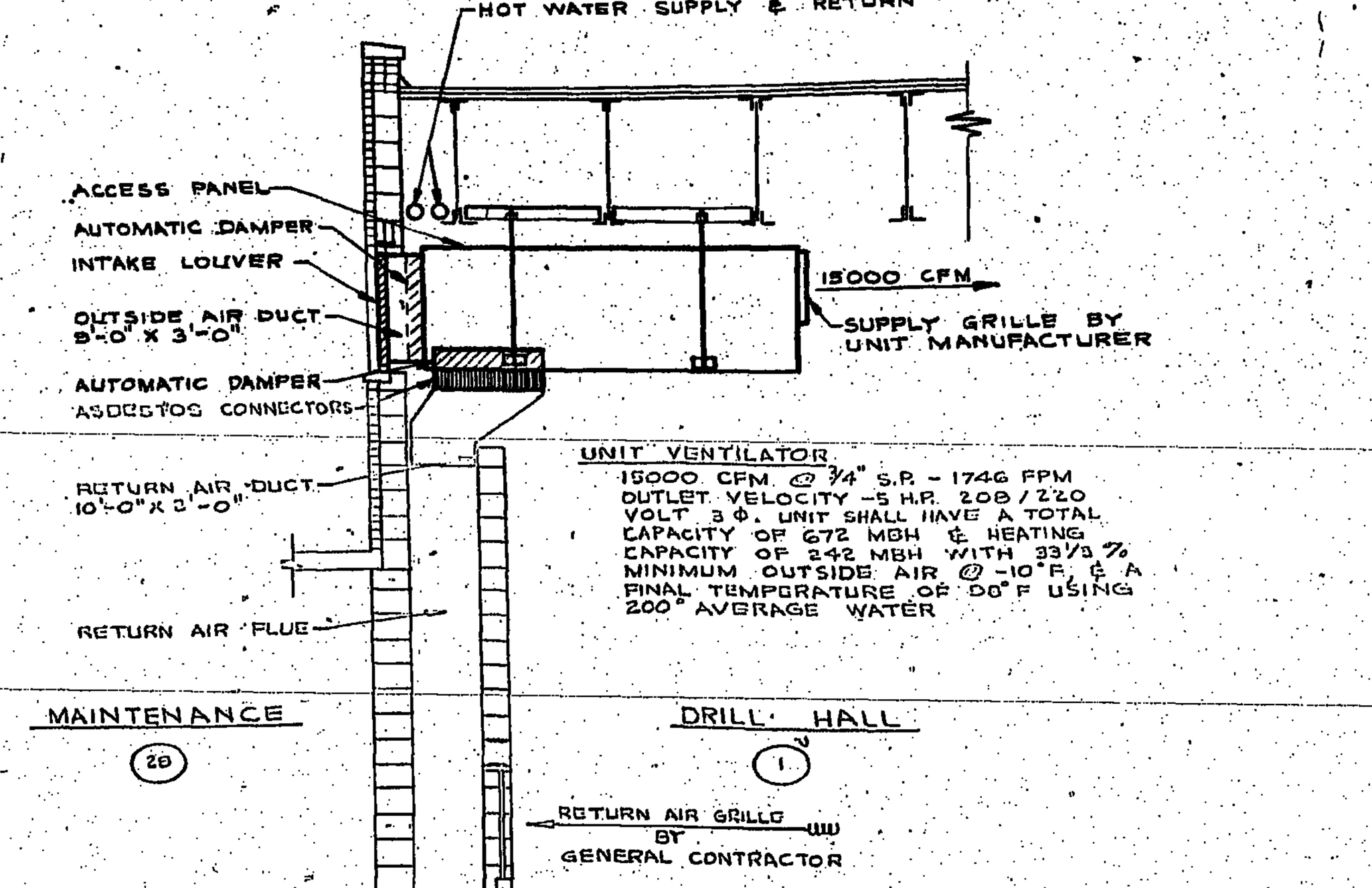
TYPICAL DETAIL OF CONVECTORS C1 & C3 NO SCALE

DETAIL OF CONVECTOR C2 ROOM # 26 NO SCALE

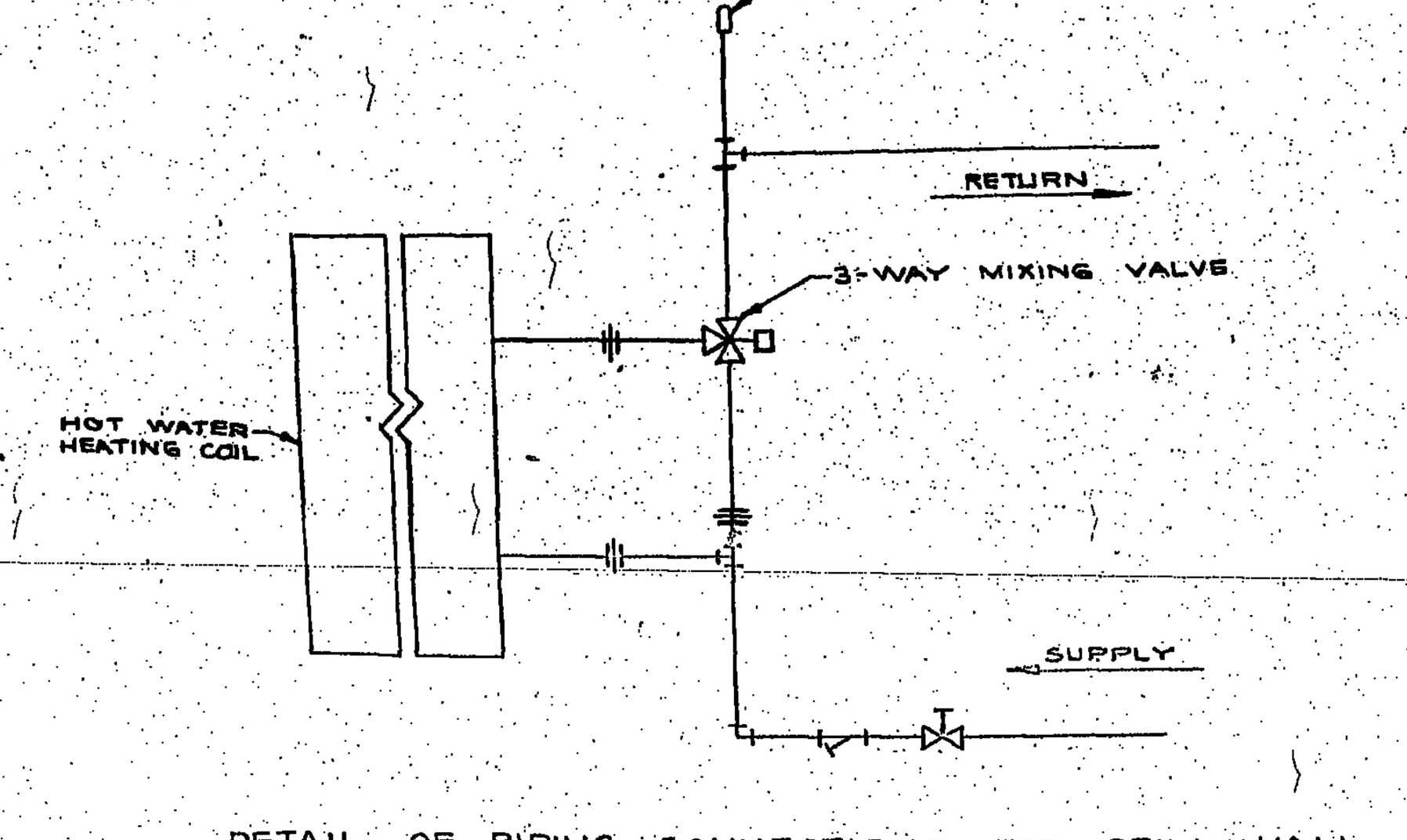
DETAIL OF TYPICAL SECTION THROUGH TYPE B RADIATION IN PANEL WALL CABINET NO SCALE

DETAIL OF FIN RADIATION TYPE A NO SCALE

NOTE: ALL RECESSED CONVECTORS & CABINET HEATERS SHALL WORK EVEN MASONRY COURSES AT THE LINTEL & SHALL BE A MINIMUM OF 4" ABOVE THE FLOOR

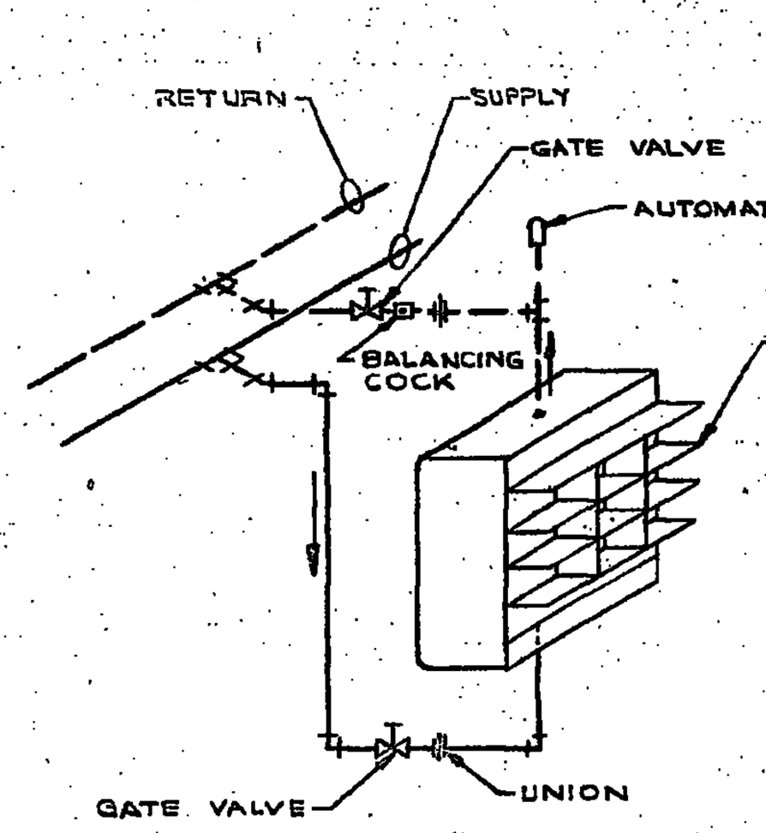


DETAIL OF UNIT VENTILATOR IN DRILL HALL SCALE: 1/4" = 1'-0"



DETAIL OF PIPING CONNECTIONS FOR DRILL HALL UNIT VENTILATOR NO SCALE

CONVECTOR SCHEDULE - 200° AVG WATER - 20° TEMP DROP							
CONVECTOR NO.	ROOM SERVED	TYPE	DEPTH	LENGTH	HEIGHT	BTU PER HOUR	REMARKS
C1	27	FULLY RECESSED BOTTOM OVERLAP	4"	24"	18"	1,800	
C2	26	FULLY RECESSED BOTTOM OVERLAP	4"	24"	18"	1,800	
C3	18	FULLY RECESSED BOTTOM OVERLAP	4"	36"	32"	5,000	
C4	23	FULLY RECESSED BOTTOM OVERLAP	6"	36"	24"	6,200	
C5	24	FULLY RECESSED BOTTOM OVERLAP	6"	48"	24"	8,700	



UNIT HEATER PIPING DIAGRAM NO SCALE

UNIT HEATER SCHEDULE (PROPELLER TYPE) 200° AVG WATER - 60° ENT AIR									
HEATER NO.	ROOM SERVED	TYPE	FAN SPEED RPM	MOTOR HP	CFM STD AIR	BTU PER HR	FINAL TEMP °F	WATER RATE GPM	REMARKS
UH-1	28	HORIZONTAL	1550	1/40	545	32,000	117	3.5	NOTES ①②
UH-2	17	HORIZONTAL	1050	1/70	197	7,500	110	1.1	NOTES ①②
UH-3	14	HORIZONTAL	1050	1/70	197	7,500	110	1.1	NOTES ①②
UH-4	1	HORIZONTAL	1050	1/6	2,620	150,000	112	15.6	NOTES ①②③
UH-5	1	HORIZONTAL	1050	1/6	2,620	150,000	112	15.6	NOTES ①②③

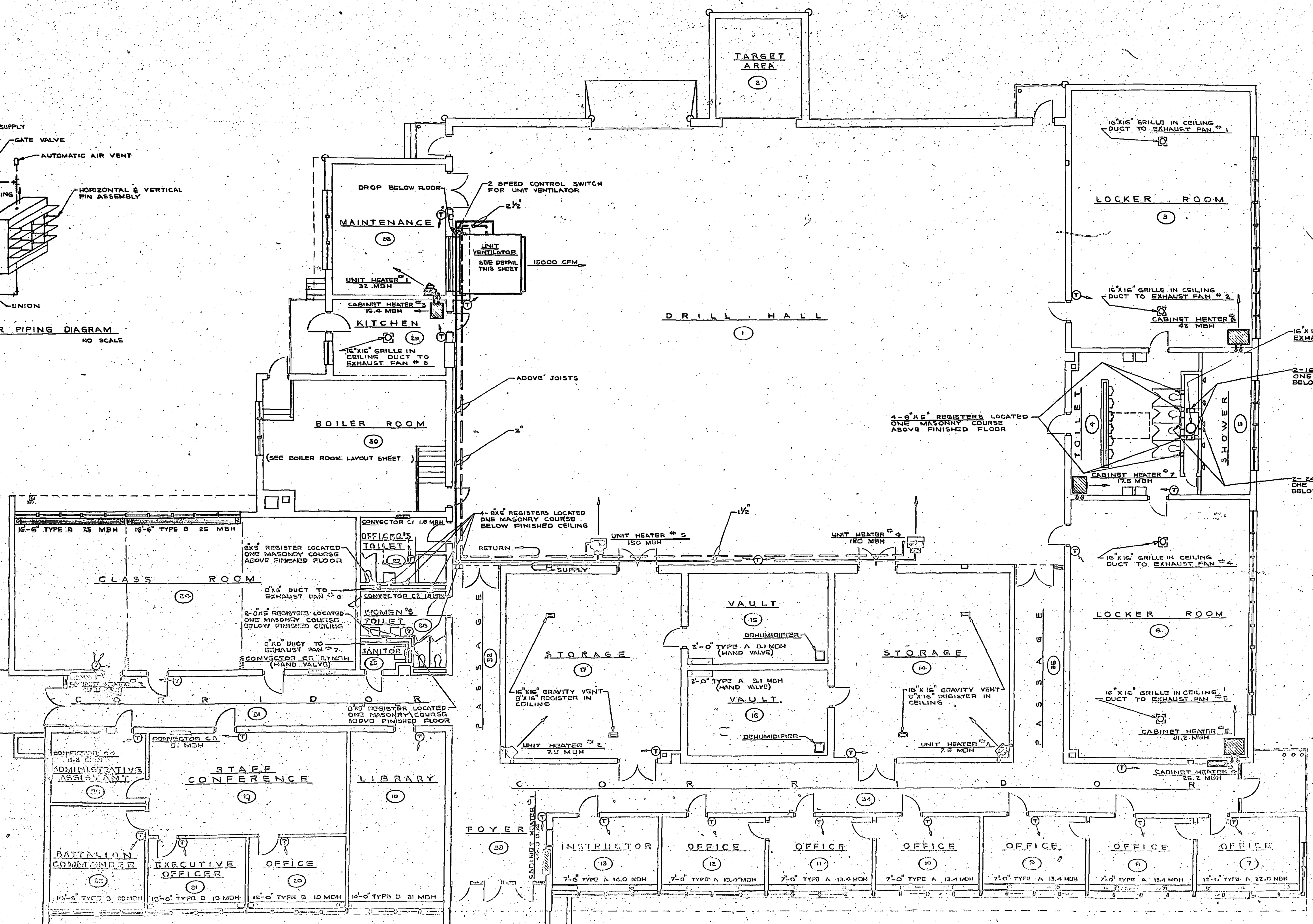
UNIT HEATER NOTES:
① MOUNTING HEIGHT 13'-0" ABOVE FLOOR TO BOTTOM OF HEATER
② ALL UNIT HEATER MOTORS 120 VOLT, SINGLE PHASE, 60 CYCLE
③ RATINGS BASED ON 20° WATER TEMPERATURE DROP

RADIATION SCHEDULE - 200° AVG WATER - 65° ENT AIR						
TYPE	BTU/FT	TUBE DIA.	FIN SIZE	NO. ROWS	TYPE COVER	REMARKS
A	1930	1 1/4"	4 1/4"	1	FLAT TOP ROUNDED CORNER	
B	1520	1 1/4"	4 1/4"	1	BY GENERAL CONTRACTOR	

CABINET HEATER SCHEDULE - 200° AVG WATER - 60° ENT AIR									
HEATER NO.	ROOM SERVED	TYPE	FAN-SPEED RPM	MOTOR H.P.	CFM STD. AIR	BTU PER. HR.	FINAL TEMP. °F	WATER RATE GPM	REMARKS
1	33	WALL SEMI-RECESSED	800	1/6	730	44,800	119	4.8	NOTES ①③
2	31	WALL SEMI-RECESSED	1000	1/6	466	27,500	115	2.8	NOTES ②③
3	29	CEILING MOUNTED	515	1/6	235	16,400	129	1.8	NOTES ①③
4	34	WALL SEMI-RECESSED	900	1/6	413	25,200	117	2.6	NOTES ②③
5	6	CEILING MOUNTED	700	1/6	483	31,200	122	3.3	NOTES ①③
6	3	CEILING MOUNTED	1100	1/6	769	42,000	113	4.4	NOTES ②③
7	4,5	CEILING MOUNTED	515	1/6	235	17,500	129	1.8	NOTES ①③

CABINET HEATER NOTES:
① FAN MOTOR IS SINGLE LOW SPEED, 120 VOLT, SINGLE PHASE, 60 CYCLE
② FAN MOTOR IS SINGLE HIGH SPEED, 120 VOLT, SINGLE PHASE, 60 CYCLE
③ RATINGS BASED ON 20° WATER TEMPERATURE DROP

EXHAUST FAN SCHEDULE							
FAN NO.	AREA EXHAUSTED	CFM	SP	RPM	MOTOR CHARACTERISTICS HP-VOLT-Ø-CYCLE	BACK DRAFT DAMPER SIZE	REMARKS
1	ROOM 3	600	1/8"	1140	1/8 - 120 - 1 - 60	12" x 12"	16x16 CEILING GRILLE
2	ROOM 3	600	1/8"	1140	1/8 - 120 - 1 - 60	12" x 12"	16x16 CEILING GRILLE
3	ROOM 4,5	2000	1/8"	820	1/3 - 120 - 1 - 60	16" x 16"	
4	ROOM 6	600	1/8"	1140	1/8 - 120 - 1 - 60	12" x 12"	16x16 CEILING GRILLE
5	ROOM 6	600	1/8"	1140	1/8 - 120 - 1 - 60	12" x 12"	16x16 CEILING GRILLE
6	ROOM 27	450	1/8"	1550	1/15 - 120 - 1 - 60	8" x 8"	
7	ROOM 26	450	1/8"	1550	1/15 - 120 - 1 - 60	8" x 8"	
8	ROOM 20	1120	1/8"	1725	1/4 - 120 - 1 - 60	12" x 12"	16x16 CEILING GRILLE



HEATING & VENTILATING FLOOR PLAN SCALE: 1/8" = 1'-0"

NOTES:
1. ALL GRAVITY VENTS & ROOF EXHAUSTERS SHALL HAVE BACK DRAFT DAMPERS.
2. ALL HAND VALVES SHALL BE KEY OPERATED.
3. ALL AUTOMATIC VALVES SHALL BE SIZED FOR 5 LB. WATER PRESSURE DROP.
4. ALL EQUIPMENT REQUIRING ASME LABELS BY STATE CODE SHALL HAVE SUCH LABELS.
5. THE BOILER ROOM SHALL BE ACCEPTED BY THE STATE BOILER INSPECTOR BEFORE FINAL PAYMENT CAN BE MADE.
6. BOTH SUPPLY & RETURN PIPING TO CEILING MOUNTED CABINET HEATERS SHALL ENTER SAME SIDE OF CABINET.
7. ALL PIPING INSTALLED UNDER FLOOR SHALL BE TYPE K COPPER
8. INSTALLATION OF ENTIRE HEATING SYSTEM SHALL BE UNDER BID #1.

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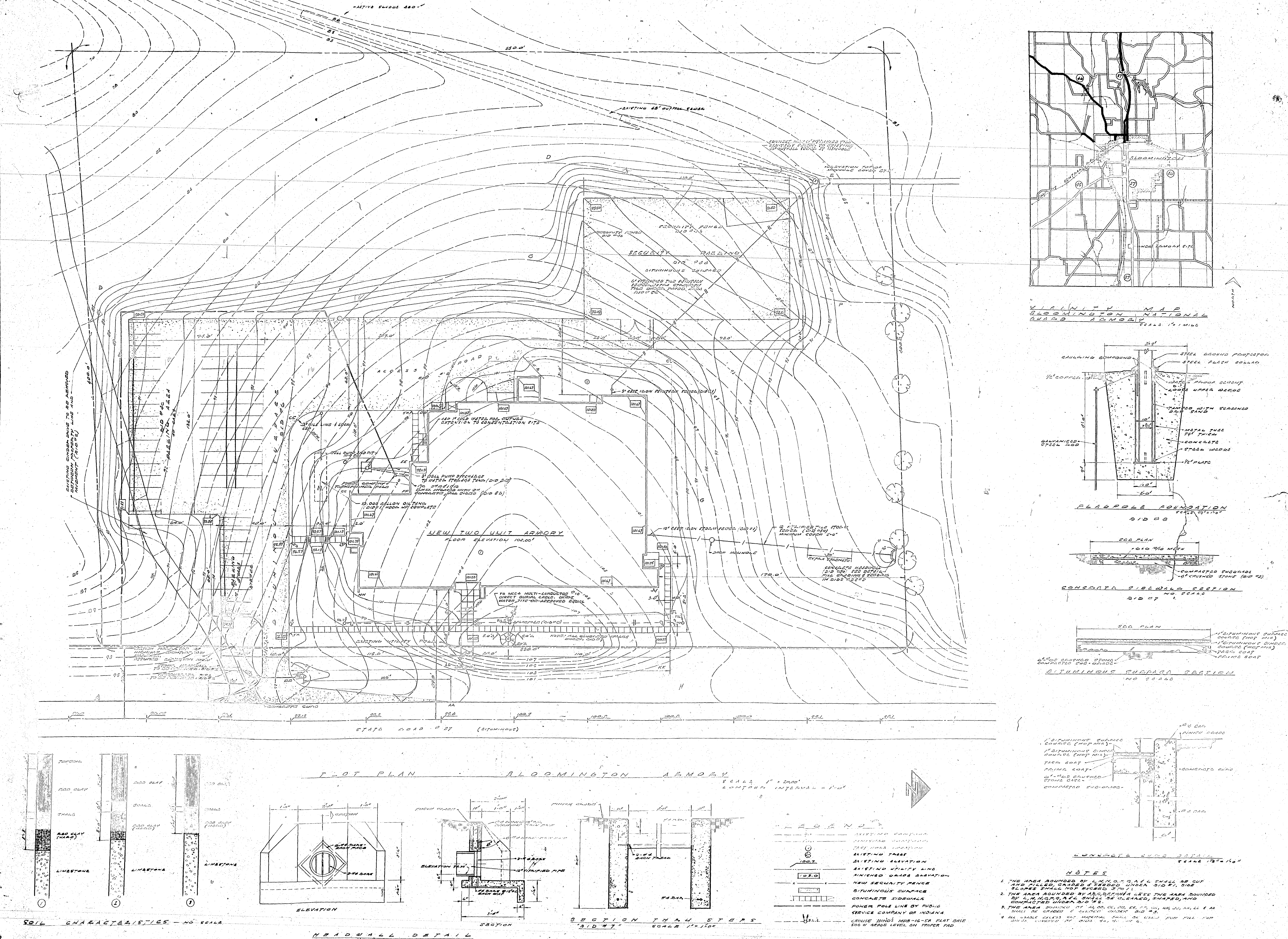
SHEET 12 OF 13

BLOOMINGTON TWO UNIT ARMORY



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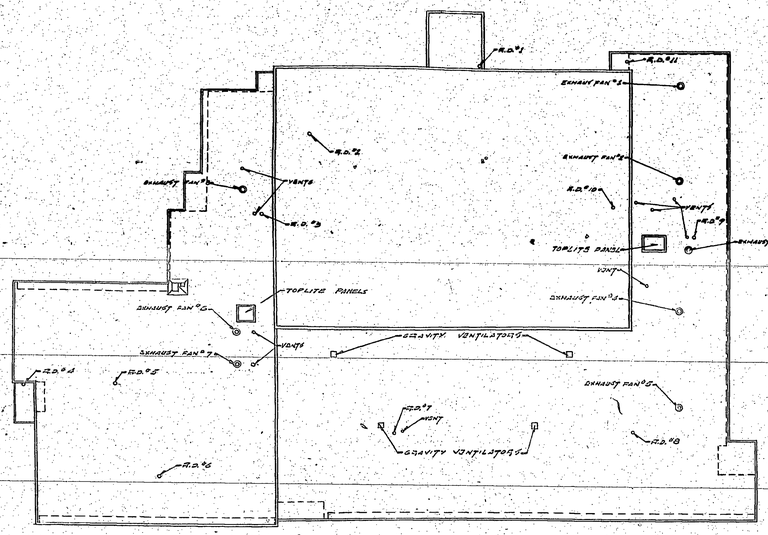
INDIANAPOLIS INDIANA

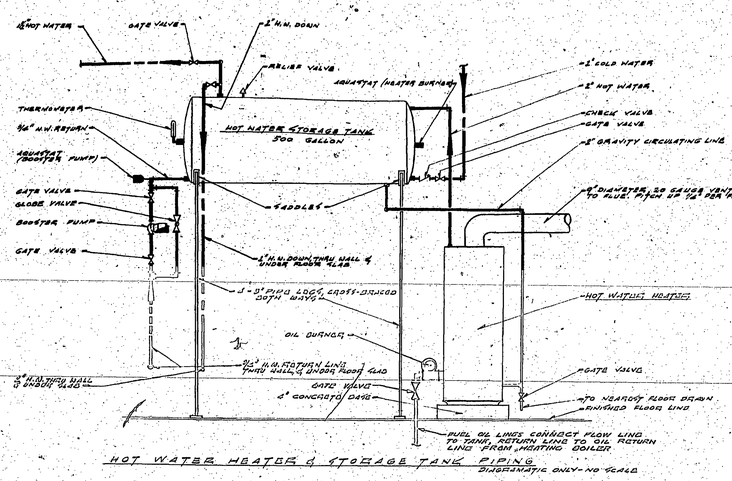
SHEET 2 of 13

BLOOMINGTON TWO ... MORY



MECHANICAL ROOF PLAN

SCALE 1/16" = 1'-0"



HOT WATER HEATER & STORAGE TANK PIPING

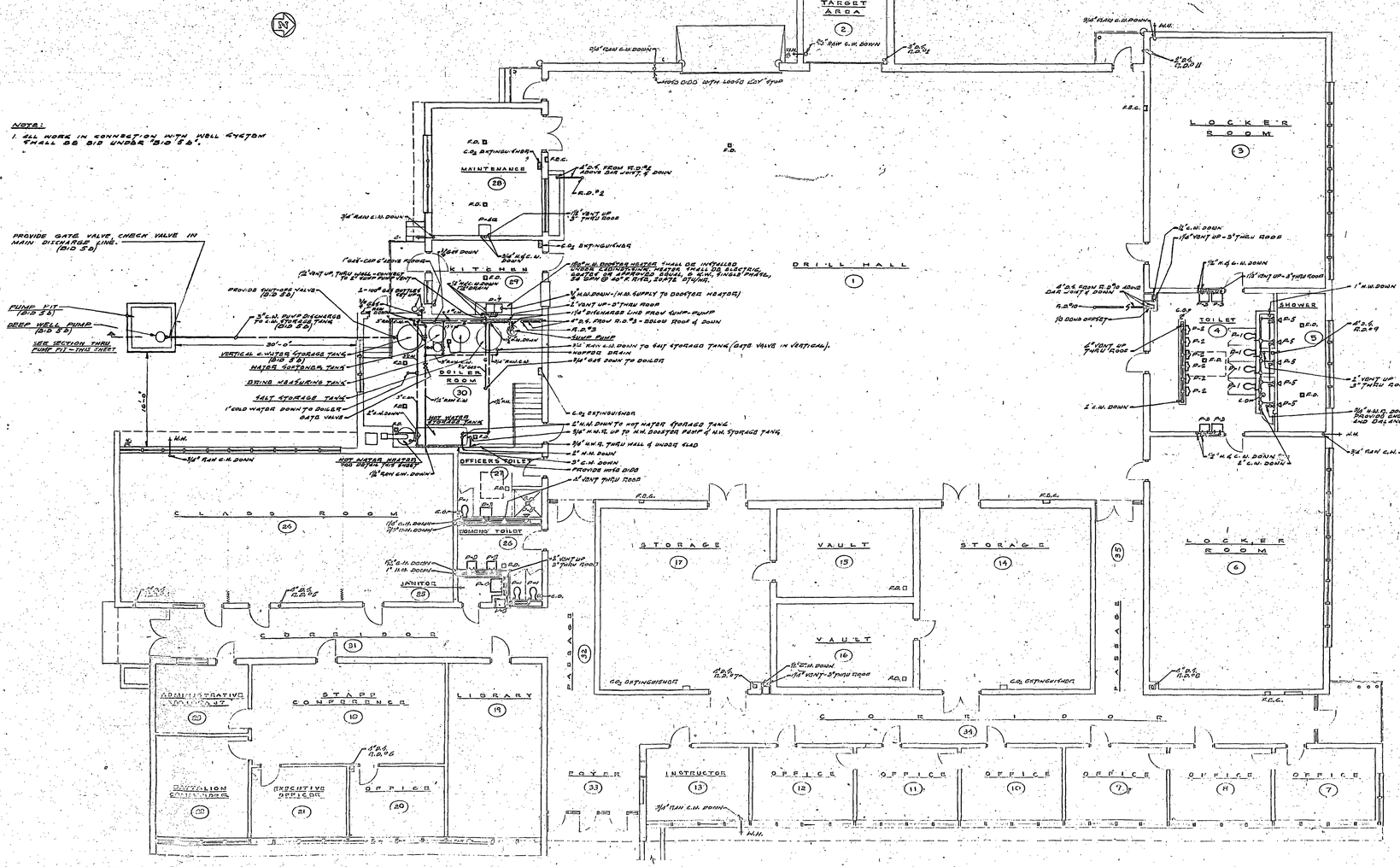
DIAGRAMATIC ONLY - NO SCALE

PLUMBING FIXTURE SCHEDULE					
ITEM	FIXTURE	WASTE	VENT	COLD WATER	HOT WATER
P-1	WATER CLOSET - FLOOR MOUNTED	4"	1½"	1"	—
P-2	URINAL - WALL HUNG	2"	1¼"	¾"	—
P-3	LAVATORY	1¼"	1¼"	½"	½"
P-4	SERVICE SINK FLOOR RECESSED	3"	1½"	¾"	¾"
P-4A	SERVICE SINK FLOOR MOUNTED	3"	1½"	¾"	¾"
P-5	SHOWER & MIXING VALVE	—	—	½"	½"
P-6	WATER COOLER	1½"	1¼"	½"	—
P-7	KITCHEN CABINET SINK	1½"	1½"	½"	½"

PLUMBING LEGEND		
NAME	SYMBOL	ABBREVIATION
COLD WATER	C.W.	C.W.
DOMESTIC HOT WATER SUPPLY	H.W.	H.W.
DOMESTIC HOT WATER RETURN	H.W.R.	H.W.R.
GAS LINE	G	G.
CAST IRON SANITARY WASTE	W	W.
CAST IRON STORM DRAIN	S	S.
VITRIFIED TILE SANITARY SEWER	V	V.T.
VITRIFIED TILE STORM SEWER	V.S.	V.T.S.
VITRIFIED TILE COMBINED SEWER	V.C.	V.T.C.S.
VENTS	V	V.
WALL HYDRANT	W.H.	W.H.
ROOF DRAIN	R.D.	R.D.
FLOOR DRAIN	F.D.	F.D.
SHOWER HEAD	S.H.	S.H.
INSIDE DOWN - SPOUT	D.S.	D.S.
HOSE BIBB	H.B.	H.B.
CLEAN - OUT	C.O.	C.O.
WATER CLOSET	W.C.	W.C.
LAVATORY	LAV.	LAV.
SERVICE SINK	S.S.	S.S.
URINAL	U.R.	U.R.
FIRE EXTINGUISHER CABINET	F.E.C.	F.E.C.
FIRE EXTINGUISHER (CARBON DIOXIDE)	CO_2	CO_2

NOTE:

1. ALL WORK IN CONNECTION WITH WELL SYSTEM SHALL BE BID UNDER "BID 25".



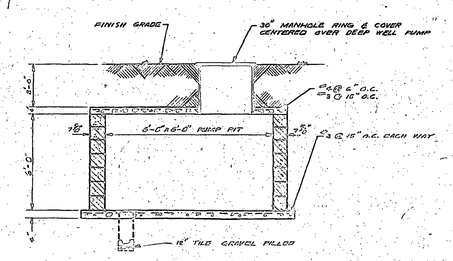
UPPER FLOOR PLAN

SCALE 1/8" = 1'-0"

ROOF DRAIN SCHEDULE		
NUMBER	JOSAM TYPE	JOSAM SERIES
1	413	410
2, 3, 5 — 10	414	410
4 & 11	4052-B	4050-B

NOTE:

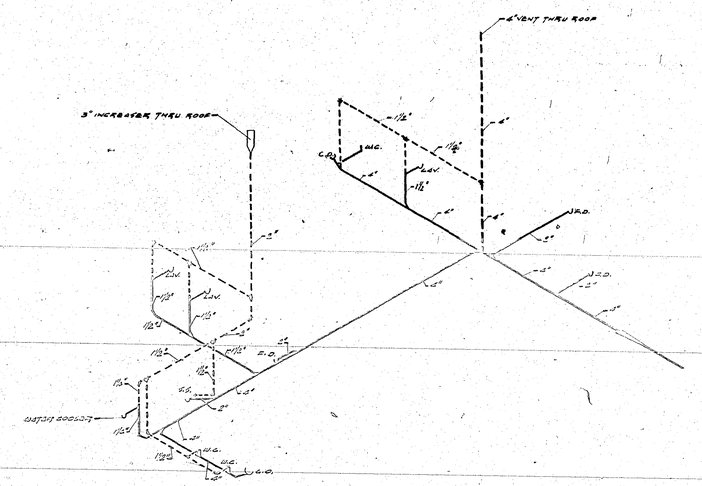
PROVIDE A HOSE BIBB UNDER EACH BATTERY OF LAVATORIES IN EACH TOILET ROOM



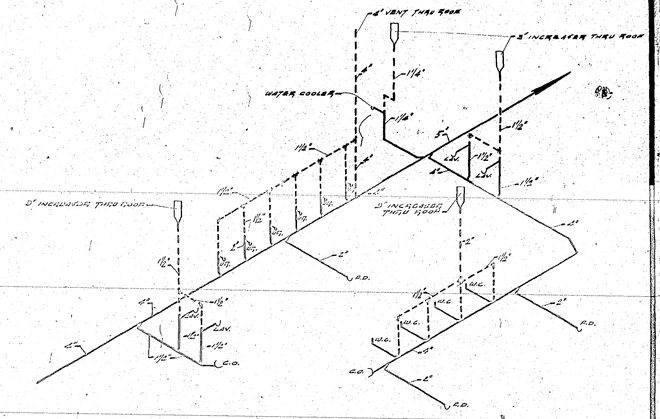
(SEE PLAN VIEW THIS SHEET)

SECTION THRU PUMP PIT (BID 25)

NO SCALE



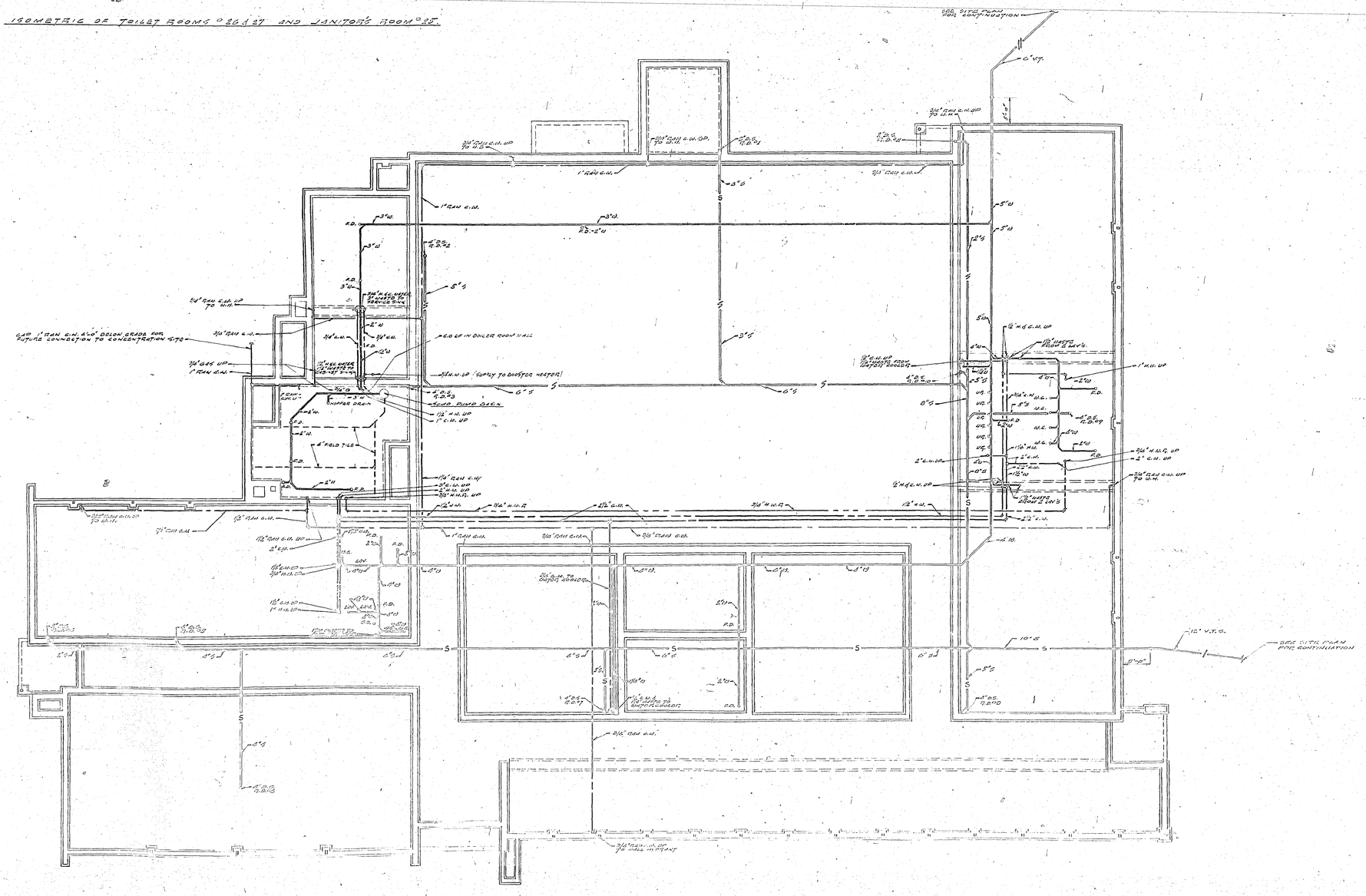
ISOMETRIC OF TOILET ROOMS #26 & 27 AND JANITOR'S ROOM #25.



ISOMETRIC OF TOILET ROOM #4 & SHOWER ROOM #5.

PLUMBING NOTES

1. ALL PIPING IN PIPE-SPACES SHALL BE RUN AS CLOSE TO WALLS AS POSSIBLE TO ALLOW MAXIMUM ACCESS.
2. ALL SANITARY AND STORM DRAINS INSIDE OF BUILDING SHALL BE EXTRA HEAVY CAST IRON TO A POINT 5'-0" BEYOND THE OUTSIDE BUILDING WALL. THEY SHALL BE VITRIFIED TILE BEYOND THAT POINT UNLESS OTHERWISE NOTED.
3. PROVIDE BOTTLE GAS SET UP FOR BOILER IGNITION AND GAS RANGE. THIS SHALL CONSIST OF TWO (2) BOTTLES SET ON A 4" THICK CONCRETE BASE LOCATED AT BOILER ROOM WALL, AND ALL PIPING AND SAFETY DEVICES REQUIRED.



PLUMBING FOUNDATION PLAN

SCALE 1/8" = 1'-0"

EVERETT I. BROWN COMPANY ARCHITECTS & ENGINEERS
901 ILLINOIS BUILDING
INDIANAPOLIS INDIANA

SHEET 9 OF 13

BLOOMINGTON TWO UNIT ARMORY

SASH & CLOSURE ANGLE SCHEDULE	
MARK	SIZE
SA 1	2"x1/2"x1/8"
CA 2	2"x1/2"x1/8"
SA 3	1"x1"x1/8"
CA 4	1/2x1/2"x1/8"
SA 5	1 1/2"x1 1/2"x1/8"
CA6	1 3/4"x1 3/4"x1/8"
SA7	1 1/4"x1 1/4"x1/8"

NOTE: ALL SASH ANGLES SHALL BE CONTINUOUS WELDED & ALL CLOSURE ANGLES SHALL BE CONTINUOUS FIELD WELDED TO THE BOTTOM OF BEAM, PLATE OR LINTEL. STEEL CLOSURE ANGLES SHALL BE ALUMINUM IF ALUMINUM WINDOW SASH IS USED. ALL SASH ANGLES SHALL CLEAR MASONRY JAMBS BY 1/8"

UNIT SLAB SCHEDULE

MARK	THICKNESS	REINFORCING	SOLID END
A	8"	1#7 & 1#8	SOUTH
B	6"	2#6	EAST
C	6"	2#3	—
D	8"	2#7	—
E	8"	1#8 & 1#7	—
F	6"	1#4 & 1#5	—
G	8"	2-#5	BOTH
H	8"	1-#6 & 1#7	WEST
J	8"	2-#3	—
K	8"	2-#7	EAST
L	8"	1-#6 & 1-#7	—
M	6"	2-#4	—
N	8"	2-#6	—
P	8"	2-#5	NORTH
Q	6"	1-#3 & 1-#4	EAST
R	8"	1-#5 & 1-#6	—

COLUMN SCHEDULE

MARK	SECTION	TOP PL	BASE PL
C1	2-4[5.4	6"x3/8"x10"	6"x3/4"x10"
C2	2-4x4x1/4 L's	6"x3/8"x7"	6"x3/4"x10"
C3	3" PIPE	6"x3/8"x7"	9"x3/4"x9"
C4	3-3" PIPE	6"x3/8"x3'-6"	3'-10"x3/4"x6"

NOTE: ALL CHANNEL AND ANGLE COLUMNS TO BE CONTINUOUS WELD AND GROUND SMOOTH WHERE EXPOSED.

LINTEL SCHEDULE

MARK	SPAN	SECTION	CONNECTION	LENGTH	PL WIDTH
L101	8-0 3/4	4"x4"x3/8 L		7'-8"	—
L102	3'-4"	5I10		4'-8"	6 1/2"
L103	3'-4"	2Ls 3"x2"x1/4"	WELD LL-BB	4'-8"	—
L104	3'-4"	5I10		4'-8"	10 1/2"
L105	12'-8 1/2"	8WF17	PL JAMB TO JAMB	8'-4"	10 1/2"
L106	8'-8 1/2"	8WF17		10'-0"	10 1/2" JAMB TO JAMB
L107	8'-6"	8WF17		10'-0"	10 1/2"
L108	3'-4"	2-5[6.7	2" PIPE SEPARATORS	4'-8"	14 1/2"
L109	6'-4"	2-8[11.5	2" PIPE SEPARATORS	7'-8"	14 1/2"
L110	8'-0"	8WF20		9'-4"	10 1/2"
L111	16'-6"	12WF45		18'-6"	14 1/2"
L112	12'-0"	10WF39		14'-2"	14 1/2"
L113	3'-4"	8WF17		4'-8"	10 1/2"
L114	6'-4"	5I10		7'-8"	6 1/2"
L115	1'-10 3/8"	—		3'-0"	18"
L116	3'-0"	2-4"x3 1/2"x1/4 L's		4'-4"	—
L117	1'-0 3/8"	7x3/8 PL		2'-0"	—
L118	3'-8"	5I10		5'-0"	10 1/2"
L119	4'-0 7/8"	5I10		5'-4"	10 1/2"
L120	4'-0"	8WF17		5'-4"	10 1/2"
L121	2'-0"	5I10		3'-0"	10 1/2"
L122	11'-8"	8WF31		13'-0"	14 1/2"
L123	8'-8"	8WF17		10'-0"	6 1/2"
L124	8'-0"	2-6x3 1/2x1/4 L's	WELD LL-BB	8'-8"	—
L125	6'-4"	8WF17		7'-8"	10 1/2"
L126	4'-0"	2-4x3 1/2x1/4 L's	WELD LL-BB	5'-4"	—
L127	2'-0"	5I10		3'-4"	6 1/2"
L128	2'-4"	5x3"x1/4" L	LOOSE	3'-2"	—
L129	6'-0"	5I10		8'-0"	10 1/2"

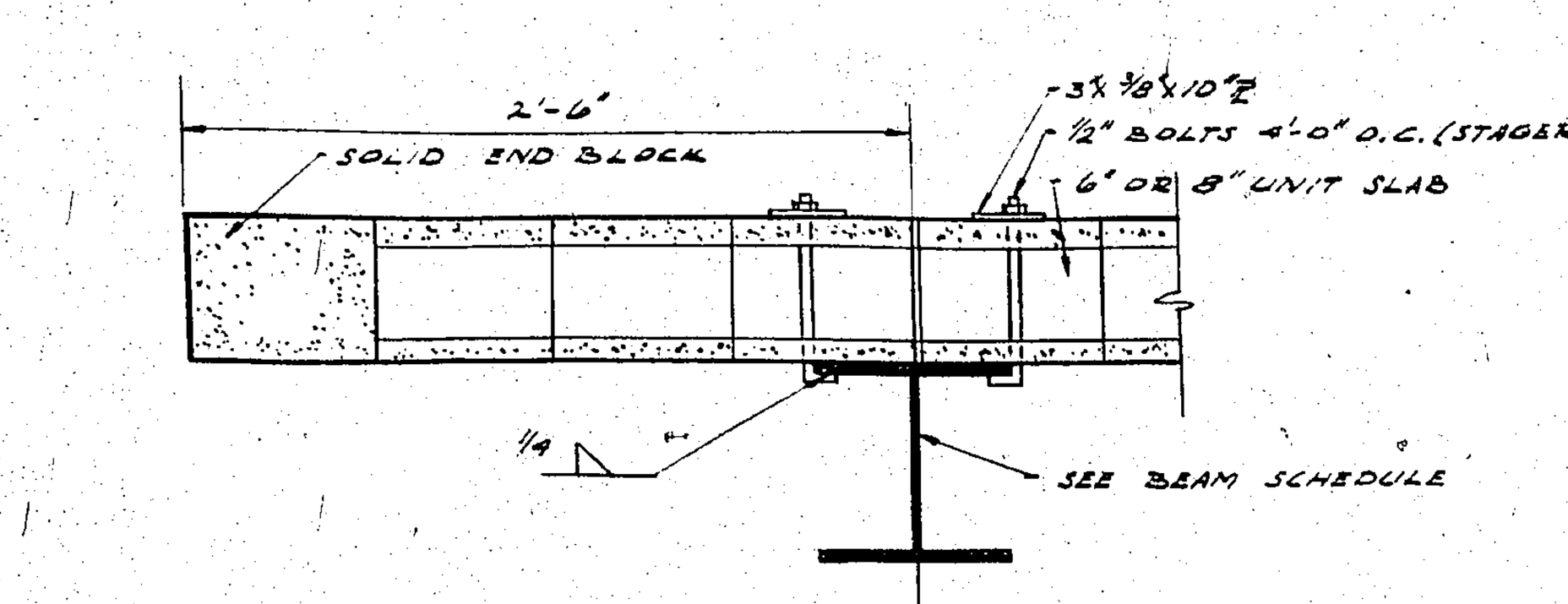
ROOF BEAM SCHEDULE

MARK	SECTION	CONNECTION	REMARKS	ELEVATION TOP ABOVE 98'-6"
RB1	6"x6" M25 5"x3/8" PL	BOLT TO COLUMN TOP PL	12" BEARING @ WALLS WELD PL TO BOTTOM FLANGE	8'-6"
RB2	6"x6" M20 5"x3/8" PL	BOLT TO COLUMN TOP PL	8" BEARING @ WALLS WELD PL TO BOTTOM FLANGE	8'-6"
RB3	8WF17	BOLT TO COLUMN TOP PL		8'-8"
RB4	8 WF 40	BOLT TO COLUMN TOP PL	8"x1"x15" BEARING PL	9'-4"
RB5	8 WF 17	BOLT TO COLUMN TOP PL	8" BEARING AT WALLS	9'-4"
RB6	2-4"x3 1/2"x1/4" L's	WELD LL-BB, WELD TO COLUMN TOP PL	8" BEARING AT WALLS	8'-3 3/4"
RB7	2-4"x3 1/2"x1/4" L's	WELD LL-BB, WELD TO COLUMN TOP PL	8" BEARING AT WALLS	9'-7 3/4"
RB8	2-4"x3 1/2"x1/4" L's	WELD LL-BB, WELD TO COLUMN TOP PL	8" BEARING @ WALLS	8'-11 3/4"

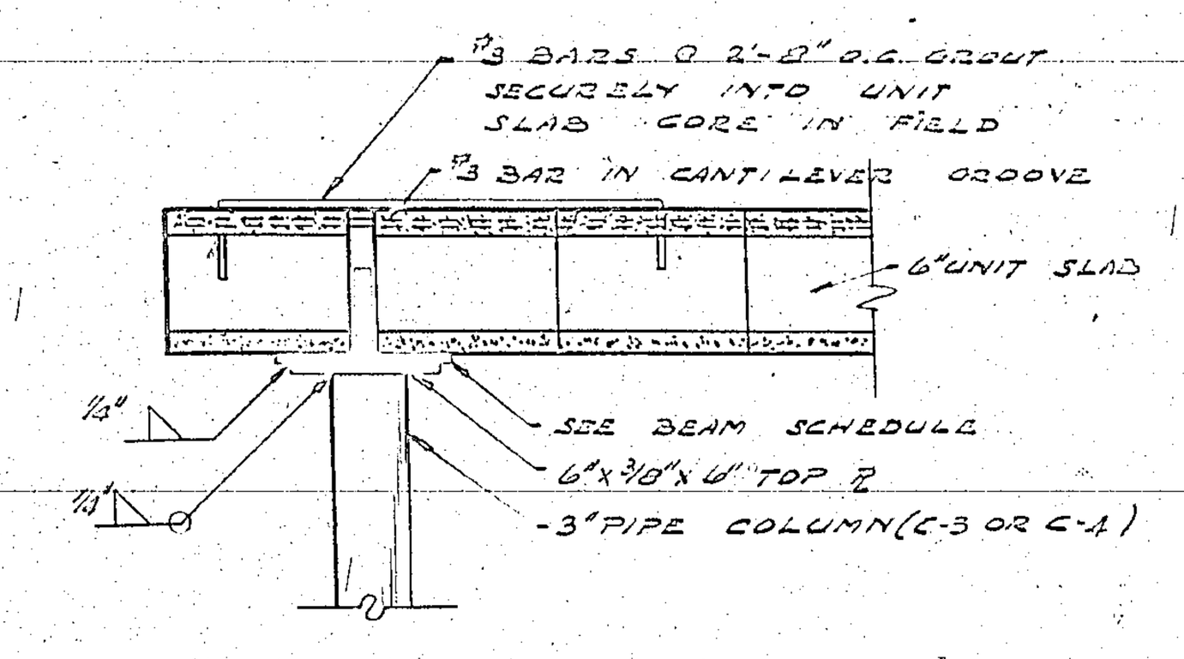
LINTEL SCHEDULE CONTINUED

MARK	SPAN	SECTION	CONNECTION	LENGTH	PL WIDTH
L130	3'-0"	4"x3 1/2"x1/4" L	LOOSE	4'-4"	—
L131	4'-3"	2-4"x3 1/2"x1/4" L's	WELD LL-BB	5'-7"	—
L132	1'-2"	4 1/2"x3/8" PL		2'-0"	—
L133	2'-0"	4"x3 1/2"x1/4" L	LOOSE	3'-4"	—
L134	8'-0 3/4"	8[11.5 6"x3 1/2"x1/4" L	WELD BB	9'-4"	—

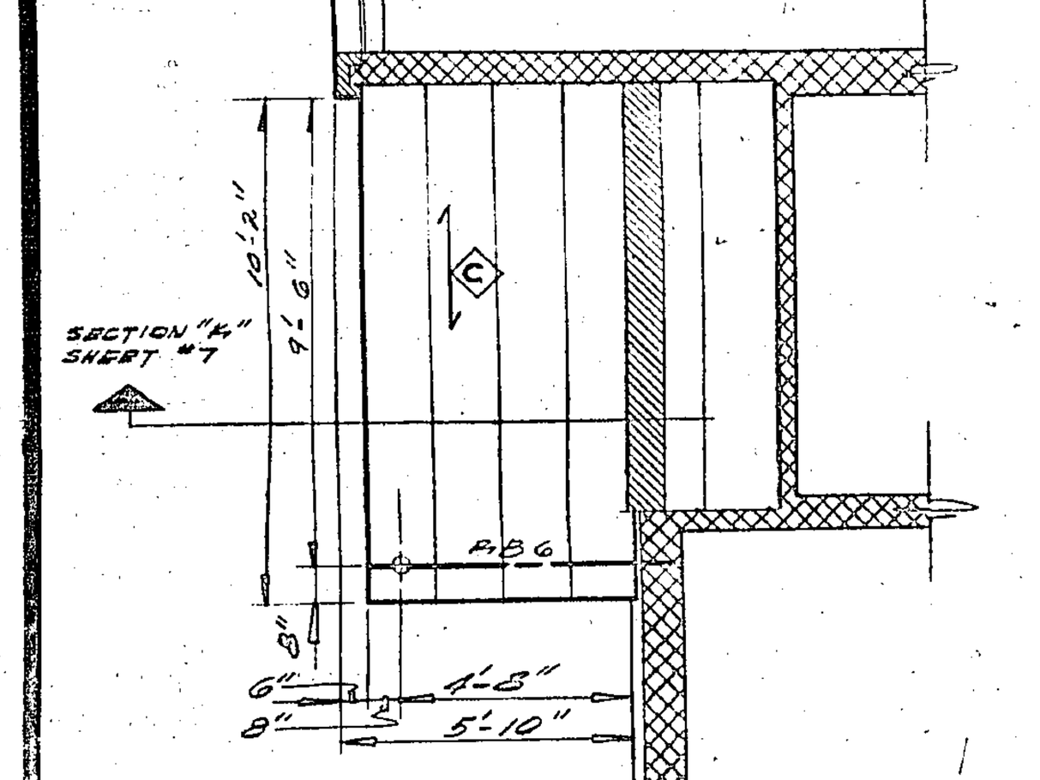
NOTE: ALL PLATES TO BE 3/8" THICK, WELDED TO BOTTOM FLANGE AND SAME LENGTH AS LINTEL UNLESS OTHERWISE NOTED.



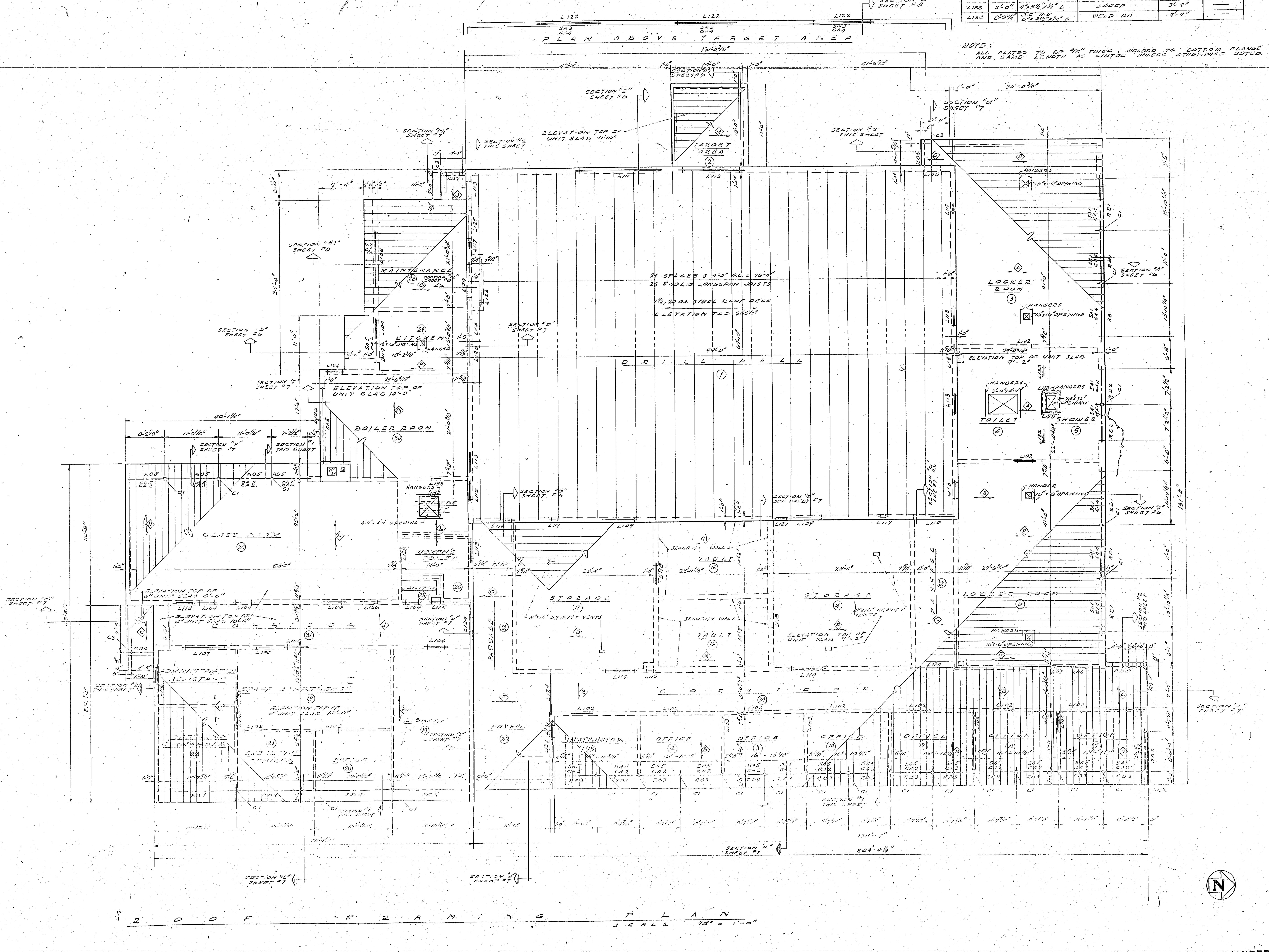
SECTION #1
SCALE 1 1/2" = 1'-0"



SECTION #2
SCALE 1 1/2" = 1'-0"



LOW CANOPY
ROOF FRAMING PLAN
SCALE 1/4" = 1'-0"



ROOF FRAMING NOTES

1. WELDING SYMBOLS ARE AS DEVELOPED BY THE AMERICAN WELDING SOCIETY.
2. ROOF DECK AND SLAB ELEVATIONS ARE REFERENCED TO NOMINAL FLOOR LINE ELEVATION 100'-0".
3. PLACE 2-#3 BARS EVERY TWO COURSES OF BRICK IN SECURITY WALLS.

ROOF FRAMING PLAN
SCALE 1/8" = 1'-0"

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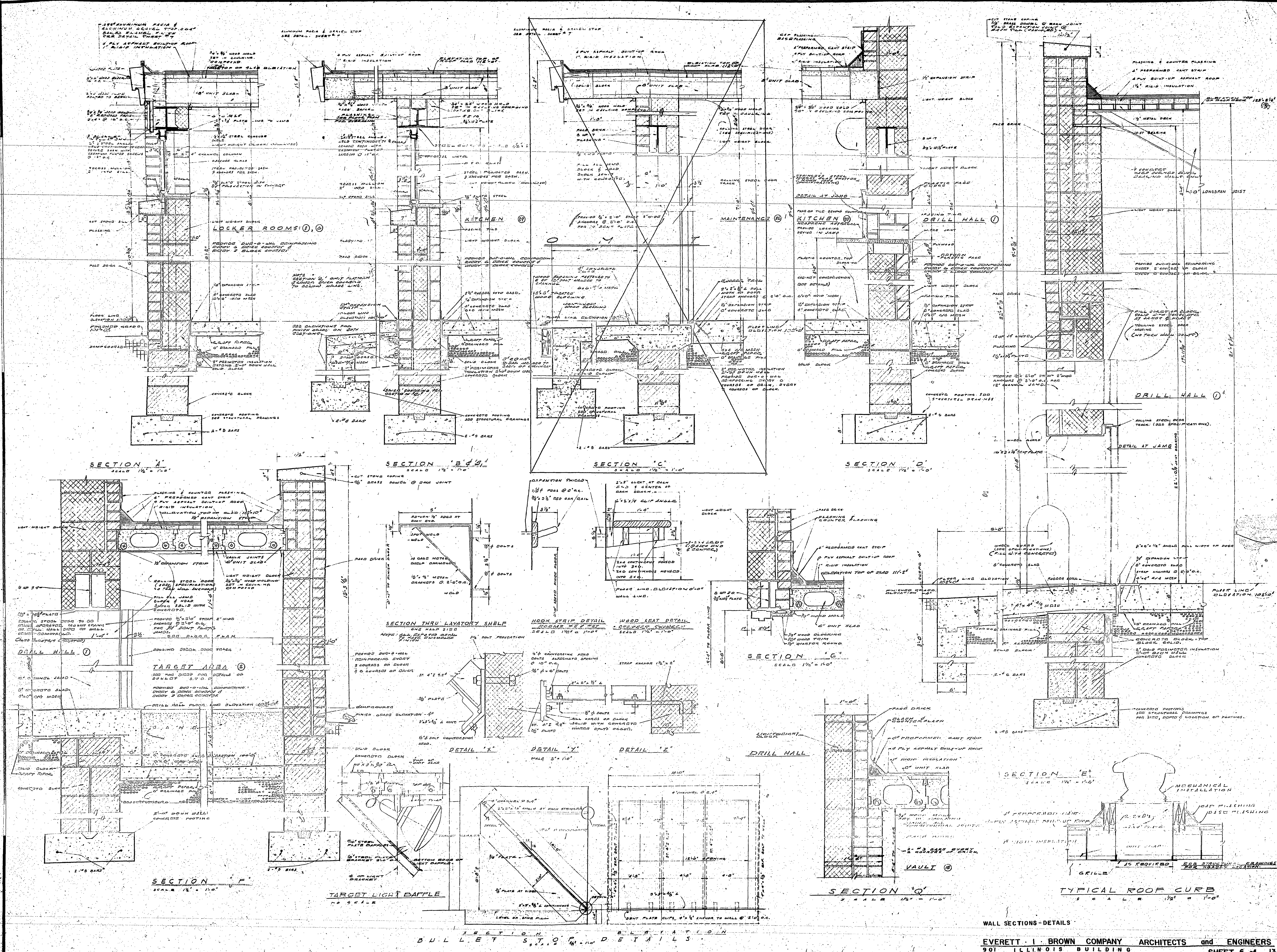
INDIANAPOLIS INDIANA

SHEET 5 OF 13

BLOOMINGTON TWO UNIT ARMORY



WALL SECTIONS - DETAILS

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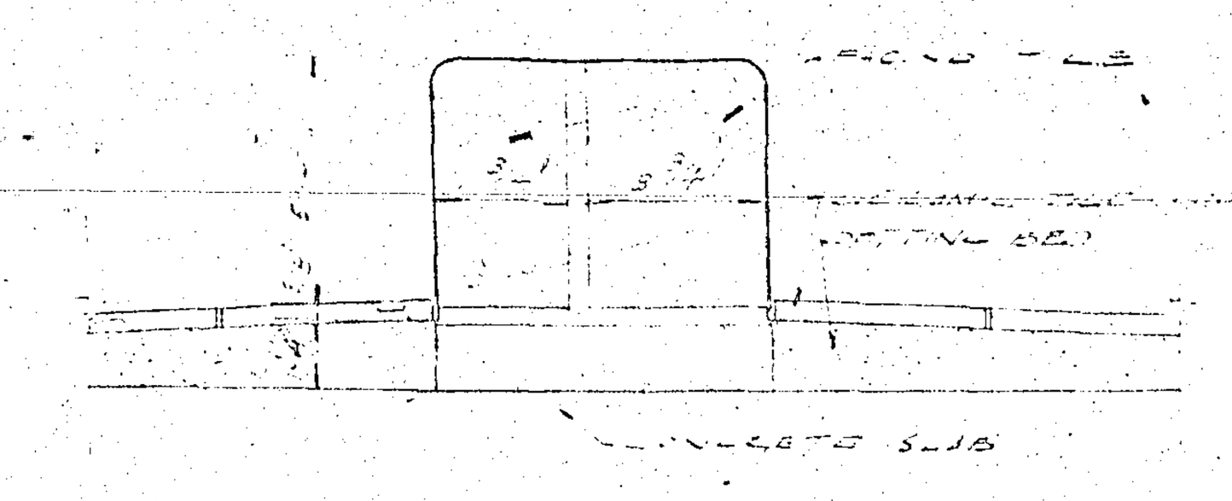
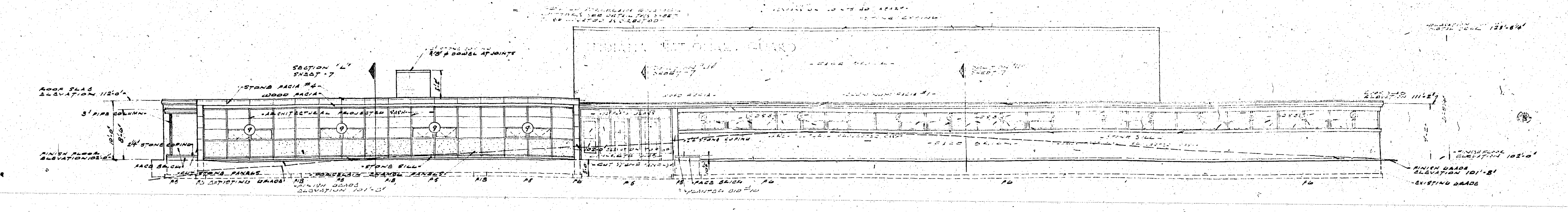
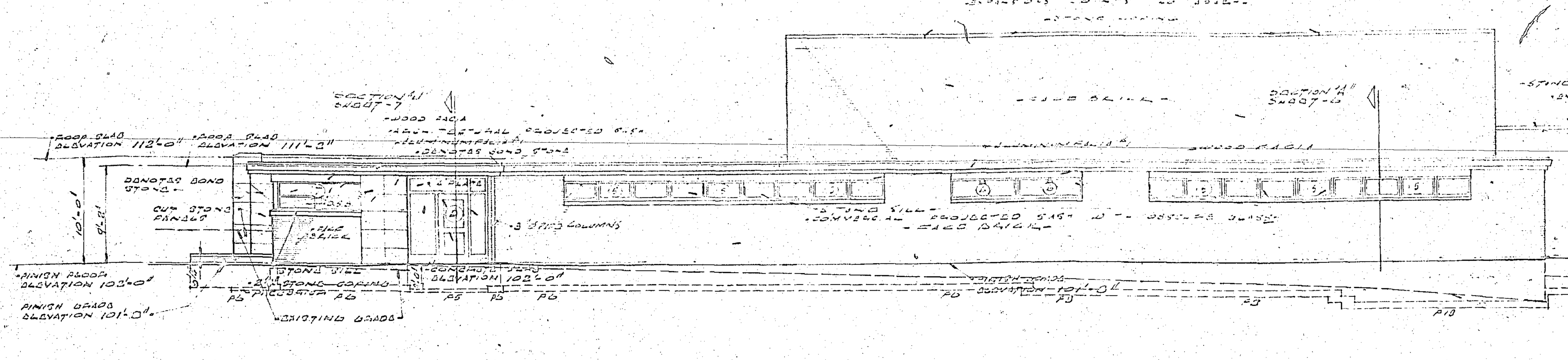
SHEET 6 of 13.
BLOOMINGTON TWO UNIT ARMORY

WINDOW SCHEDULE

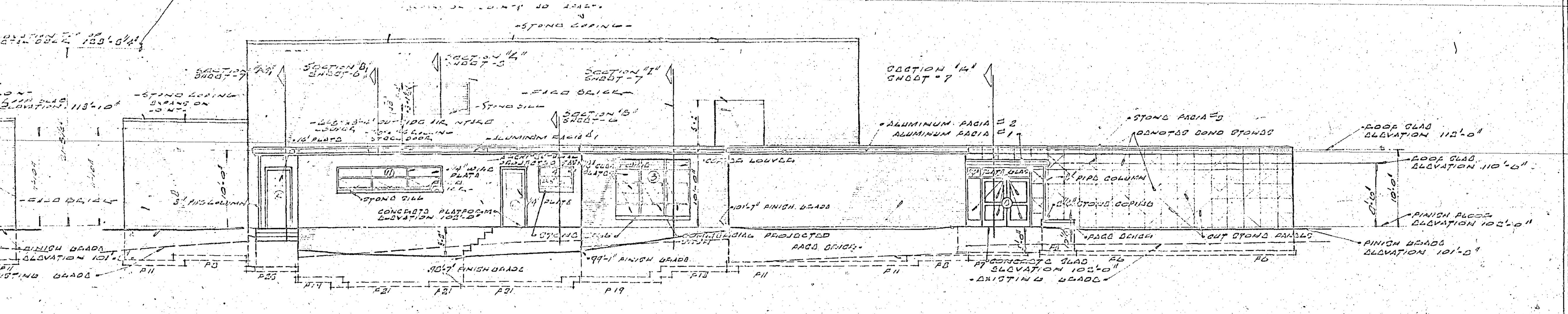
No.	SIZE	TYPE	MATERIAL	MULLION	GLASS	SCREEN	REMARKS
1	[illegible]	ARCHITECTURAL PROJECTED	STEEL	STANDARD	[illegible]	NO	[illegible]
2	DELETED						
3	[illegible]	PROJECTED	STEEL	STANDARD	[illegible]	NO	CLEAR
4	[illegible]	ARCHITECTURAL PROJECTED	STEEL	STANDARD	D.S.B.	YES	
5	[illegible]	COMMERCIAL PROJECTED	STEEL	STANDARD	OBSCURE	NO	
6	[illegible]	COMMERCIAL PROJECTED	STEEL	STANDARD	OBSCURE	YES	
7	[illegible]	ARCHITECTURAL PROJECTED	STEEL	STANDARD	D.S.B.	NO	
8	[illegible]	ARCHITECTURAL PROJECTED	STEEL	STANDARD	D.S.B.	NO	
9	[illegible]	ARCHITECTURAL PROJECTED	STEEL	STANDARD	D.S.B.	NO	[illegible]
10	[illegible]	COMMERCIAL FIXED SASH	STEEL	STANDARD	OBSCURE	NO	
11	3@4-0⅝"x4-1	ARCHITECTURAL PROJECTED	STEEL	STANDARD	D.S.B.	YES	



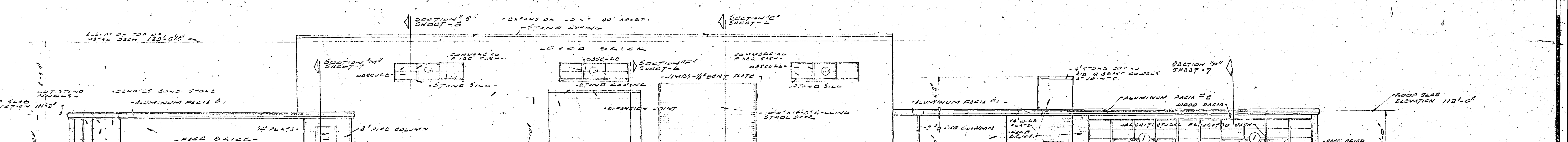




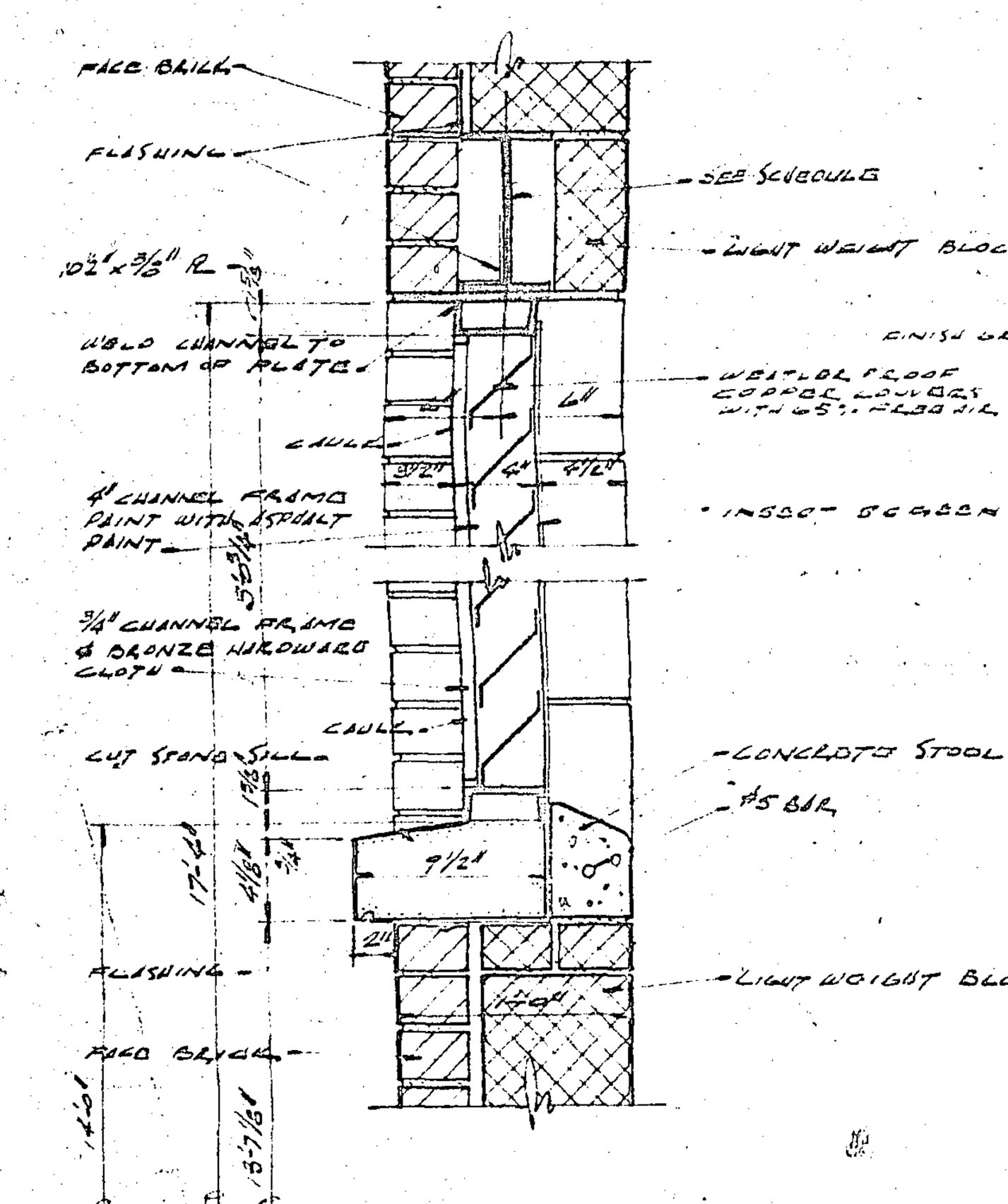
NORTH ELEVATION



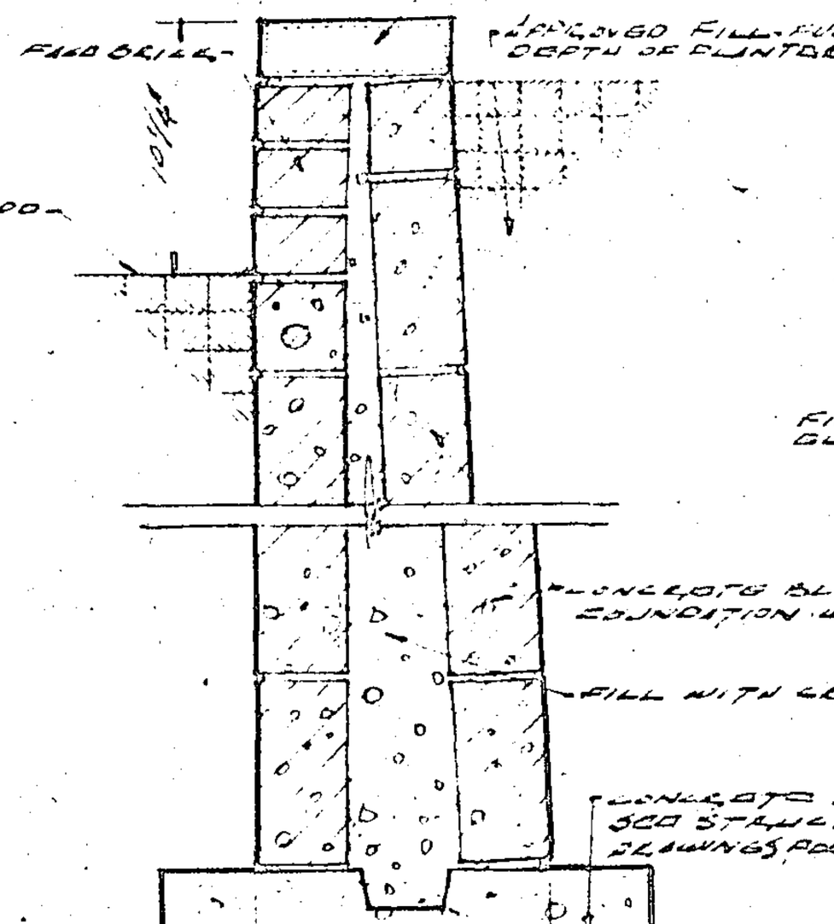
SOUTH ELEVATION



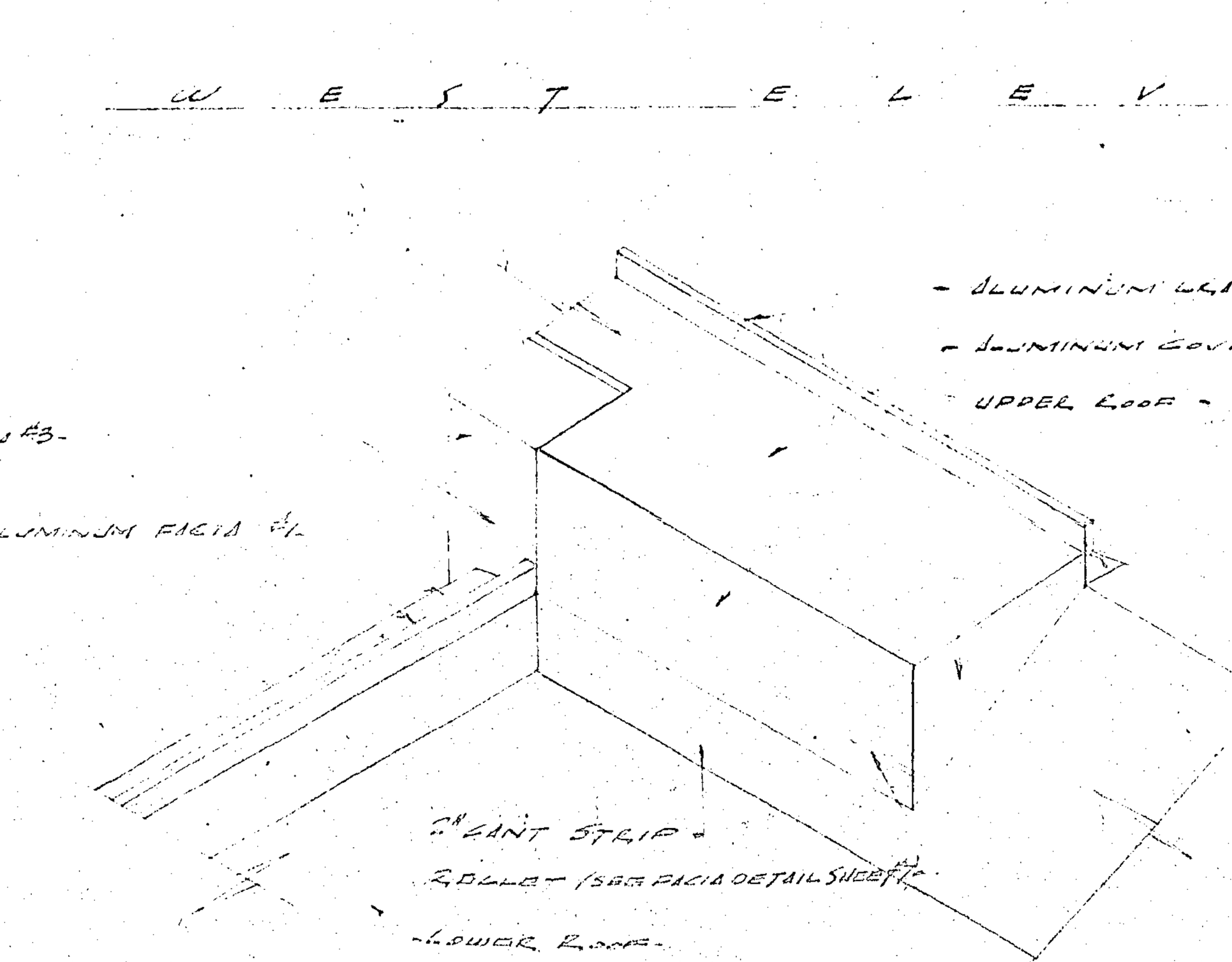
WEST ELEVATION



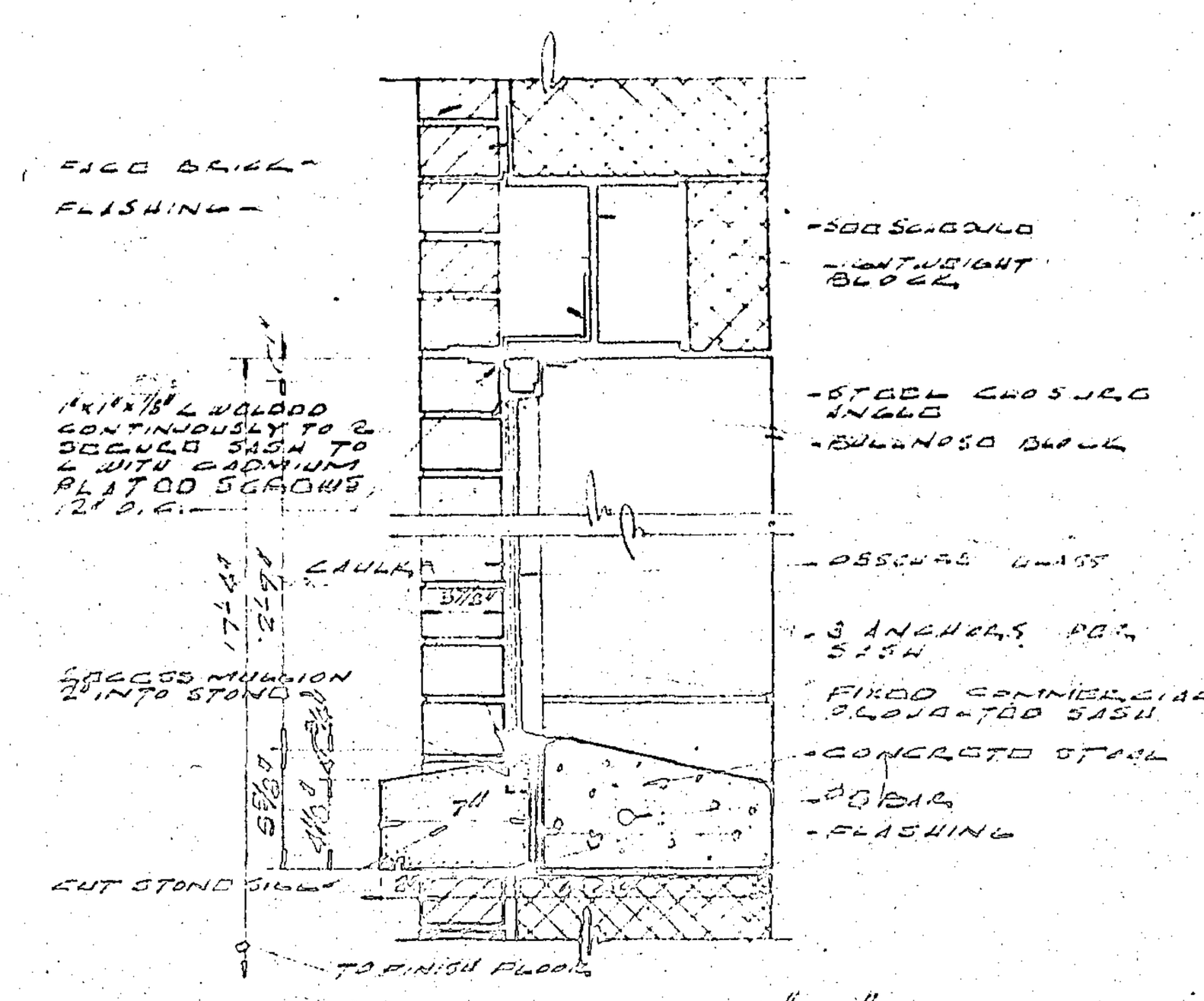
SECTION "H"



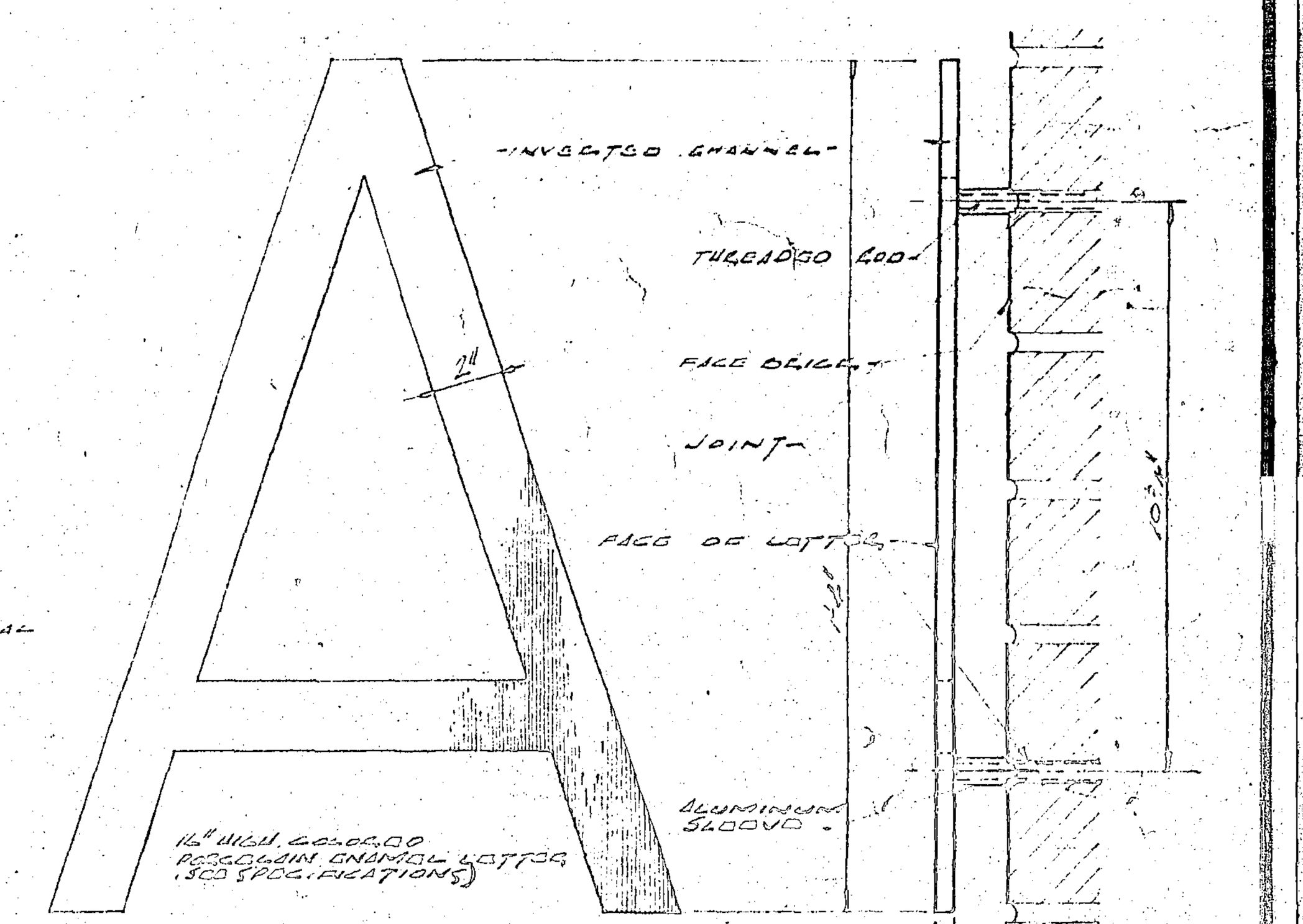
TYPICAL LINTEL DETAIL



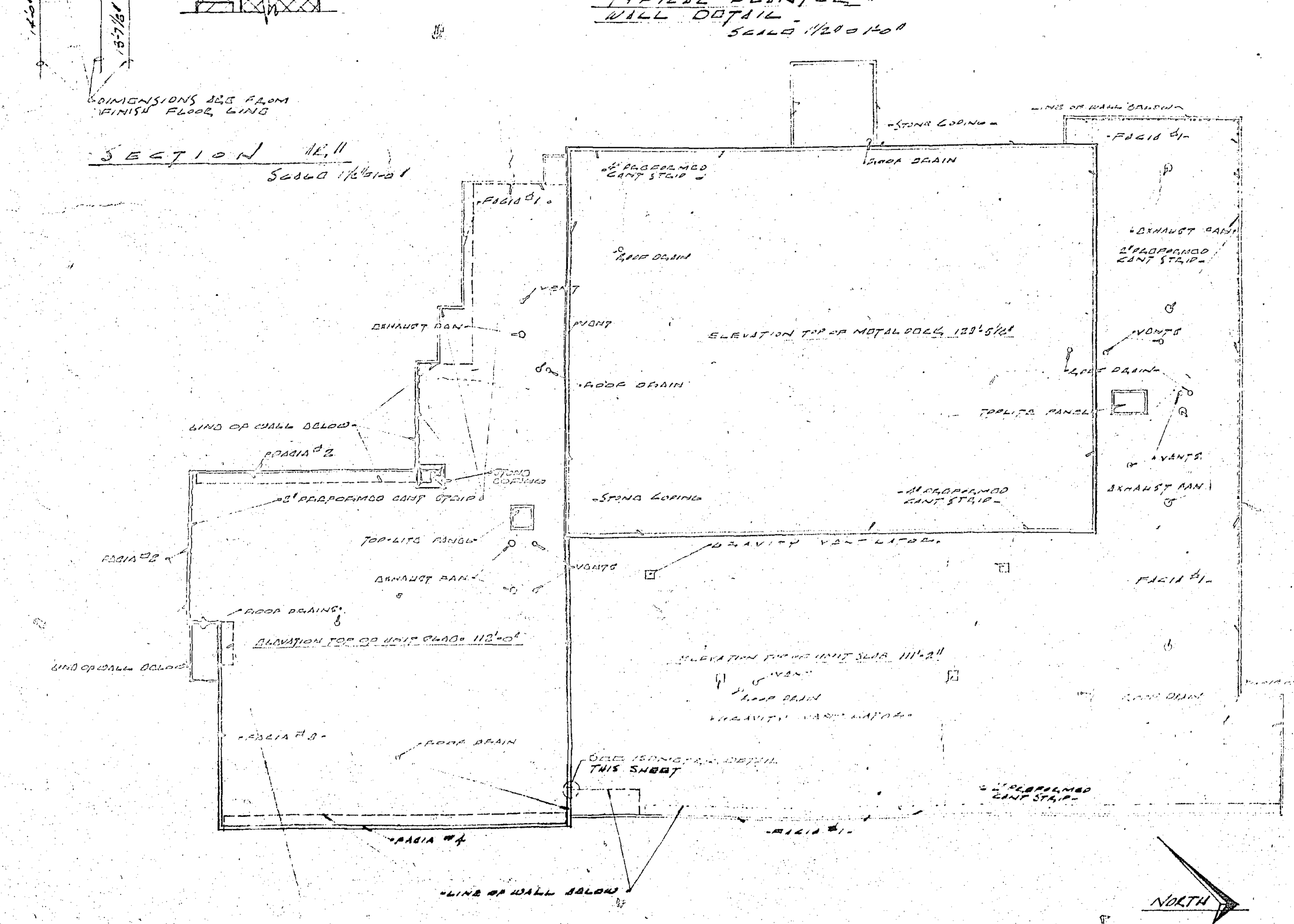
ISOMETRIC OF FACIA JUNCTION OVER FRONT ENTRANCE
NO SCALE



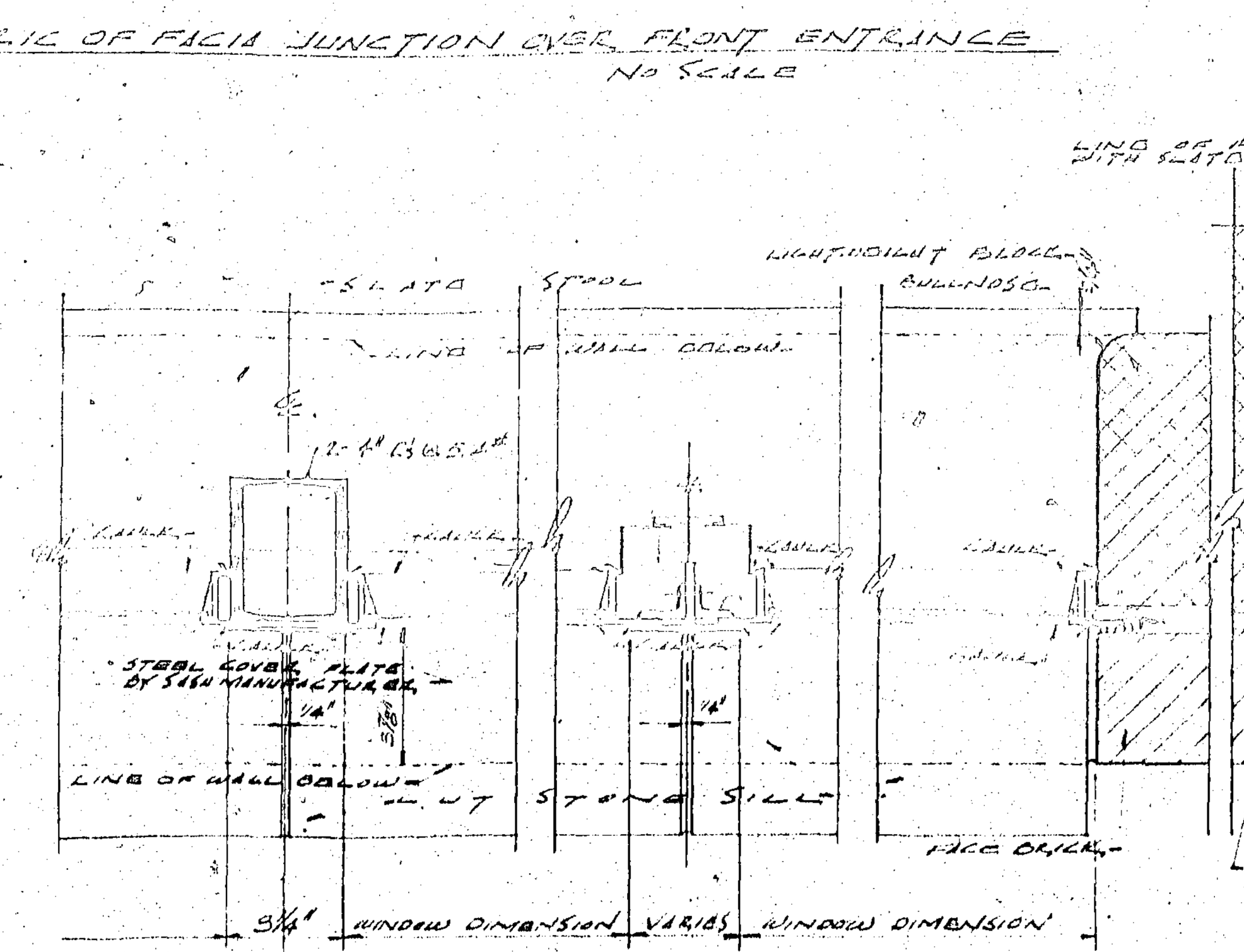
SECTION "G"



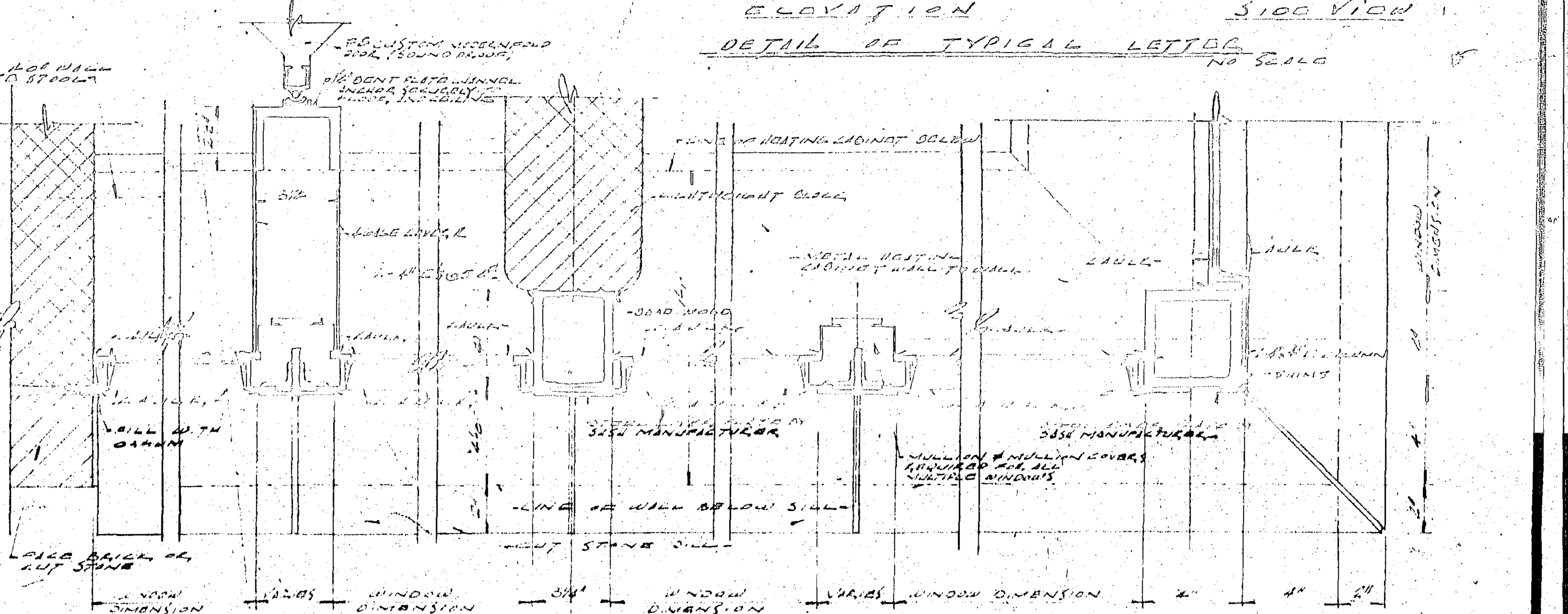
ELEVATION — SIDE VIEW
DETAIL OF TYPICAL LETTER
NO SCALE



ROOF PLAN



COMMERCIAL PROJECTED WINDOW DETAILS



ARCHITECTURAL PROJECTED WINDOW DETAILS

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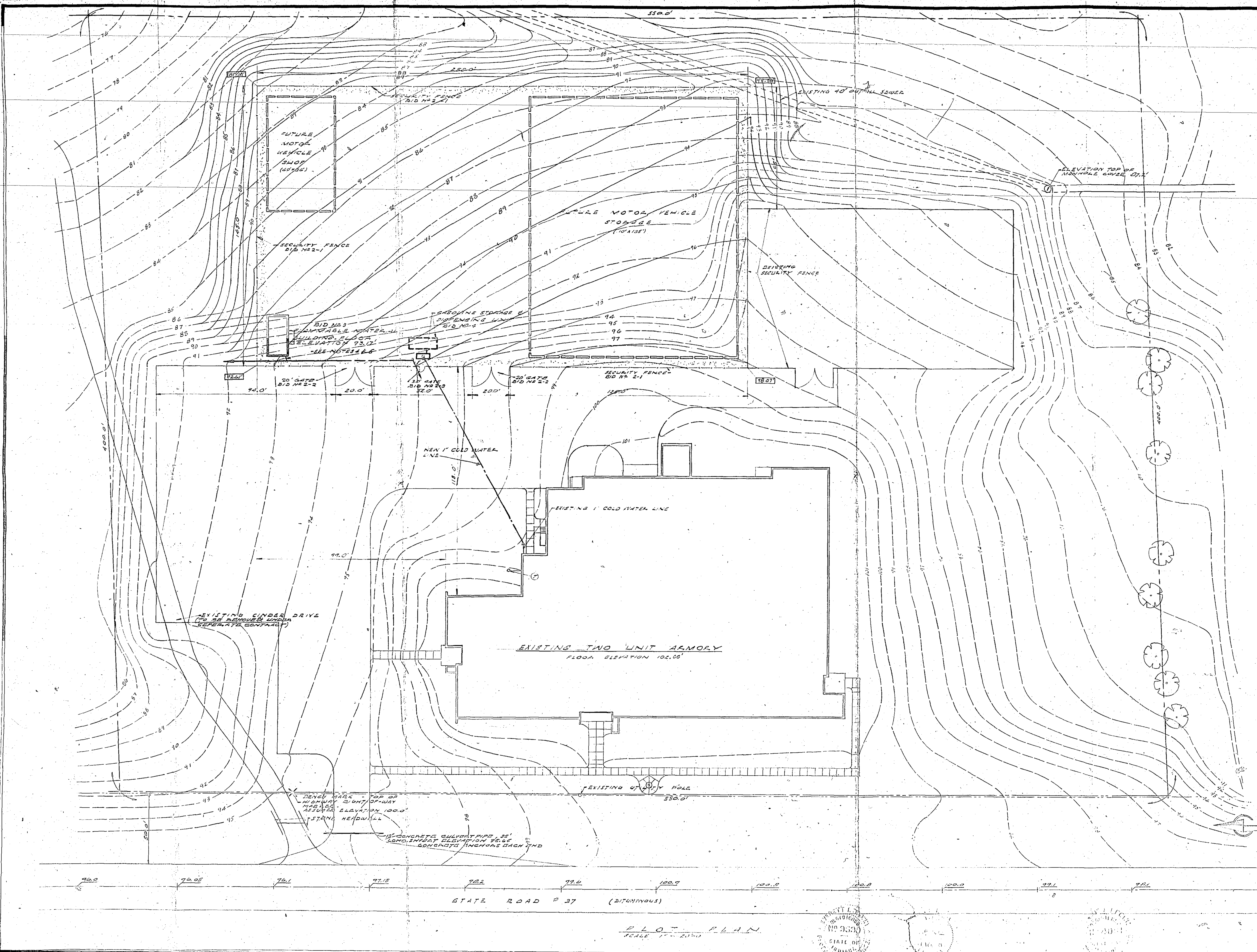
INDIANAPOLIS INDIANA

SHEET 8 OF 13

BLOOMINGTON TWO UNIT ARMORY



PLOT PLAN

SCALE 1" = 20'-0"

BID NOTES

BID No 1

ITEM #1 — EARTHWORK OPERATIONS FOR HARDSTAND AND PIPE CULVERT.

ITEM #2 — STONE IN PLACE FOR HARDSTAND.

BID No 2

ITEM #1 — SECURITY FENCE.

ITEM #2 2-20' GATES.

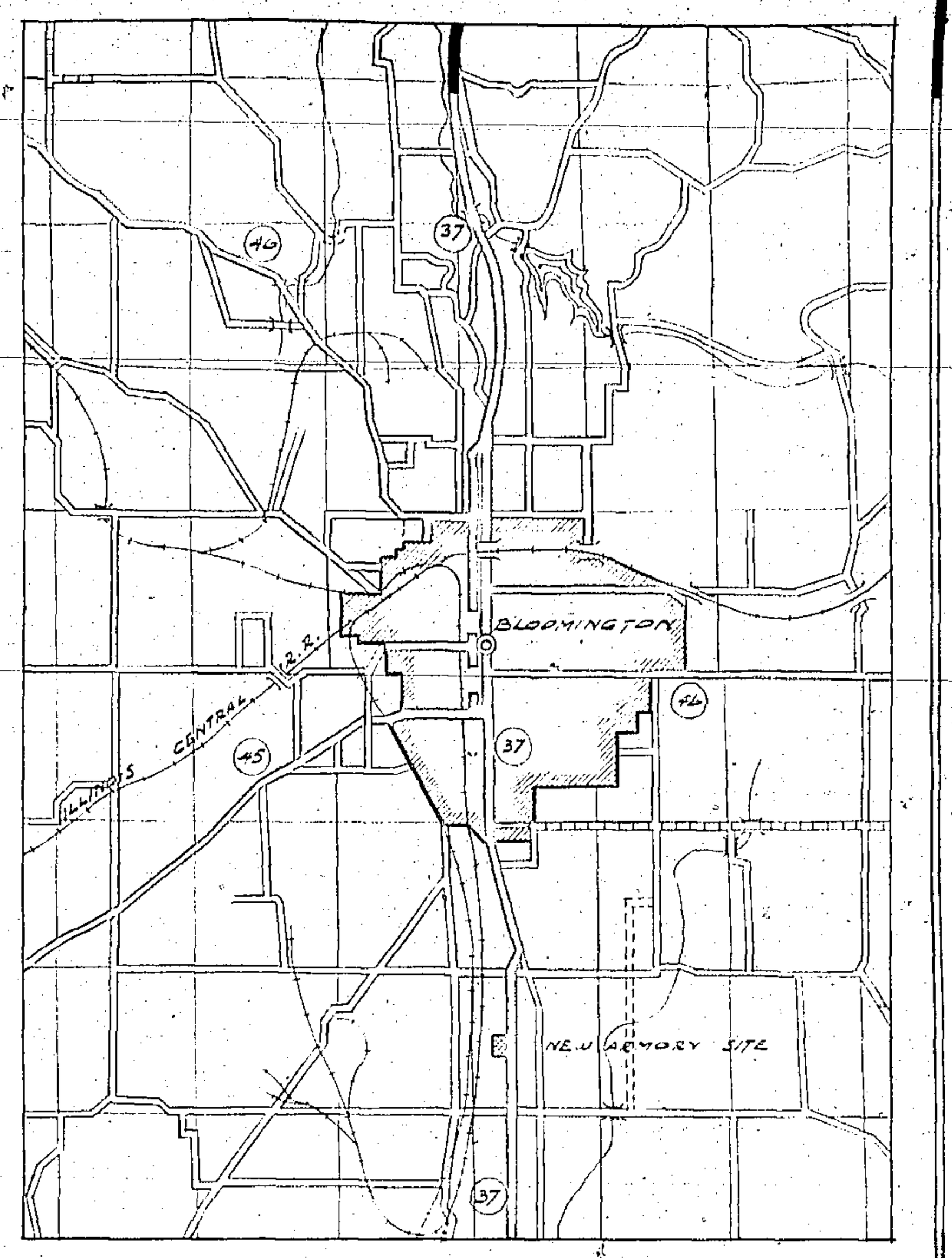
ITEM #3 1-3' GATE.

BID No 3

FLAMMABLE MATERIAL BUILDING.

BID No 4

GASOLINE STORAGE AND DISPENSING UNIT AND WATER LINE.

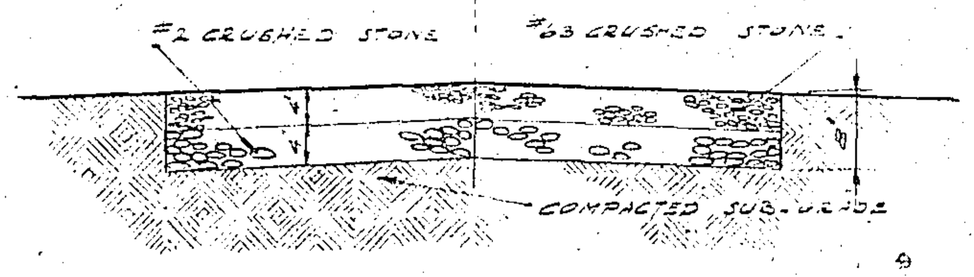


VICINITY MAP BLOOMINGTON NATIONAL GUARD ARMORY

THESE PLANS CERTIFIED BY

Everett I. Brown
EVERETT I BROWN
REGISTERED ARCHITECT NO [illegible]
REGISTERED ENGINEER NO [illegible]

Eugene L. Brown
EUGENE L BROWN
REGISTERED ARCHITECT NO 760
REGISTERED ENGINEER NO [illegible]



SECTION THRU NEW HARDSTAND

NO SCALE

NOTES:

1. HARDSTAND, FLAMMABLE MATERIAL BUILDING, GASOLINE DISPENSING SYSTEM, SECURITY FENCES, AND GATES, AND ALL GRADING, SEEDING AND UTILITY CONNECTIONS INCIDENT TO ABOVE ITEMS ARE IN THIS CONTRACT.
2. ALL ITEMS NOTED AS EXISTING ARE [illegible] UNDER SEPARATE CONTRACT.
3. ANCHOR GASOLINE TANK [illegible] TO SECURITY FENCE.
4. SERVICE DROP TO RISER BY POWER COMPANY. [illegible] AS DIRECTED BY POWER COMPANY.
5. SERVICE RISER BY CONTRACTOR TO HEIGHT AS DIRECTED BY POWER COMPANY.
6. ALL NECESSARY FILL MUST BE OBTAINED AWAY FROM PROJECT SITE.

LEGEND.

— — 90 — —	EXISTING CONTOUR
—— 100 ——	FINISHED CONTOUR
▭	NEW HARDSTAND
✿	EXISTING TREES
100.7	EXISTING ELEVATION
— · —	EXISTING UTILITY LINE
103.0	FINISHED GRADE ELEVATION
——	[illegible] WATER LINE
(T)	TRANSFORMER POLE
— — —	POWER POLE LINE BY PUBLIC SERVICE COMPANY OF INDIANA

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INDIANAPOLIS INDIANA

SHEET 1 OF 2

MOTOR VEHICLE CONCENTRATION SITE BLOOMINGTON, INDIANA